REPORT
TO
THE NATIONAL CAPITAL COMMISSION

PHASE II ENVIRONMENTAL SITE ASSESSMENT UPDATE
16 TAUVETTE STREET
(NCC PROPERTY ASSET #6976)
OTTAWA, ON

Prepared by:

DECOMMISSIONING CONSULTING SERVICES
260 Hearst Way, Unit 512
Ottawa, Ontario K2L 3H1
CANADA

Tel: (613) 230-2405
Fax: (613) 230-1403
E-Mail: engineers@dcsltd.ca
Web Page: www.dcsltd.ca

May 2013

450186

DECOMMISSIONING CONSULTING SERVICES

260 Hearst Way, Suite 512
Kanata, Ontario
Canada K2L 3H1

Tel: (613) 230-2405
Fax: (613) 230-1403
E-mail: engineers@dcsltd.ca
Web site: http://www.dcsltd.ca

450186

31 May 2013

National Capital Commission
202-40 Elgin Street
Ottawa, ON K1P 1C7
Tel: 613-239-5642
Fax: 613-239-5337

Attention: Mr. Guillaume Couillard,
Environmental Advisor

Re: **Phase II Environmental Site Assessment Update**
16 Tauvette Street, Ottawa
Property Asset #6976

Dear Mr. Couillard:

We are pleased to provide you with our report on the Phase II Environmental Site Assessment (ESA) Update of the National Capital Commission's Property Asset #6976 located at 16 Tauvette Street in Ottawa. The investigation was carried out to evaluate current soil conditions at the subject property specifically beneath former buildings and greenhouses as well as beneath the three former aboveground storage tank (ASTs) locations. It is understood that the NCC is interested in determining the suitability of the property for crop production.

Please do not hesitate to contact us if you have any questions.

Yours very truly,

DECOMMISSIONING CONSULTING SERVICES

Troy Austrins, P.Eng.
Project Manager

EXECUTIVE SUMMARY

Decommissioning Consulting Services (DCS) was retained by the National Capital Commission (NCC) to conduct a Phase II Environmental Site Assessment (ESA) Update for the subject property located at 16 Tauvette Street in Ottawa, Ontario (known as Property Asset # 6976). The scope of the Phase II ESA Update was to evaluate the current soil conditions at the subject property, specifically at locations beneath the former building footprint, beneath the location of two former underground storage tanks (USTs), beneath and adjacent to a former buried fuel delivery pipe, within former above-ground storage tank (AST) areas, and an area of potential concern identified by the NCC northwest of the former buildings

The NCC property asset formerly consisted of eight NCC-operated greenhouses and an office structure. The site was operated by the NCC from the early 1970s to the mid-1990s, after which the NCC leased the property to various businesses. The use of the property as a nursery was reported to have been discontinued in the late 1990s or early 2000s. The site buildings and greenhouses were demolished in March 2013. The current site surface conditions were noted to contain miscellaneous debris residuals from the demolition program, including glass, metals, styrofoam insulation, concrete fragments and wood materials.

A Phase I ESA was conducted on the subject property by Environmental Ecological Enterprises (E3) in November 1998. The Phase I ESA identified an area of the site where two fuel-containing underground storage tanks (USTs) had been located. The review of property management files by E3 determined that the USTs had been removed; however there were no reports available that verified the soil and groundwater quality following removal of the tanks.

A Phase II ESA was conducted on the subject property by Intera Engineering Ltd (Intera) in 2005 which focussed on the two former UST areas. The intrusive investigation included seven boreholes advanced within the former UST Area 1, four boreholes advanced within former UST Area 2, and three monitoring well installations. Soils and groundwater significantly contaminated with hydrocarbons were identified in UST Area 1. Hydrocarbon-contaminated soils extended north, east and south of the limits of this former UST location. Concentrations of hydrocarbons in soils and groundwater within former UST Area 2 were reported to be below the then applicable Federal commercial land use guidelines and standards, and were also below the now applicable agricultural land use guidelines and standards. The Intera Phase II ESA recommended additional Phase II ESA work to delineate the extent of contaminated soil and groundwater in former UST Area 1. The reported values from former UST Area 1 were greater than the now applicable Federal agricultural land use guidelines/standards.

A supplemental Phase II ESA was conducted by Intera in 2006 which focussed on delineating the hydrocarbon contamination within former UST Area 1. The supplemental assessment included the advancement of ten boreholes with four additional monitoring well installations. The aerial extent of soil and groundwater contamination using the commercial land use criteria was estimated at approximately 750 m^2. Following the application of current Federal agricultural guidelines and standards to the 2006 reported values, an estimated aerial extent of soil and groundwater contamination was calculated at 850 m^2.

A Screening Level Risk Assessment (SLRA) and Remedial Option Feasibility Study were completed by Intera in 2008. The SLRA comprised a human health risk assessment (HHRA) and an ecological risk assessment (ERA) for the identified contaminants which included benzene, petroleum hydrocarbons (PHC) F1 and PHC F2 for soil. The contaminants of concern for groundwater were identified as PHC F1 to F4. Additional field work conducted in 2008 included advancing 13 boreholes, seven test pits and four monitoring well installations. The additional data obtained from the supplementary sampling and testing further delineated the extent of soil and groundwater contamination, augmented the database of soil and groundwater quality of the site for use in the SLRA and determined that the inferred direction of groundwater flow was north-northeasterly. The SLRA report stated that the PHC and BTEX contamination related to the former UST did not pose any adverse health effects to human or ecological receptors for the then current commercial land use. Monitored natural attenuation was recommended as a possibility for the site.

A Natural Attenuation Monitoring Program was conducted by Stantec Consulting Limited (Stantec) in 2012. The program evaluated the electron donor and metabolic by-product concentrations inside and outside the plume and inferred that natural attenuation may be occurring at the site. The report suggested that the aerial extent of the plume had decreased as compared to 2011. As part of the program, ground water samples were collected from 10 existing wells and water samples were collected from the surrounding catch basins. Stantec recommended that the Natural Attenuation Monitoring Program be continued in 2013 to evaluate the continued effectiveness of this selected remediation approach.

The 2013 DCS Phase II ESA Update program included excavating 18 test pits to a maximum depth of 3.9 m below ground level (bgl). Evidence of hydrocarbons was observed within two areas of the site. The two areas included: beneath the former buried pipeline at the north end of the main building to a depth of 0.8 mbgl; and, within the former UST Area 1. The hydrocarbon contaminants were present within UST Area 1 at depths greater than 0.5 m in TP5 and depths greater than 2.0 m in TP14. No evidence of hydrocarbons was observed within the remaining test pits which included locations beneath former greenhouse and building footprints, beneath

former ASTs, and adjacent to the former buried pipeline. Additionally, no evidence of hydrocarbons was observed within the agricultural field surface samples collected from the area of concern identified by the NCC northwest of the former greenhouse facility.

DCS recommends excavating and off-site disposal as a non-hazardous solid waste of an estimated 25 m^3 of soils along the former buried pipeline which are heavily contaminated with PHCs. It is also recommended that an additional work program be directed to removing the surface debris left over from demolition activities. Following these activities, DCS recommends conducting a Preliminary Quantitative Risk Assessment (PQRA) due to the proposed land use change to agricultural, and continuing the Natural Attenuation Monitoring Program through sampling the groundwater from existing wells at UST Area 1. It is recommended to reinstate any damaged monitoring well installations.

It may be beneficial to conduct a more comprehensive, integrated sampling program for the soils within the fill area zone in order to obtain a detailed view of the soil nutrient status. However, this will be dependent on the method of any site preparation or soil amendments chosen in advance of crop production and the extent and timing of site areas to be converted to agricultural purposes.

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1.0 INTRODUCTION

Decommissioning Consulting Services (DCS) was retained by the National Capital Commission (NCC) to conduct a Phase II Environmental Site Assessment (ESA) Update of the property known as Property Asset #6976 located at 16 Tauvette Street in Ottawa, Ontario. It was understood that the objective of the Phase II ESA Update was to evaluate current soil conditions at the subject property following demolition of former site buildings completed in March 2013. DCS was advised that the NCC is interested in determining if this property is suitable for crop production. Specifically, the scope of the Phase II ESA Update was to:

- Advance test pits in order to evaluate the soil conditions beneath the former NCC greenhouses and building;
- Advance test pits in order to evaluate soil conditions in the vicinity of the former underground fuel piping associated with the former 2,200L above-ground storage tank (AST);
- Advance test pits in order to evaluate soil conditions within the former underground storage tank (UST) area 1 and UST area 2 ;
- Compare soil analytical results with applicable Federal guidelines and standards for an agricultural land use and evaluate agricultural-suitability of soils;
- Provide a Phase II ESA Update report.

The intrusive field investigation involved:

- The advancement of 18 test pits and collection of 79 soil samples;
- Measurement of combustible vapours (excluding methane) from the soil samples collected using an Eagle RKI unit;
- Sampling and analysis of 17 soil samples for petroleum hydrocarbons (BTEX/PHCs) including one duplicate from the former greenhouse facility;
- Sampling and analysis of two soil samples from the former greenhouse facility for crop testing including lime, nutrient requirements, fertilizer/organic matter levels, and crop-specific pH;
- Toxicity Characteristic Leaching Procedure (TCLP) testing of PHC-contaminated soil;
- Sampling and analysis of two samples from the agricultural field northwest of the former greenhouse facility for BTEX/PHCs.

The cornfield sampling was requested by NCC as a trace of sheen was observed by an NCC field officer within an isolated area in the cornfield in late March/early April 2013.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

The subject property is located at 16 Tauvette Street, Ottawa, Ontario, as shown on Drawing 450186-1, in Appendix A. Current City of Ottawa mapping refers to the property as an NCC Nursery. The NCC property asset formerly consisted of eight NCC-operated greenhouses and an office structure. The overall agricultural property is approximately 75 ha in size and was developed by the NCC as a nursery from the early 1970s to the mid-1990s, after which NCC leased the property to various businesses. The use of the property as a nursery was reported to have been discontinued in the late 1990s or early 2000s. The site buildings and greenhouses were demolished in March 2013. It should be noted that the residence and red barn on the adjacent street, Pepin Court, was also previously referenced as associated with the subject property (2389 Pepin Court).

It was reported that of the entire 75 ha parcel, approximately 70 ha were utilized as agricultural land/nursery fields with the remaining approximate 5 ha, located in the southeast corner, developed as a greenhouse facility. In addition to the growing operations, vehicle refueling was conducted at the greenhouse facility. Fuel storage tanks, at first USTs followed by ASTs, were historically present northwest of the main office building. The layout of the former greenhouse facility and location of the former USTs and ASTs are illustrated on Drawing 450186-2 in Appendix A.

From observations made prior to demolition in 2013, the main building was heated using gas-fired boilers and gas-fired ceiling mounted blowers as well as electrical baseboard heaters. A former 900 L fuel storage tank observed inside the Generator Room appeared to be empty (although the gauge read at ⅝ full). In addition, one exterior 2,200 L AST was observed on the middle north side of the main building and was determined to contain 0.96 m depth of diesel product, based on an observation of the gauge. It was inferred that the large AST and interior day tank were used to fuel the on-site generator set. It is understood that the 2013 demolition program included the removal of all existing ASTs.

There is an abundance of building material debris scattered across the surface of the site left over from the demolition activities which include broken glass, broken concrete, pieces of metal, and styrofoam building insulation.

2.2 PREVIOUS ENVIRONMENTAL REPORTING

The NCC provided the following reports to DCS concerning the subject property:

1. *Phase II ESA,* 16 Tauvette Street and 2389 Pepin Court, September 2005, by Intera Engineering Ltd.;
2. *Supplemental Phase II ESA –Former UST Area -16 Tauvette Street* , November 2006, by Intera Engineering Ltd.;
3. *Screening Level Risk Assessment* and *Remedial Options Feasibility Study; 16 Tauvette*, July 2008, by Intera Engineering Ltd.; and
4. *Year 4 Natural Attenuation Monitoring –NCC Property Asset 6976, 16 Tauvette, Ottawa,* July 2012- Stantec Consulting Ltd.

The brief summary below lists the important findings for each environmental study report listed above. The locations of the referenced boreholes and monitoring wells from previous studies are included within the attached site plan, Drawing #450186-2, in Appendix A.

September 2005 Phase II ESA

The September 2005 Phase II ESA was completed in response to recommendations made in a Phase I ESA conducted by Environmental Ecological Enterprises (E3). The Phase I ESA identified the presence of two former UST areas and several areas of surficial soil staining. A review of the property management files conducted by E3 indicated that the tanks had been removed however no reports were available to verify soil and groundwater conditions following removal.

The Intera Phase II ESA included drilling of 12 exterior boreholes and three interior boreholes, installation of three groundwater monitoring wells, and sampling and analysis of soil and groundwater.

Soils encountered on the subject property were primarily clay and sandy gravel fill. Five areas of concern, identified in the Phase I ESA conducted by E3 and during a site visit by Intera personnel, were investigated. The five areas of potential environmental concern (APEC) included:

1. Basement of the residence at 2389 Pepin Court;
2. Surficial staining near the barn;
3. Surficial staining inside the greenhouse near the compressors;

4. Former UST/AST [*UST Area 1*] (identified by E3 in the Phase I ESA) ; and
5. Former UST [*UST Area 2*] (identified by INTERA in the Phase II ESA).

The following observations were made based on the results from the soil sampling completed as part of the 2005 Phase II ESA:

- Soils significantly contaminated with hydrocarbons were identified in UST Area 1. Hydrocarbon-contaminated soils was reported to extend north, east and south of the limits of this former UST locatoin from ground surface to a potential depth of 6 mbgs. A maximum PHC F2 soil concentration of 5,700 ppm was detected at BH2-2 (1.2- 1.8 m depth);

- Although there were minor detected concentrations of hydrocarbons, the soil below the stained area in the basement of the Pepin Court residence were below the then-applicable Federal and Provincial soil standards for a commercial land use (concentrations were also noted to be below agricultural and residential standards, however method detection limits for benzene, toluene, and ethylbenzene were greater than existing criteria for an agricultural land use);

- The soil below the stained areas identified in the cooler rooms of the greenhouse buildings were less than the then-applicable Federal and Provincial soil standards for a commercial land use (concentrations are also noted to be below agricultural standards, however method detection limits for benzene, toluene, and ethylbenzene were greater than current criteria for an agricultural land use);

- Soils in UST Area 2 showed detectable concentrations of hydrocarbons but were at concentrations below applicable CCME and MOE standards for a commercial land use (concentrations were also noted to be below agricultural standards; however, method detection limits for benzene, toluene, and ethylbenzene were greater than current criteria for an agricultural land use);

- A small quantity of contaminated soil was detected at concentrations above the then-applicable Federal and Provincial soil standards (commercial land use) in the area northeast of the barn where surface staining was previously identified. The contamination appeared to be shallow and confined within the soil fill unit;

- A light sheen and hydrocarbon odours were detected during purging of MW1 and MW6 in former UST Area 1. Groundwater sampled from UST Area 1 exceeded the CCME and MOE standards for benzene and the MOE standards for petroleum hydrocarbons (commercial land use). No indication of hydrocarbon contamination was detected during

purging of MW7 in UST Area 2. Based on the groundwater analytical results, no hydrocarbon impact was observed in groundwater at UST Area 2;

- A 2000 L fuel oil AST, containing approximately 1600 L of fuel oil was reported to remain on the site. It was Intera's understanding that the AST had not been used for approximately 10 years. It was stated that the presence of the fuel and unused AST was in contradiction to the Liquid Fuels Handling Code.

Based on the completed Phase II ESA, the following recommendations were provided:

- Additional Phase II work was recommended to delineate the extent of contaminated soil and groundwater in the former UST Area 1. Following soil delineation, contaminated soil was recommended to be excavated and disposed off-site, followed by verification sampling;

- To the northeast of the barn, contaminated soil was identified (formerly identified as surficial staining) and was recommended to be excavated in accordance with best management practices. Based on the photograph provided in the 1998 Phase I ESA, only a limited quantity of contaminated soil was estimated to be present. Excavation, off-site disposal and collection of up to two verification samples was to be completed concurrent with soil excavation at UST Area 1;

- The 2000 L AST containing fuel was recommended to be emptied. All remaining fuel in the underground lines was also to be removed. If the system was no longer needed, the AST and associated piping were to be decommissioned.

November 2006 Supplemental Phase II ESA- Former UST Area

The November 2006 Supplemental Phase II ESA was completed by Intera to provide additional delineation and characterization to augment the previous September 2005 Phase II ESA report. The work scope for the 2006 Supplemental Phase II ESA included the evaluation of underground utility locations, drilling of 10 additional boreholes, installation of four additional groundwater monitoring wells, and sampling and analysis of soil and groundwater.

Soils encountered on the subject property during the supplemental Phase II ESA consisted primarily of grey clay. Sandy gravel fill material was encountered between ground surface (asphalt) and 0.8 mbgs in the general area of former UST Area 1. A thicker layer of sandy gravel fill was encountered in the immediate vicinity of the former UST Area 1.

The November 2006 Supplemental Phase II ESA report contained the following conclusions:

- It was observed that numerous soil samples tested showed obvious impacts from petroleum hydrocarbons in relation to the commercial land-use guidelines. Seven soil samples submitted for laboratory analysis exceeded either the MOE or CCME standards or both for petroleum hydrocarbons and/or BTEX. A maximum PHC F2 soil concentration of 300 ppm was detected at BH16-3 (1.2- 1.8 m depth);

- Groundwater contamination was detected in the former UST Area 1. A hydrocarbon sheen was visible on the water from MW1 and MW6. Benzene, toluene and xylene concentrations exceeded CCME and/or MOE standards in MW6. The MW6 benzene concentration was measured at 8,000 ug/L. PHCs were detected in groundwater from MW1 and MW6 in the F1 (C6-C10), F2 (>C6-C16) and F3 (>C16-C34) ranges. Groundwater samples collected from MW7, MW18, MW19, MW20 and MW21 did not contain detectible PHC or BTEX concentrations;

- The lateral extent of soil and groundwater contamination had been delineated to the west, east and north of the former UST Area 1 and was calculated to be approximately 750 m^2 in area. The thickness of soil contamination in the immediate vicinity of the former UST was estimated to be 4 m (over an approximate area of 400 m^2). The average thickness of soil contamination in the area surrounding the former UST Area 1 excavation was estimated at approximately 2 m (over an approximate area of 350 m^2). The estimated volume of soil contamination was 2,300 m^3 (or approximately 4,600 tonnes);

- It was reported that a small amount of hydrocarbon contamination likely extends below the greenhouse to the south;

- It was recommended that contaminated soil in the vicinity of former UST Area 1 be excavated and disposed of off site at a licensed landfill. During excavation, samples were to be collected to verify that all contaminated soil is excavated. The work scope was to include excavation, transport and disposal of all contaminated soils, including backfilling, surface restoration, verification sampling and report preparation.

The 2006 supplemental Phase II ESA found that the extent of soil and groundwater contamination using the commercial land use criteria was estimated at approximately 750 m^2. Following the application of current Federal agricultural guidelines and standards to the 2006

reported values, an estimated aerial extent of soil and groundwater contamination was calculated at 850 m^2.

July 2008 SLRA and Remedial Options Feasibility Study

Following from the earlier Phase II ESA report of September 2005, Intera was retained by the NCC to complete a Screening Level Risk Assessment (SLRA) and Remedial Option Feasibility Study for the former UST area. The SLRA comprised a human health risk assessment and ecological risk assessment for identified contamination which included benzene, PHC F1 and PHC F2 for soil and PHC F1 to F4 for groundwater. At the time, the NCC property was a vacant commercial greenhouse operation.

The Phase II ESAs conducted on the property in 2005 and 2006 by Intera were referenced within the SLRA and feasibility study. Thirteen additional boreholes were drilled, seven test pits were advanced, and four new groundwater monitoring wells were installed. It was reported that seven pre-existing groundwater monitoring wells were present at the subject property. Storm sewer sampling and floor drain dye tracing was performed. Groundwater well hydraulic conductivity testing was performed.

Supplementary sampling and testing of soil and groundwater were undertaken as part of the SLRA assignment to augment the database of soil and groundwater quality for use in the site study. Chemicals that exceeded the then-applicable CCME and MOE guidelines and standards for commercial land use, fine-textured soils and non-potable groundwater conditions included PHC and BTEX parameters in soil and groundwater. The identified PHC and BTEX contamination was reported to be related to releases from the former UST within UST Area 1. Soil and groundwater contamination was reported to cover a maximum area of approximately 780 m^2 at depths of about 1.0 to 4.0 m below the paved parking lot. The maximum volume of contaminated soil was estimated to be 2,400 m^3.

The maximum soil concentrations for purposes of the SLRA evaluation were found to be 600 mg/kg for PHC F1, 5700 mg/kg for PHC F2, 2000 mg/kg for PHC F3, 30 mg/kg for PHC F4s, 1.9 mg/kg for benzene, 13 mg/kg for toluene, 14 mg/kg for ethylbenzene and 88 mg/kg for xylenes. The maximum groundwater concentrations to be applied for purposes of the SLRA evaluation were 9000 ug/L for PHC F1, 6100 ug/L for PHC F2, 3800 ug/L for PHC F3, 600 ug/L for PHC F4, 8000 ug/L for benzene, 350 ug/L for toluene, <50 ug/L for ethylbenzene and 4200 ug/L for xylenes.

The supplementary site investigation completed for the SLRA including test pit inspection and sampling of storm sewers demonstrated that the extent of PHC and BTEX contamination at the site had been adequately delineated and was contained on site. The bedding backfill of the storm sewer and the storm sewer that transects the area of contamination did not appear to be pathways for off-site migration of PHC or BTEX.

Results of the SLRA indicated that the PHC and BTEX contamination related to the former USTs at 16 Tauvette St. did not pose any adverse health effect to human or ecological receptors for the then current site conditions and land uses, with respect to ongoing commercial operation of the greenhouses.

Given the results of the SLRA and site and contaminant conditions, the recommended risk management approach for this site was to undertake monitored natural attenuation, with re-evaluation of monitoring results at completion of an annual groundwater and storm sewer water monitoring program proposed for five year duration.

Year 4 Natural Attenuation Monitoring; July 2012

Stantec was retained by the NCC to conduct a Natural Attenuation Monitoring program at the 16 Tauvette Street property. The work scope was to evaluate the natural attenuation conditions in the vicinity of the former diesel and gasoline USTs and to investigate the presence or absence of PHCs in the catch basins adjacent to the site.

The monitoring program included the collection of groundwater samples from 10 existing monitoring wells. Testing was conducted for BTEX and PHCs (F1-F4). Four well samples were tested for sulphate and methane as well as for nitrate and ferrous iron. Catch basin water samples were collected from four locations.

The Attenuation Monitoring report inferred that the shallow groundwater flowed in a north to northeasterly direction and ranged in depth from 1.6 to 0.9 m below the top of well riser. PHC odours were encountered at monitoring wells MW1, MW6, MW19 and MW28.

Based on laboratory testing of groundwater samples collected in June 2012, the concentrations of BTEX and PHCs F1 to F4 in nine of the ten monitoring wells were observed to be less than both the commercial land-use criteria listed in the Federal Interim Groundwater Quality Guidelines (FIGQG) and the MOE Table 3 standards. The concentration of benzene in groundwater collected from MW6 was 1940 ug/L in 2012 which was noted to be greater than the MOE Table

3 standard and also greater than the MOE Table 2 standard. MW6 is located within former UST Area 1 as shown on Drawing 450186-2.

Samples obtained from the four storm sewers were noted to have BTEX and PHC (F1-F4) concentrations which met the City of Ottawa storm sewer bylaw and the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life.

The Natural Attenuation Monitoring Program report stated that the aerial extent of the plume may be decreasing based on compared values from 2012 to those reported in 2011. The report also made a comparison of the metabolic by-product and electron donor concentrations both inside and outside the contaminant plume which suggested that natural attenuation had occurred. The assimilative capacity of the groundwater system was calculated to range from 6.7 to 7.99 mg/L. The report stated that the highest concentrations of BTEX and PHCs measured on-site were less than the calculated capacity and thus suggested that the natural attenuation of the contaminants of concern was possible within the contaminant plume area. As a result, the report recommended that the natural attenuation program continue with the next sampling and evaluation to occur in 2013.

Summary - Review of Previous Investigations

All previous studies used the commercial land-use criteria for comparison of analytical data to applicable guidelines and standards for groundwater and soil. In addition, the previous guidelines and standards used in the Phase II ESAs have been superseded by more recent guideline updates. Upon review, the FIGQG agricultural land use guidelines are much more conservative, especially related to BTEX and F2 PHCs in comparison to the commercial criteria. The CCME agricultural soil guidelines are also more stringent as it relates to BTEX and F2 and F3 PHCs. Upon review of the environmental data contained within the preceding reports, Tables 2.1 and 2.2 provide the highest reported values for soil and groundwater using an agricultural land use and fine-grained soil condition for comparison.

TABLE 2.1

HIGHEST REPORTED VALUE FOR SOIL CONTAMINANTS OF CONCERN (COC)

Highest Reported Value			MOE Table 2 Agricultural Standard (ppm)	CCME Agricultural Standard/Guideline (ppm)
CoC	(ppm)	Location/depth/ date		
PHC: F1	600	BH6-2;1.2-2.4m; June 2005	65	210

Highest Reported Value			MOE Table 2 Agricultural Standard (ppm)	CCME Agricultural Standard/Guideline (ppm)
CoC	(ppm)	Location/depth/ date		
PHC: F2	5700	BH2-2; 1.2 - 1.8m; June 2005	150	150
PHC: F3	2000	BH2-2; 1.2 - 1.8m; June 2005	1300	1300
PHC: F4	30	BH3-2; 1.2 – 2.4m; June 2005	5600	5600
Benzene	1.9	BH2-2; 1.2 - 1.8m; June 2005	0.17	0.0068
Toluene	13	BH6-2;1.2-2.4m; June 2005	6	0.08
Ethylbenzene	14	BH6-2;1.2-2.4m; June 2005	1.6	0.018
Xylenes	88	BH6-2;1.2-2.4m; June 2005	25	2.4

TABLE 2.2

HIGHEST REPORTED VALUE FOR GROUNDWATER CONTAMINANTS OF CONCERN

Highest Reported Value			MOE Table 2 All Property types (ug/L)	CCME Agricultural Standard/Guideline (ug/L)
CoC	(ug/L)	Location/date		
PHC: F1	9000	MW6-June2006	750	6500
PHC: F2	6100	MW1-June2006	150	1800
PHC: F3	3800	MW1-June2006	500	NV
PHC: F4	600	MW1-June2005	500	NV
Benzene	8000	MW6-June2006	5	88
Toluene	350	MW6-June2006	24	4900
Ethylbenzene	310	MW6-May2010	2.4	3200
Xylenes	5400	MW6-July2011	300	13,000

Groundwater data from the July 2012 Natural Attenuation report were evaluated and comparisons were made to current applicable guidelines/standards. Previously, the concentrations of BTEX and PHCs F1 to F4 in all ten groundwater samples were observed to be less than the commercial land-use criteria listed in the FIGQG. Using the agricultural land-use criteria under the FIGQG, it was observed that benzene exceeded the FIGQG at MW6 at a concentration of 1940 ug/L (vs. criterion of 88 ug/L). Aside from MW6, the groundwater concentrations of BTEX and PHCs in all other monitoring wells were generally below the

laboratory detection limit. All BTEX compounds in groundwater at MW6 were observed to exceed the provincial Ontario Table 2 standards.

2.3 REGIONAL GEOLOGY AND HYDROGEOLOGY

The surficial geology in the region consists generally of Post-Champlain Sea Deposits. In particular, medium grained stratified sand with some silt; in the form of fluvial terraces and channels cut in marine clay, and bars and spits within abandoned channels (Geological Survey of Canada, Map 1506A). Bedrock in the area consists generally of Billings formation of black shale with some brown shale (Geological Survey of Canada, Map 1508A).

2.4 ENVIRONMENTAL STANDARDS SELECTION

Previous environmental studies had applied the commercial land-use to the subject property. Final demolition of all site buildings occurred in March 2013. DCS was advised that the intent is to transfer the subject property to an agricultural land use. DCS therefore compared analytical results to agricultural standards.

DCS compared soil analytical results to:

- Canadian Council of Ministers of the Environment (CCME, 1999 with updates to 2013): *Canadian Environmental Quality Guidelines, Soil Quality Guidelines for the Protection of Environmental and Human Health* (Agricultural Land Use, Fine and Coarse Textured Soil);
- CCME (2008a): *Canada-Wide Standards for Petroleum Hydrocarbons in Soil,* Soil Criteria for Agricultural Land Use; and
- Ontario Ministry of the Environment (MOE, April 2011), *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act,* Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition (Agricultural or Other Property Use);

Application of agricultural land use guidelines/standards to the site was based on the report that the property is to revert to agricultural purposes. Soils at the site are predominately clay at depth overlain by sand and fill or topsoil, invoking use of guidelines/standards for both fine and coarse textured soil. Reference was made to the MOE Table 2 Standards as the agricultural lands will likely not be served by municipal water supply and the fact that the Table 3 Standards do not provide any agricultural-specific criteria.

3.0 PHASE II ESA UPDATE SITE ACTIVITIES

3.1 SOIL SAMPLING

On 24 April 2013, test pits TP-1 to TP-15 were advanced using a rubber-tired 580 Case backhoe (mobilized from H. Ken Brown Excavating) to a minimum depth of 1.2 m and to a maximum depth of 3.9 m. Test pits were advanced in order to evaluate the soil conditions within UST Area 1, adjacent to the former buried pipeline, from within building and greenhouse footprints, from beneath three former ASTs, as well as a general evaluation of the soil conditions across the property. A site plan showing test pit locations is presented as Drawing 450186-2, found within Appendix A. Photographs of site activities are presented as Appendix C. Descriptions of the soil stratigraphy are presented in the test pit logs attached as Appendix D.

On 19 March 2013, during demolition activities (undertaken by Michanie Construction Inc.), three test pits were advanced using a tracked excavator under supervision of DCS staff, namely the test pits referred to as TP-Pipe Start, TP-Pit, and TP-16. On 29 April 2013, two surface samples were collected by DCS staff using a hand shovel within the agricultural field located northwest of the former greenhouse facility to evaluate the PHC sheen as reported by NCC staff.

The rationale for the test pits is presented below in Table 3.1.

TABLE 3.1
PHASE II ESA UPDATE - RATIONALE FOR TEST PITS

Test Pit ID	Rationale
TP-1	To evaluate soil conditions beneath former buildings; 1 of 4 from greenhouse footprint (GH1).
TP-2	To evaluate soil conditions beneath former buildings; 2 of 4 from greenhouse footprint (GH4).
TP-3	To evaluate soil conditions beneath former buildings; 3 of 4 from greenhouse footprint (GH7).
TP-4	To evaluate soil conditions beneath former buildings; 4 of 4 under greenhouse (GH8).
TP-5	To evaluate natural attenuation from the middle of UST 1 Area, at former UST location.
TP-6	To evaluate soil conditions beneath a former AST (1 of 3), within UST 1 Area.
TP-7	To delineate the area of the former buried pipeline, south of TP-Pipe Start, 1 of 3 from main building footprint.

Test Pit ID	Rationale
TP-8	To evaluate soil conditions beneath a former AST (2 of 3) and to delineate the area of the former buried pipeline. Located north of TP-Pipe Start, at former 2200 Litre AST location.
TP-9	To evaluate soil conditions beneath a former AST (3 of 3) and to delineate the area of the former buried pipeline. Located within the main building, south of pipe end, at 900 Litre AST location, 2 of 3 from main building footprint.
TP-10	To delineate the area of the former buried pipeline, north of pipe end (2 of 3 in main building footprint).
TP-11	To confirm the absence of PHCs within former UST Area 2
TP-12	To evaluate soil conditions beneath former buildings (3 of 3 from main building footprint).
TP-13	To evaluate soil conditions northeast of former UST Area 2. To evaluate topsoil conditions from the grassed area adjacent to the former main building footprint.
TP-14	To evaluate natural attenuation within former UST Area 1. Located northeast of the former UST.
TP-15	To confirm the absence of PHCs northeast of the former UST Area 1
TP-16	To evaluate soil conditions at east end of site. Located east of former main building.
TP-Pipe Start	To evaluate soil conditions beneath the former buried fuel pipe, located at the start of the pipe, south of the 2200 L AST.
TP-Pit	To evaluate soil conditions beneath the former buried pipe, located along the former buried fuel pipe.
Cornfield	To evaluate soil conditions northwest of the greenhouse facility in the cornfield at an area identified by the NCC. Only shallow surface soil samples were to be collected from this location using a hand shovel.

One soil sample from each of TP2 and TP11 was secured for general soil analysis referred to as crop testing. The samples were submitted to Exova, an Ontario Ministry of Agriculture and Food (OMAFRA) accredited laboratory. The soil samples were tested for parameters such as crop-specific pH, lime, nutrient requirements, and fertilizer/organic matter levels.

Soil conditions were reviewed during site work in order to evaluate the current site conditions. Soil samples from the advancement of the test pits were screened in the field for combustible vapours (excluding methane), using an Eagle RKI-1 instrument. The vapour readings are included within the test pit logs.

All new test pit locations were accurately measured by DCS staff using a Garmin GPS unit, as shown on Table 3.2 below.

TABLE 3.2

GPS COORDINATES OF TEST PITS

Test Pit ID	Northing	Easting
TP1	45.42942	75.57430
TP2	45.42923	75.57479
TP3	45.42908	75.57507
TP4	45.42924	75.57519
TP5	45.42942	75.57536
TP6	45.42950	75.57558
TP7	45.42946	75.57478
TP8	45.42952	75.57492
TP9	45.42953	75.57461
TP10	45.42962	75.57466
TP11	45.42970	75.57480
TP12	45.42975	75.57462
TP13	45.42984	75.57471
TP14	45.42958	75.57545
TP15	45.42970	75.57525
TP16	45.42976	75.57455
TP Pipe Start	45.42954	75.57481
TP Pit	45.42955	75.57475
Corn Field Samples	45.42960	75.57753

*All measurements are within ± 3m

Soil samples were collected using a hand trowel. Sampling tools were thoroughly cleaned between each sampling event to avoid cross contamination. Sterile nitrile gloves were also employed during each sampling event to prevent cross contamination between samples. Recovered soil samples were retained in clean laboratory-supplied glass jars corresponding to the analysis required. The following typical sampling jar collection protocol was used during this investigation:

- 1 x 120 ml jar (F1-F4 PHCs, BTEX);
- 1 x plastic bag

The collected soil samples were examined in the field using visual and olfactory methods. The sample placed in the plastic bag was subjected to soil vapour screening using an RKI Eagle-1 unit in methane elimination mode. The RKI Eagle-1 provided soil vapour screening data based on its LEL/PPM catalytic sensor. Based on these initial parameters, samples were selected for

analysis and transferred under Chain of Custody to the analytical laboratory. Duplicate samples were submitted for QA/QC purposes.

3.2 SUBSURFACE CONDITIONS

The subsurface conditions comprised sandy gravel fill material, which was encountered between ground surface and 0.5 mbgs. Beneath the fill, a damp to moist brown to grey sand layer was observed with varying amounts of silt. The subsurface soil conditions, as encountered in the test pits completed during the current investigation, are documented in the detailed logs provided in Appendix D.

Summarized descriptions of the soil horizons encountered in the test pits completed in the current investigation are provided in the following sections. The reader is cautioned that conditions may vary between and beyond sampling locations.

3.2.1 Fill Soils

Typically, within the building, greenhouse and asphalt areas, the upper 0.5 m soil horizon consisted of a sand and gravel fill with traces of silt. The sand and gravel fill layer was typically damp to moist, light grey to brown. The fill soils in the demolition area contained building materials such as broken glass, pieces of metal such as wire and framing, pieces of styrofoam, and broken concrete.

No hydrocarbon odours, staining or elevated hydrocarbon vapour readings were noted in the fill layer within any of the test pits.

3.2.2 Native Soils

3.2.2.1 *Sand*

Native sand was typically encountered beneath the fill. The sand was light to dark brown, occasionally grey or black. This layer was typically damp to moist.

No hydrocarbon odours, staining or elevated hydrocarbon soil vapour readings were noted in the native sand within most of the test pits. There was, however, an odour and vapour reading of 100 ppm in TP5, located within former UST Area 1, between 0.5 and 0.6 m depth below grade (mbg) and from 1.0 to 1.1 mbg.

3.2.2.2 *Silt*

Native silt was encountered beneath the sand layer at several of the test pits. The silt was grey to brown in colour and contained varying amounts of sand. This layer was typically damp to moist.

3.2.2.3 *Clay*

A grey damp clay was encountered in TP5 and TP14 within former UST Area 1. In this layer, at both test pits, a hydrocarbon odour was detected. Soil vapour readings ranged from 230 ppm to 6400 ppm in TP5, and between 30 ppm and 540 ppm in TP14.

3.2.3 Bedrock

No bedrock was encountered.

3.3 GROUNDWATER CONDITIONS

Sampling of groundwater was beyond the scope of the present study, although DCS staff confirmed that of the ten originally installed monitoring wells, three monitoring wells (MW21, MW28, and MW34) were located and were intact / available for sampling purposes. Water levels were recorded for MW21 at 1.3m below grade, for MW28 at 0.7m below grade, and at MW34 at 0.73m below grade. No PHC odour was detected in any of these three monitoring wells.

Monitoring wells MW1 and MW24 were found but the well casing could not be opened to verify whether the well was functional. Both wells will require further investigation and perhaps repair to return to functional status. Monitoring well MW18 was observed to have a broken protective casing and it was inferred that the PVC riser may be broken as well. MW18 may not be salvageable.

Based on preliminary site review, the other four pre-existing monitoring wells (MW6, MW19, MW20, MW31) could not be located and were assumed to be damaged as a result of the building demolition program.

3.4 SOIL ANALYSIS RESULTS

Environmental soil samples were selected for testing on the basis of vapour loading, observation of staining in soils, olfactory evidence and to establish soil conditions in certain areas.

The RKI Eagle-1 was used to provide soil vapour screening data based on the PPM catalytic sensor. The maximum reading using this sensor on all soil samples obtained was found to be 6400 ppm in a sample from TP5 (TP5 SA6). Only 2 test pits (TP5 and TP14) encountered vapour readings above 0 ppm. A summary of soil vapour readings is provided in the test pit logs found in Appendix D.

The soil samples from the field program were transported by DCS staff to Exova Laboratories Ltd. in Ottawa, Ontario, under Chain of Custody protocols for chemical analysis. The Exova facility is a commercial facility that is accredited by the Canadian Analytical Laboratories Association (CALA). Certificates of Analysis are provided in Appendix E. The results of the analyses are presented in the following tables:

- **Table B.1: Results of Analyses for BTEX and PHCs in Soil**; Fifteen soil samples, including 1 duplicate, were analyzed for the presence of benzene, toluene, ethylbenzene and xylenes (BTEX) as well as F1 to F4 petroleum hydrocarbon (PHC) parameters (in addition to one field blind duplicate soil sample). Two additional soil samples were submitted in March 2013 following building demolition and two other soil samples from the cornfield were submitted at end of April 2013;
- **Table B.2: Results of Analyses for Agricultural Soil Chemistry;** Two soil samples were analyzed for the presence of Manganese, Zinc, Calcium, Potassium, Magnesium, Sodium, Phosphorus as well Organic Matter and soil pH.

The applicable environmental quality criteria and/or standards that are used for the numerical comparison are included in the Tables, and bold text is used to indicate where a guideline/standard has been exceeded.

A soil sample was also secured for Toxicity Characteristic Leaching Procedure (TCLP) analysis, as obtained from the east end of the buried diesel piping in March 2013. The soil was classified as a non-hazardous solid waste. The TCLP Certificates of Analysis are provided in Appendix E.

3.5 QUALITY ASSURANCE / QUALITY CONTROL

3.5.1 DCS' Field & Analytical Quality Assurance and Quality Control Program Outline

Soil samples were retrieved within the field in adherence to DCS' *Standard Field Sampling Procedures* which were developed in accordance with the CCME *Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites*.

3.5.2 Laboratory Quality Assurance and Quality Control

All soil samples were submitted to the testing laboratory via a Chain Of Custody Record documenting the time and date the sample was collected, the requested analysis as well as the time, date and temperature the samples arrived at the laboratory. All certificates of analysis or analytical reports received have been included in full within Appendix E.

Duplicate samples were obtained in accordance with regulations and the relative percent difference (RPD) was calculated for the duplicate and original samples. Duplicate samples were submitted for analysis at a minimum frequency of one duplicate for every ten samples submitted. The QA/QC precision is determined by the relative percent difference (RPD) between the set of duplicate soil or groundwater samples and is calculated as follows:

$$RPD = (X1 - X2) \ / \ X_{avg}$$

where: $X1$ = concentration of original sample
$X2$ = concentration of duplicate sample
X_{avg} = average concentration of original and duplicate sample

The RPD values for homogeneous samples are generally considered acceptable in laboratory QC if they are less than 30%. The relative percent difference (RPD) was calculated for the duplicates and the original soil samples. RPD values are typically not calculated unless the average recorded concentration was greater than 5 times the method detection limit (MDL).

The maximum RPD calculated for the soil collected from the sample and its duplicate, as listed in the PHC and BTEX in Results of Analysis Summary Table (Table B.1) was found to be 45% for Ethylbenzene and 77 % for PHC F1 when comparing sample TP5 SA6 and its duplicate. The other parameters had RPD values less than 30%. It is inferred that the heterogeneous distribution of the contaminants within the silty clay contributed to this result. Overall, the results were considered acceptable as all of the concentrations which exceeded standards in the original sample also exceeded standards in the blind duplicate sample.

The surrogate recoveries reported on the laboratory certificates were also examined to ensure that the percentage recoveries fell within the laboratory's stated acceptable range. Furthermore, the data reported on the laboratory certificates were studied to determine that the results returned were generally of the magnitude expected, based on examination of the recovered samples and

the site history. It has been concluded that the laboratory test results were representative of the environmental quality of the soils at the site for the locations tested and on the sampling date.

Decision making was not affected by the QA/QC results and the overall objectives of the investigation and the assessment were met. All soil results reviewed by DCS were within the control limits specified by the labs and therefore deemed to be accurate and reliable.

4.0 DISCUSSION

4.1 SOIL CONTAMINANTS

The soil sample laboratory results for PHC/BTEX are summarized in Table B.1, with comparisons to the Canadian Soil Quality Guidelines (CSQG) for the Protection of Environmental and Human Health (CCME, updated 2013) for an agricultural land use, and Canada-Wide Standards for Petroleum Hydrocarbons in Soil, Soil Criteria for Agricultural Land Use (CCME, 2008a) as well as the MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Table 2 Full Depth Generic Site Condition Standards in a Potable Ground Water Condition; Agricultural or Other Property Use (revised 15 April 2011).

Concentrations of both BTEX and PHCs were detected in nine of the soil samples analyzed at levels greater than the laboratory method detection limit; and five of these samples exceeded either MOE or CCME guidelines and in some cases both, listed as follows:

- one sample exceeded both the CCME and MOE guideline for Benzene (TP14 SA8) at a concentration of 0.226 mg/kg (vs. CCME guideline of 0.0068 mg/kg);

- four samples exceeded the CCME guideline for Ethylbenzene (TP5 SA3; TP5 SA3; TP5 SA6 (not including its field duplicate DUP A); TP14 SA8); one of these samples also exceeded the MOE guideline (TP5 SA6; (not including DUP A)). It should be noted that DUP A is a field blind duplicate of sample TP5 SA6. The maximum ethylbenzene concentration detected was 4.69 mg/kg (vs. CCME guideline of 0.018 mg/kg);

- one sample exceeded both the CCME and MOE guideline for PHC F1 hydrocarbons (TP5 SA6); and one other sample exceeded only the MOE guideline (TP5 SA3 (not including sample DUP A)). The maximum concentration of PHC F1 detected was 360 mg/kg (vs. CCME guideline of 210 mg/kg) in sample TP5 SA6;

- one samples exceeded both the CCME and MOE guideline for PHC F2 hydrocarbons (TP5 SA6 (not including duplicate DUP A)). The maximum concentration of PHC F2 detected was 490 mg/kg (vs. CCME guideline of 150 mg/kg).

The hydrocarbon contaminants were present at depths greater than 0.5 m in TP5 and depths greater than 2.0 m in TP14.

DCS staff attended at the subject property on 19 March 2013 to review demolition activities undertaken by Michanie Construction Inc. On that date, the demolition crews were removing a length of buried fuel piping containing diesel. The length of diesel pipe running underground was measured to be 20 to 25 m and was oriented in an east-west direction just south of the north wall of the main building. The depth to grey clay was measured to be 1.3 m below grade. A surficial soil fill consisting of coarse gravel and sands to approximate 0.5 m depth was found above a brown clayey silt to silty clay soil at which point it transitioned to a grey clay by 1.3m depth. DCS was advised by the demolition contractor that the buried fuel pipe was very old and that the diesel leak likely pre-dated the hookup of natural gas to the site. The pipe line contained diesel and approximately 0.5 L of diesel fuel was accidentally spilled during the removal of one segment of the pipe. The AST contained >80 L of diesel at time of decommissioning. Strong diesel odours were detected in soil beneath the old diesel pipe and soil staining was observed. Two soil samples were submitted for PHC/BTEX testing and one for waste characterization TCLP analysis by DCS on 19 March 2013. The 'Pit' sample was taken as representative of soil stockpile excavated from the test pit at the end of the fuel pipe run while the 'Pipe Start' sample was taken from immediately beneath the fuel pipe bedding near where the pipe entered the ground and adjacent to the AST location. The TCLP analysis confirmed that the soil could be classified as a non-hazardous solid waste and disposed of at a licensed landfill.

The soil sample taken from beneath the fuel pipe had PHC/BTEX concentrations at 0.7 m depth as listed below:

Soil Concentration (ug/g)	**Sample "Pipe Start" (0.7m depth) - 19 March 2013**	**Sample "Pit" (0.8m depth) - 19 March 2013**	**CCME/CWS Guideline (Agricultural)**
PHC: F1	**973**	< 7	210
PHC: F2	**4460**	44	150
PHC: F3	**3800**	169	1300
PHC: F4	< 6	31	5600
Benzene	**0.38**	< 0.002	0.0068
Toluene	**6.46**	< 0.002	0.08
Ethylbenzene	**8.1**	< 0.002	0.018
Xylenes	39.7	< 0.002	2.4

Aside from F4 PHC, it was noted that the soil bedding beneath the former fuel pipe at a depth of 0.7 mbgs exceeded the applicable CCME BTEX and PHC soil guidelines. However, the soil in the vicinity of the "Pit" sample was noted to meet all agricultural CCME soil guidelines.

Soil samples collected on 29 April 2013 from two surface locations within the agricultural field located northwest of the former greenhouse facility did not contain PHC or BTEX concentrations greater than either the federal or provincial standard/guidelines.

4.2 AGRICULTURAL SOIL CHEMISTRY

Samples were collected for agricultural nutrient analysis from two test pits on the subject site. The samples were submitted to Exova Laboratories of Ottawa. These samples represent the disturbed fill area upon which the greenhouses and main building rested (TP2) and the less disturbed, grassed area surrounding the former built area (TP11). The analytical results for the samples collected from the top approximately 30 cm of the soil profile are presented in Table B.2 and their relevance to future agricultural crop production is discussed below. Reference was made to Ontario Ministry of Agriculture and Food documentation for determining suitability of site soils for agricultural uses.

4.2.1 Grassed Areas

For the grassed areas, the nutrient content and availability is generally considered adequate for growing of most crops. The organic matter content and cation exchange capacity (CEC) of this soil will provide good moisture and nutrient holding capacity. The soil charge, indicated by pH, is slightly more basic than considered ideal growing condition for most crops. This condition is acceptable, however, and will be mitigated over time with the expected addition of organic material as amendment with future planting.

The macronutrient levels for phosphorus (P) and potassium (K) at TP11 are generally adequate for most crops, with potassium having the potential to be slightly low for plant use. The basic nature (pH above 7) and high calcium content may begin to tie up phosphorus and potassium, respectively, making them slightly less available for plant take up. The third main macronutrient, nitrogen, was not analyzed but is expected to be available at a level to support plant growth based upon the organic matter content. Upon initiation of plant production, the level of organic matter is expected to be increased by amendment. This will result in an increased amount of soil nitrogen available for plant use, as well as an increase in P and available K.

The level of soil magnesium (Mg) at the vegetated TP11 site is also good for support of healthy plant growth. Finally, the levels of micronutrients, zinc and manganese, are also available in this soil at levels considered adequate for most crops.

4.2.2 Fill Areas

For the TP2 soil sample location, the results are reflective of the disturbed nature of the site it is meant to represent. The soil was a coarse grained “fill” type medium that had been mixed with vegetative material. The organic matter (OM) content of this sample was much higher than expected, likely due to the mixing of various soil substrates. As a result, the cation exchange capacity for this soil is slightly higher than the undisturbed TP11 site because of the higher OM content. Although the soil pH is more desirable for plant growth at a neutral level of 7, the macronutrient levels of P and K are low for plant use. The level of soil Mg is also low. The availability of K and Mg for plant growth will be further restricted by the high availability of calcium (Ca). Mn and Zn levels are adequate, tending towards low, for growth of most crops. Use of the soil at TP2 as a food growing medium must also consider the results of the soil contamination levels discussed in Section 4.1 of this report, as well as the scattered debris as noted in Section 3.2.

The level of soil sodium (Na) is low and will not impact upon plant growth at either site. The soil analytical results for the two soil test pit locations sampled and discussed above are offered as a preliminary indication of agricultural crop production on the Tauvette site. Prior to soil preparation and planting, it may be required that a more comprehensive, integrated sampling program for the soils be conducted in order to obtain a detailed view of the soil nutrient status across the fill area zone.

A summary of laboratory findings is presented on Tables B1 and B2. Copies of all laboratory certificates (including TCLP data) are appended within Appendix E.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the investigation, the following conclusions have been drawn:

5.1 BUILDING AND GREENHOUSE FOOTPRINTS

- No evidence of PHC or BTEX contamination was found in the footprints of the former greenhouses. Based on sampling from TP4, no hydrocarbon contamination was found to extend below the former greenhouse to the south of former UST Area 1;
- PHC and BTEX contamination was not encountered beneath the former building footprint apart from directly underneath the former buried pipeline;
- No evidence of PHC or BTEX contamination was found in the footprints of the former ASTs installed within and adjacent to the main building;
- There is an abundance of building material debris scattered across the surface of the site left over from the demolition activities which include broken glass, broken concrete, pieces of metal, and styrofoam building insulation.

5.2 FORMER BURIED FUEL PIPE

- PHC and BTEX contamination was found in the surficial soil beneath the former buried fuel pipe associated with the former 2,200 L AST, as represented by the 'Pipe Start' soil sampling location;
- No evidence of PHC or BTEX contamination was found in test pits adjacent to the former buried pipe;
- The volume of PHC-contaminated soil is estimated to be 25 m^3 based on 1.0 m width, 1.0 m depth, and 25 m length, at a minimum. It is expected that PHC soil contaminants will extend beyond this volume delineation in low concentrations.

5.3 FORMER UST AREA 1

- Evidence of PHC and/or BTEX contamination was found in two of the test pits sampled (TP5 and TP14) within UST Area 1. TP5 soil exceeded federal guidelines for ethylbenzene, and PHCs F1 and F2. TP14 exceeded federal guidelines for benzene and ethylbenzene. This contamination is likely related to the former UST Area 1, as previously reported;
- The depth of the impacted soil in former UST Area 1 is below 0.5 mbgs depth in TP5 and below 2.0 mbgs in TP14;
- No evidence of PHC or BTEX soil contamination was found in TP6, which was underneath a former AST location adjacent to the UST Area 1;
- The July 2012 Natural Attenuation Monitoring Program report inferred that natural attenuation may be occurring at the former UST Area 1;

- Three previously installed monitoring wells (MW21, MW28, and MW34) were located and were confirmed to contain groundwater. The remaining monitoring wells were assumed to have been damaged and/or covered during demolition activities.

5.4 CORNFIELD SAMPLES

- No evidence of PHC or BTEX soil contamination was found in the two samples collected from the cornfield to the northwest of the former greenhouse facility. Hence, the trace of sheen observed by an NCC field officer in the cornfield was attributed to be related to a natural source.

5.5 RECOMMENDATIONS

DCS recommends excavating and off-site landfill disposal of an estimated 25 m^3 of surface soils along the former buried pipeline (as sampled at TP-PipeStart) which are contaminated with PHCs. Once the PHC-contaminated soils have been removed in the vicinity of the former underground diesel piping, DCS recommends carrying out verification sampling to determine PHC and BTEX concentrations at the periphery of the excavated zone. The aim of this program would be to remove the worst-case contamination and allow residual levels of BTEX/PHCs beyond the limits of excavation to naturally attenuate.

Given that soil contamination above allowable limits was detected on the subject property and the land use is proposed to be changed from commercial to agricultural, it is DCS' recommendation that the NCC proceed with a Preliminary Quantitative Risk Assessment (PQRA), in order to evaluate the potential for risks to human health and the environment and to formulate an appropriate Risk Management Plan (RMP), if required, to deal with contaminants of concern. The previous 2008 SLRA was undertaken using much less restrictive guidelines/standards and was applied to a commercial site use which is not applicable under future site conditions. The new PQRA should also include a review of uptake and effects of PHC-contamination on common crop growth. The PQRA may find that the soil which was found to exceed current CCME criteria in the UST Area-1 could potentially pose no risk to human health or the environment or specifically to crop uptake of contaminants. The PQRA would also be used to assess residual PHC contaminant levels surrounding the former underground diesel piping.

In view of future crop production land use, and dependent on the anticipated areal coverage of agricultural uses, DCS recommends excavating and off-site disposal or recycling of the asphalt pavement which covers the former parking lot area. Further, an additional round of housekeeping/cleanup is required to remove the surface debris left over from demolition activities (including glass, Styrofoam, wood, metals, etc.) in advance of agricultural uses.

With regard to UST Area 1, the Natural Attenuation Monitoring Program should be continued through sampling of the groundwater from existing wells at UST Area 1 with the potential installation of additional groundwater wells. Another attempt to evaluate whether former monitoring wells remain should be conducted. Three previously installed monitoring wells (MW21, MW28, and MW34) were located and were confirmed to contain groundwater. Monitoring wells MW1 and MW24 were located but the protective casing could not be opened. It is recommended that former monitoring well locations MW6, MW20, and MW18 be re-instated if these sampling locations were destroyed during the demolition activities in March 2013 in addition to one new well location to be installed mid-way between MW34 and MW28. The natural attenuation sampling should re-confirm that the assimilative capacity of the system remains sufficient to biodegrade any dissolved hydrocarbon contamination present under both aerobic and anaerobic conditions.

DCS recommends that a more comprehensive, integrated sampling program for the soils within the fill area zone be completed in order to obtain a detailed view of the soil nutrient status. An understanding of exact areas to be utilized for agricultural purposes would be required. However, this will be dependent upon the method of site preparation chosen in advance of crop production as an organic soil amendment is recommended. Bio-solids or animal wastes, such as cattle manures or poultry litter, could be applied to fields. Such amendments are typically applied in light applications of 5 to 10 mm over surface areas and are incorporated into the soil after application. Rates of application should be based on nutrient analysis of animal wastes. Foliar tissue analysis of fully expanded leaves collected early in the growing season can provide valuable information about the efficiency of the animal waste application and determine if any supplement is required.

Composts from municipal yard wastes may become an affordable organic source for amending fields. Application rates of stabilized composted wastes can range between 50 and 200 tonnes per acre since composted yard wastes may have only 0.2 to 0.5 percent nitrogen content and nutrient loss is of less concern. The 50 tonnes per acre application rate represents approximately 10 mm coverage over a 1-acre area, while the 200 tons per acre would be approximately a 40 mm depth. An alternative to applying organic materials over the entire field is to incorporate the organic matter in planting rows only. If rows in the field are spaced 3.75 m apart and the root zone area of plants is considered to be 0.6 m on each side of the stem, a 1.2 m strip would receive the organic matter, thus reducing the amount of organic matter applied in the field by two-thirds.

Traditional methods to increase organic matter in fields include green manure crop rotation. Since the primary concern with a green manure program is increasing organic matter levels in the soil, grasses and small grains are generally used in a double cropping system. Grasses, legumes, or non-legume broadleaf varietals could be sown and then plowed in before they produce seed as a form of green manure.

If clean fill is imported to the site, the soil nutrient status of the imported fill will need to be evaluated to ensure its suitability.

6.0 STATEMENT OF LIMITATIONS OF THIS PHASE II ESA UPDATE

This report prepared for the National Capital Commission (NCC), does not provide certification or warranty, expressed or implied, that the investigation conducted by DCS uncovered all potential contaminants or environmental concerns at the site. The work undertaken by DCS was directed to provide information on contamination that might have accrued from historic use of adjacent properties and to determine the existing environmental conditions of the site. Based on the results of the investigation, DCS found evidence of environmental impacts in soil. The test data, chemical analyses and conclusions given in this report are the results of sampling the soil encountered during the program, and based upon the total number of tests performed, are considered to fairly represent the average concentrations of chemical parameters within each area tested. Chemical parameters were chosen based on potential contamination sources identified through previous Phase I ESA and Phase II ESA studies, and were presented as such in our proposal.

Further, the report was prepared by DCS for NCC. The material in it reflects the best judgment of DCS in light of the information available at the time of investigation (April/May 2013). Changes to soil quality in the areas investigated or inspected can occur following the date of investigation. Any use which a third party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such third parties.

7.0 CLOSURE

The environmental assessment field work for this Phase II ESA Update was undertaken by Jason Mauchan, M.Eng while reporting and general overview was provided by Troy Austrins, P.Eng., with senior review by Barry Cooke, P.Eng. The reporting on soil quality with respect to agricultural requirements was conducted by Ms. Cynthia Levesque, B.Sc. Honours (Agriculture). The qualifications of the assessment staff are provided in résumé format within Appendix F.

We trust that the enclosed reporting is sufficient for your current purposes.

Respectfully submitted,

DECOMMISSIONING CONSULTING SERVICES

Troy Austrins, P.Eng.
Regional Engineer

Barry H. Cooke, P.Eng.
Vice President

8.0 REFERENCES

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APPENDIX A

SITE DRAWINGS

DCS

DCS

DECOMMISSIONING CONSULTING SERVICES

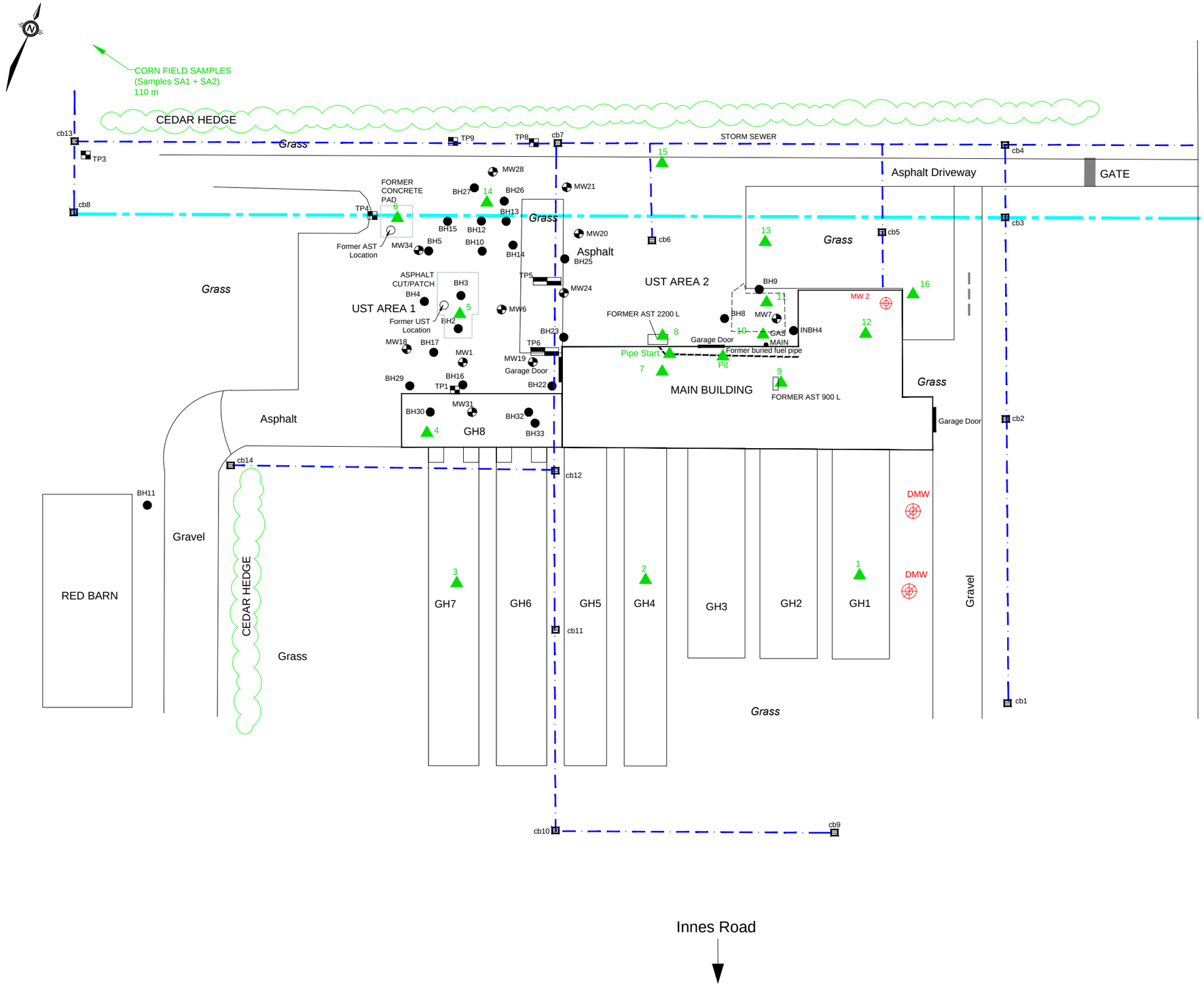
NATIONAL CAPITAL COMMISSION

PHASE II ENVIRONMENTAL SITE ASSESSMENT UPDATE

16 TAUVETTE STREET, OTTAWA, ONTARIO

KEY PLAN

Drawn By: J.B.S.	Approved By: M.F.	Project No: 450186
Date: MAY 2013	Scale: N.T.S	Drawing No: FIGURE 1



LEGEND:

- FORMER BUILDING OUTLINE
- GH6 — FORMER GREENHOUSE
- TP9 — INTERA TEST PIT (2007)
- MW28 — INTERA MONITORING WELL (2005, 2006 & 2007)
- BH27 — INTERA BOREHOLE (2005, 2006 & 2007)
- DMW — DMW IRRIGATION WELL (old)
- cb6 — CATCHBASIN
- DCS 2013 TEST PIT
- STORM SEWER
- WATER MAIN

NOTES:

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1. INTERA PHASE II ESA (2005)
2. INTERA SUPPLEMENTAL PHASE II ESA (2006)
3. INTERA SLRA (2008)
4. STANTEC YEAR FOUR NATIONAL ATTENUATION MONITORING (2012)

0 10 20 30 40 metres

SCALE 1:750

DCS

DECOMMISSIONING CONSULTING SERVICES

NATIONAL CAPITAL COMMISSION

PHASE II ENVIRONMENTAL SITE ASSESSMENT UPDATE

16 TAUVETTE STREET, OTTAWA. ONTARIO

SITE PLAN

Drawn By: J.B.S.	Approved By: M.F.	Project No: 450186	
Date: MAY 2013	Scale: AS SHOWN	Drawing No: 450186-2	

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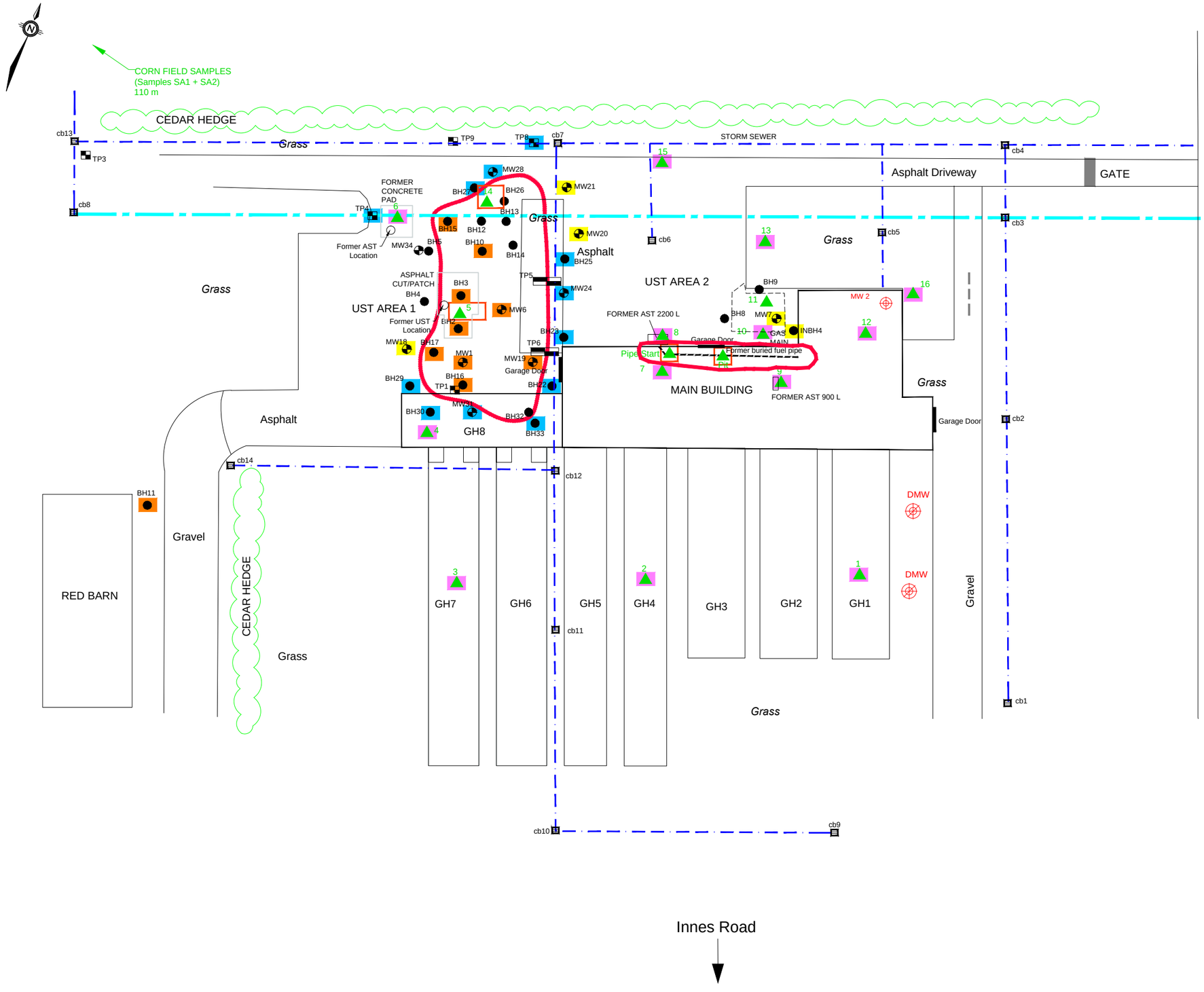

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- DCS 2013 TEST PIT
- STORM SEWER
- WATER MAIN
- APPROXIMATE EXTENT OF PHC SOIL CONTAMINATION
- SOIL ANALYTICAL RESULT GREATER THAN CRITERIA (2005, 2006)
- SOIL ANALYTICAL RESULT LESS THAN CRITERIA (2006)
- SOIL ANALYTICAL RESULT LESS THAN CRITERIA (2007)
- SOIL ANALYTICAL RESULT LESS THAN CRITERIA (2013)
- SOIL ANALYTICAL RESULT GREATER THAN CRITERIA (2013)

NOTES:

1. IN COMPARISON TO MOE TABLE 2.
2. FROM OBSERVATIONS MADE IN APRIL 2013: MW21, MW28 AND MW34 ARE ACCESSIBLE. REMAINING MONITORING WELLS ARE ASSUMED TO HAVE BEEN DAMAGED AND/OR COVERED DURING DEMOLITION ACTIVITIES.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1. INTERA PHASE II ESA (2005)
2. INTERA SUPPLEMENTAL PHASE II ESA (2006)
3. INTERA SLRA (2008)
4. STANTEC YEAR FOUR NATIONAL ATTENUATION MONITORING (2012)

0 10 20 30 40 metres

SCALE 1:750

DCS

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NATIONAL CAPITAL COMMISSION

PHASE II ENVIRONMENTAL SITE ASSESSMENT UPDATE

16 TAUVETTE STREET, OTTAWA. ONTARIO

APPROXIMATE EXTENT OF SOIL CONTAMINATION

Drawn By: J.B.S.	Approved By: M.F.	Project No: 450186	
Date: MAY 2013	Scale: AS SHOWN	Drawing No: 450186-3	

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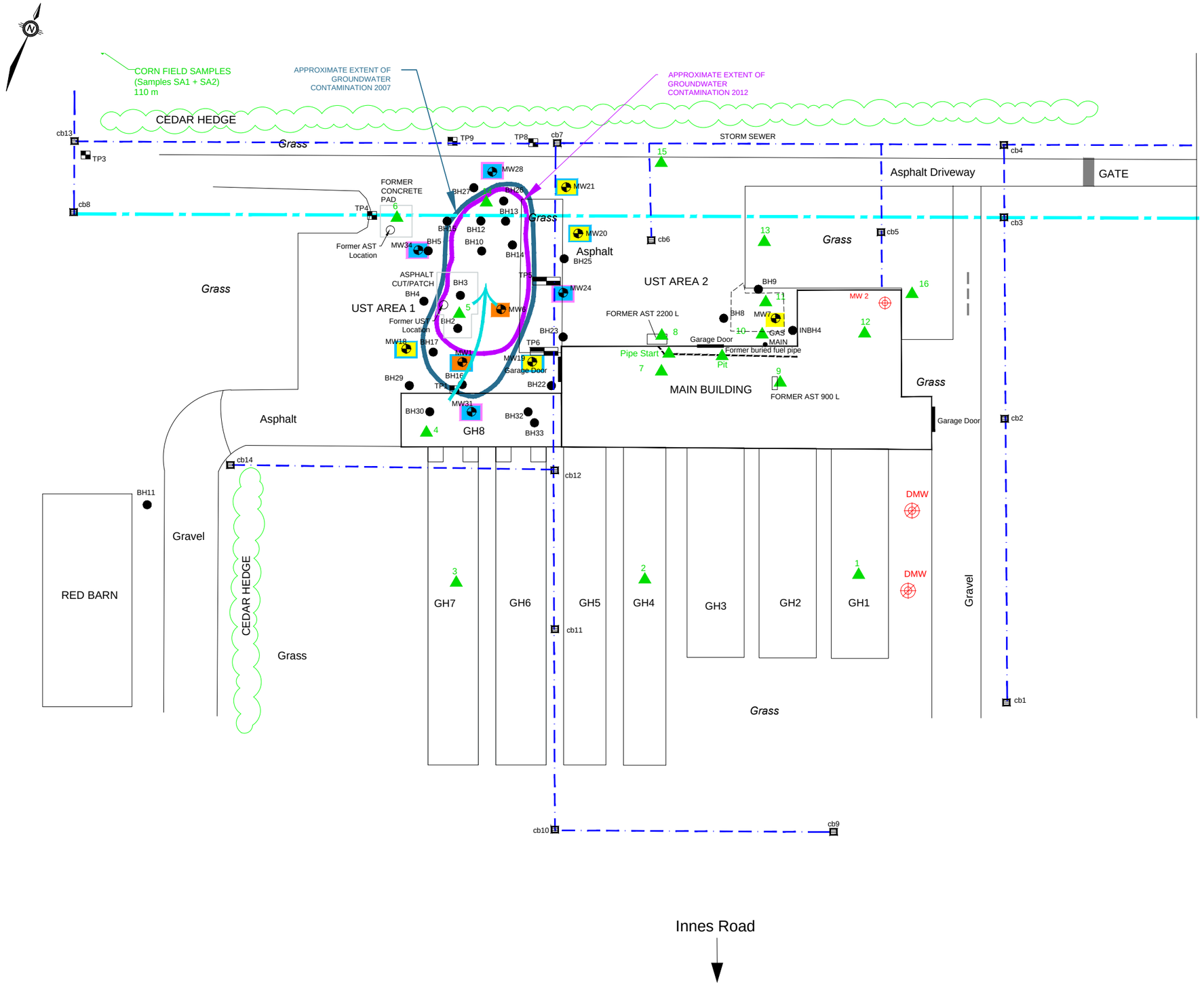

LEGEND:

- FORMER BUILDING OUTLINE
- GH6 — FORMER GREENHOUSE
- TP9 — INTERA TEST PIT (2007)
- MW28 — INTERA MONITORING WELL (2005, 2006 & 2007)
- BH27 — INTERA BOREHOLE (2005, 2006 & 2007)
- DMW — DMW IRRIGATION WELL (old)
- cb6 — CATCHBASIN
- DCS 2013 TEST PIT
- STORM SEWER
- WATER MAIN
- APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION 2007
- APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION 2012
- GROUNDWATER ANALYTICAL RESULT GREATER THAN CRITERIA (2005, 2006, 2007)
- GROUNDWATER ANALYTICAL RESULT LESS THAN CRITERIA (2005, 200, 2007)
- GROUNDWATER ANALYTICAL RESULT LESS THAN CRITERIA (2007)
- GROUNDWATER ANALYTICAL RESULT LESS THAN CRITERIA (2012)
- INFERRED GROUNDWATER FLOW

NOTES:

1. IN COMPARISON TO MOE TABLE 2.
2. FROM OBSERVATIONS MADE IN APRIL 2013: MW21, MW28 AND MW34 ARE ACCESSIBLE. REMAINING MONITORING WELLS ARE ASSUMED TO HAVE BEEN DAMAGED AND/OR COVERED DURING DEMOLITION ACTIVITIES.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1. INTERA PHASE II ESA (2005)
2. INTERA SUPPLEMENTAL PHASE II ESA (2006)
3. INTERA SLRA (2008)
4. STANTEC YEAR FOUR NATIONAL ATTENUATION MONITORING (2012)

0 10 20 30 40 metres

SCALE 1:750

DCS

DECOMMISSIONING CONSULTING SERVICES

NATIONAL CAPITAL COMMISSION

PHASE II ENVIRONMENTAL SITE ASSESSMENT UPDATE

16 TAUVETTE STREET, OTTAWA. ONTARIO

APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION

Drawn By: J.B.S.	Approved By: M.F.	Project No: 450186	
Date: MAY 2013	Scale: AS SHOWN	Drawing No: 450186-4	

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NCC CCN

Canada

2012-06-14

Former NCC Nursery

Legend

- Core Natural Area
- Natural Link
- Agriculture
- Federal Facility & Operations
- Non-Federal Facility & Operations
- Transportation Route
- Addition
- Existing Built Area
- NCC Recreational Pathway
- Greenbelt Planning Zone (2012)

Just Food Farm Cultivation

- Year 1
- Year 2
- Year 3
- Future use

19 18 17 16 15 14 13 12 11 10 28 27 26 25 24W 24E 23 22 21W 21E 20 37 36 35 34 33W 33E 32W 32E 31 30 46 43 53 42 41 40 50

Location of oil observed April 11, 2013

CENTREPARK
BEARBROOK
SOUTHPARK
INNES
GLEN PARK
PEPIN
BLACKBURN BYPASS
ANDERSON

N

0 150 300 M

Working Document

APPENDIX B

DATA TABLES

DCS

TABLE B.1

RESULTS OF ANALYSES FOR BTEX AND PETROLEUM HYDROCARBONS (PHCs) IN SOIL

PARAMETERS	CCME Table 1	CCME Table 1	MOE Table 2	MRL	TP1 SA1 24-Apr-13	TP3 SA2 24-Apr-13	TP4 SA1 24-Apr-13	TP5 SA2[1] 24-Apr-13	TP5 SA3[1] 24-Apr-13	TP5 SA6[1] 24-Apr-13	DUP A[1] Duplicate of TP5 SA6[1]	TP6 SA3 24-Apr-13	TP9 SA3 24-Apr-13	TP10 SA1 24-Apr-13
	Fine	Coarse		Depth	0.1-0.2 m	0.5-0.6 m	0.2-0.3 m	0.5-0.6 m	1.0-1.1 m	2.5-2.7 m	2.5-2.7 m	0.9-1.0 m	0.7-0.8 m	0.1-0.2 m
	(*)	(**)	(+)	Texture	Coarse	Coarse	Coarse	Coarse	Coarse	Fine	Fine	Fine	Coarse	Coarse
Volatile Organic Compounds														
Benzene	**0.0068**	**0.0095**	**0.17**	0.002	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002
Toluene	**0.08**	**0.37**	**6**	0.002	<0.002	<0.002	<0.002	0.05	<0.004	0.002	<0.004	<0.002	<0.002	<0.002
Ethylbenzene	**0.018**	**0.082**	**1.6**	0.002	<0.002	<0.002	<0.002	0.022	**0.69***	**4.69*+**	**2.98*+**	0.009	<0.002	<0.002
o-Xylene	-	-	-	0.002	<0.002	<0.002	<0.002	<0.004	0.066	0.14	0.09	<0.002	<0.002	<0.002
m+p Xylenes	-	-	-	0.002	0.003	<0.002	<0.002	<0.004	0.86	14.04	8.9	0.034	<0.002	<0.002
Xylenes, total	**11**	**2.4**	**25**	0.004	<0.005	<0.004	<0.004	<0.008	0.926	14.18	8.99	<0.036	<0.004	<0.004
Petroleum Hydrocarbons														
F1 (C6-C10)	**210**	**30**	**65**	10	<10	<10	<10	20	**70*+**	**360*+**	**160+**	<10	<10	<10
F1-BTEX	-	-	-	10	<10	<10	<10	20	70	340	150	<10	<10	<10
F2 (C10-C16)	**150**	**150**	**150**	10	<10	<10	<10	<10	80	**490*+**	**380*+**	<10	<10	<10
F3 (C16-C34)	**1300**	**300**	**1300**	20	<20	<20	<20	30	<20	220	180	<20	<20	<20
F4 (C34-C50)	**5600**	**2800**	**5600**	20	<20	<20	<20	50	<20	<20	<20	<20	<20	<20
Soil Vapour Reading (ppm)	-	-	-	-	0	0	0	100	260	6400	na	0	0	0

NOTES:

All parameter values in µg/g (ppm) unless otherwise indicated.

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health,
CCME (CCME, 1999 with updates to 2013)

***** Exceeds Soil Quality Guidelines for Agricultural Land Uses for the Protection of Environmental and Human Health.
For Table 1 -Canadian Soil Quality Guidelines Exceeds Soil Quality Guidelines for Agricultural Land Uses
For Table 1 - Summary of Tier I Levels for Surface Soil; Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (January 2008)

MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA (15 April 2011)

+ Exceeds Agricultural or Other Property Use Standards, For Table 2 - Generic Site Condition
Standards for Shallow Soils in a Potable Ground Water Condition

MRL Method Reporting Limit
- Standard not available.
< Not detected.
na Not analyzed.
1 BTEX MRL elevated due to matrix interference (dilution was done)

TABLE B.1

RESULTS OF ANALYSES FOR BTEX AND PETROLEUM HYDROCARBONS (PHCs) IN SOIL

PARAMETERS	CCME Table 1	CCME Table 1	MOE Table 2	MRL	TP10 SA3	TP11 SA4[1]	TP14 SA3	TP14 SA5	TP14 SA8	Demolition		Cornfield Northwest of Site	
										Pipe Start	Pit	SA1	SA2
					24-Apr-13	24-Apr-13	24-Apr-13	24-Apr-13	24-Apr-13	19-Mar-13	19-Mar-13	29-Apr-13	29-Apr-13
	Fine	Coarse		Depth	0.7-0.8 m	1.3-1.5 m	1.0-1.2 m	2.1-2.2 m	3.7-3.8 m	0-0.7m	0-0.8m	0-0.01m	0.01-0.05m
	(*)	(**)	(+)	Texture	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine
Volatile Organic Compounds													
Benzene	**0.0068**	**0.0095**	**0.17**	0.002	<0.002	<0.004	<0.002	<0.002	**0.226***+	**0.38***+	<0.002	<0.004	<0.002
Toluene	**0.08**	**0.37**	**6**	0.002	<0.002	<0.004	<0.002	<0.002	0.034	**6.46***+	<0.002	<0.004	0.032
Ethylbenzene	**0.018**	**0.082**	**1.6**	0.002	<0.002	<0.004	<0.002	<0.002	**0.714***	**8.1***+	<0.002	<0.004	0.008
o-Xylene	-	-	-	0.002	<0.002	<0.004	<0.002	<0.002	0.019	na	na	<0.004	<0.002
m+p Xylenes	-	-	-	0.002	<0.002	0.02	<0.002	0.003	8.9	na	na	<0.004	<0.002
Xylenes, total	**11**	**2.4**	**25**	0.004	<0.004	<0.24	<0.004	<0.005	8.92	**39.7***+	<0.002	<0.008	<0.002
Petroleum Hydrocarbons													
F1 (C6-C10)	**210**	**30**	**65**	10	<10	<10	<10	<10	<10	**973***+	<7	<10	10
F1-BTEX	-	-	-	10	<10	<10	<10	<10	<10	na	na	<10	10
F2 (C10-C16)	**150**	**150**	**150**	10	<10	<10	<10	<10	<10	**4460***+	44	<10	<10
F3 (C16-C34)	**1300**	**300**	**1300**	20	<20	<20	<20	<20	<20	**3800***+	169	<20	<20
F4 (C34-C50)	**5600**	**2800**	**5600**	20	<20	<20	<20	<20	<20	<6	31	<20	<20
Soil Vapour Reading (ppm)	-	-	-	-	0	0	0	85	30	na	na	na	na

NOTES:

All parameter values in µg/g (ppm) unless otherwise indicated.

Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health,
CCME (CCME, 1999 with updates to 2013)

***** Exceeds Soil Quality Guidelines for Agricultural Land Uses for the Protection of Environmental and Human Health.
For Table 1 -Canadian Soil Quality Guidelines Exceeds Soil Quality Guidelines for Agricultural Land Uses
For Table 1 - Summary of Tier I Levels for Surface Soil; Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (January 2008)

MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA (15 April 2011)

+ Exceeds Agricultural or Other Property Use Standards, For Table 2 - Generic Site Condition
Standards for Shallow Soils in a Potable Ground Water Condition

MRL Method Reporting Limit
- Standard not available.
< Not detected.
na Not analyzed.
1 BTEX MRL elevated due to matrix interference (dilution was done)

TABLE B.2

AGRICULTURAL SOIL CHEMISTRY

PARAMETERS	MRL	UNITS	TP11 SA1 area adjacent to grass lawn	TP2 SA1 area beneath greenhouse building
		Depth	0.1 - 0.2 m	0.1 - 0.2 m
		Texture	Fine	Fine
Agri - Metals				
Mn (Index)	1	Ind	18	15
Zn (Index)	1	Ind	24	17
Agri - Soil				
Base Saturation Ca	0.1	%	85.9	91.1
Base Saturation K	0.1	%	1.7	0.6
Base Saturation Mg	0.1	%	12.0	7.9
Base Saturation Na	0.1	%	0.4	0.4
Base Saturation Total	0.1	%	100	100
Ca (NH4 Acetate Extractable)	100	ppm	3500	4400
CEC Ca	0.1	meq/100g	17.4	22.0
CEC K	0.1	meq/100g	0.3	0.1
CEC Mg	0.1	meq/100g	2.4	1.9
CEC Na	0.1	meq/100g	<0.1	0.1
CEC Total	0.1	meq/100g	20	24
K (NH4 Acetate Extractable)	10	ppm	130	50
Mg (NH4 Acetate Extractable)	10	ppm	300	230
Na (NH4 Acetate Extractable)	10	ppm	20	20
Organic Matter (@350 C)	0.1	%	3.9	9.8
P (NaHCO3 Extractables)	2	ppm	51	7
pH	2.0		7.4	7.0

MRL Method Reporting Limit

- Standard not available.

< Not detected.

na Not analyzed.

APPENDIX C

SITE PHOTOGRAPHS

DCS

Photograph No. 1: View southeast across the footprint of the former building and greenhouses.

Photograph No. 2: View west toward former main entrance of the greenhouses main entrance.

Photograph No. 3: View of typical surface debris (metals, broken glass, Styrofoam) scattered across the site.

Photograph No. 4: View northeast of TP1-2 within the former building footprint.

Photograph No. 5: View of TP-6 which was located beneath the former AST concrete pad west of UST Area 1.

Photograph No. 6: DCS representative measuring soil vapour from collected samples using an RKI Eagle.

APPENDIX D

TEST PIT LOGS

DCS

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP1	0-30	**FILL**, grey gravel with occasional broken glass and metal wire, dry					
	30-300	**FILL**, grey gravel and sand, damp	TP1 SA1	100 -200	PHC/BTEX	0	No odour
	300-1200	**SANDY SILT**, grey and brown, homogenous	TP1 SA2	400 -500		0	No odour
			TP1 SA3	1100 -1200		0	No odour
TP2	0-50	**FILL**, medium sand and gravel with broken pieces of patio stones and metal frame piece, dry, heterogeneous					
	50-250	**FILL**, black coarse sand and gravel with occasional rootlets, damp, heterogeneous	TP2 SA1	100 - 200	Agricultural	0	No odour
	250-500	**SAND**, brown, damp, homogeneous	TP2 SA2	250 - 350		0	No odour
	500-800	**SAND**, grey and black, moist, homogeneous	TP2 SA3	500 - 600		0	No odour
	800-1700	**SAND**, grey silty, moist	TP2 SA4	1200 -1400		0	No odour
TP3	0-500	**FILL**, grey gravel and sand with occasional metal wire at surface, damp, heterogeneous					
	500-1000	**SAND**, dark brown and silty, moist, homogeneous	TP3 SA1	100 - 200		0	No odour
			TP3 SA2	500 - 600	PHC/BTEX	0	No odour
	1000-2200	**SILT**, light brown and sandy, moist, homogeneous	TP3 SA3	1200 - 1300		0	No odour
			TP3 SA4	2000 - 2100		0	No odour

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP4	0-50	**FILL**, grey with sand and gravel with occasional broken wood, metal pieces, plastic pieces and broken Styrofoam, heterogeneous					
	50-150	**ASPHALT**					
	150 - 300	**FILL**, brown sand with occasional gravel, damp, heterogeneous	TP4 SA1	200 -300	PHC/BTEX	0	No odour
	300 - 900	**SAND**, medium light brown, damp, homogeneous	TP4 SA2	400 - 500		0	No odour; groundwater infiltration observed at 800 mm; wet
	900 - 2000	**SAND**, silty grey and brown, damp, homogeneous	TP4 SA3	1100 - 1200		0	800-900 mm
			TP4 SA4	1500 - 1600		0	No odour; siltier with depth
TP5	0-80	**ASPHALT**					
	80-500	**FILL**, grey and brown with sand and gravel, moist, heterogeneous	TP5 SA1	100 - 300		0	No odour
	500-1200	**SAND**, black and grey with black striations, medium, moist, homogeneous	TP5 SA2	500 - 600	PHC/BTEX	100	Moderate PHC odour
			TP5 SA3	1000 -1100	PHC/BTEX	260	Moderate PHC odour
	1200 - 2000	**SILTY SAND**, grey, damp, homogeneous	TP5 SA4	1400 - 1500		500	Strong PHC odour
			TP5 SA5	2000 - 2100		2800	Strong PHC odour
	2000 - 3100	**CLAYEY SILT,** brown and grey, homogeneous	TP5 SA6	2500 - 2700	PHC/BTEX	6400	Very strong PHC odour
			TP5 SA7	3000 - 3100		1500	Strong PHC odour
	3100 - 3800	**SILTY CLAY**, grey, damp, homogeneous	TP5 SA8	3700 - 3800		230	Moderate PHC odour

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP6	0 - 300	**FILL**, grey with sand and gravel with rootlets, moist, heterogeneous	TP6 SA1	100 - 200		0	No odour
	300 - 900	**SAND**, light brown medium with occasional oxidation striations and occasional roots, moist and homogeneous	TP6 SA2	300 - 400		0	No odour
	900 - 2600	**CLAYEY SILT**, brown and grey, sandy with occasional roots, moist and homogeneous	TP6 SA3	900 - 1000	PHC/BTEX	0	Groundwater infiltration observed at 800 mm; wet 800-900 mm
			TP6 SA4	1500 - 1600		0	No odour
			TP6 SA5	2000 - 2200		0	No odour
			TP6 SA6	2400 - 2600		0	No odour
TP7	0-500	**FILL**, brown sand with occasional cobble and gravel, dry, heterogeneous	TP7 SA1	100 - 200		0	No odour
	500-700	**SAND**, light brown, damp, homogeneous	TP7 SA2	500 - 600		0	No odour
	700 - 1600	**CLAYEY SILT**, grey and sandy, damp, homogeneous	TP7 SA3	1000 - 1100		0	Groundwater infiltration observed at 650 mm; wet 650-700 mm
			TP7 SA4	1500 - 1600		0	No odour
TP8	0 - 400	**FILL**, brown coarse sand and gravel with organic matter (roots), dry, heterogeneous	TP8 SA1	100 - 120		0	No odour
	400 - 800	**SAND**, black and brown medium grained, damp, homogeneous	TP8 SA2	400 -500		0	No odour
	800 -2200	**CLAYEY SILT**, grey and brown sand with occasional oxidation striations, moist	TP8 SA3	1100 - 1200		0	No odour
			TP8 SA4	1500 - 1700		0	No odour
			TP8 SA5	2100 - 2200		0	No odour

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP9	0-300	**FILL**, grey and brown sand and gravel with occasional gravel, dry, heterogeneous	TP9 SA1	50 -150		0	No odour
	300-700	**FILL**, brown and silty sand, moist, homogeneous	TP9 SA2	300 - 400		0	No odour
	700-900	**FILL,** brown and silty sand, damp, homogeneous	TP9 SA3	700 - 800	PHC/BTEX	0	No odour Groundwater infiltration observed at 700 mm; wet 700-800 mm
	900-1500	**CLAYEY SILT**, grey and sandy, moist, homogeneous; broken wood foundation observed at 1100 mm	TP9 SA4	1400 - 1500		0	No odour
TP10	0-400	**FILL**, grey and brown sand with gravel and cobble, damp, heterogeneous	TP10 SA1	100 - 200	PHC/BTEX	0	No odour
	400-800	**SAND**, grey and light brown and silty, damp, homogeneous	TP10 SA2	400 - 500		0	No odour
			TP10 SA3	700 - 800		0	No odour; groundwater infiltration observed at 700 mm; wet 700-800 mm
	800-1600	**CLAYEY SILT**, grey and brown and sandy, damp, homogeneous	TP10 SA4	1400 - 1600	PHC/BTEX	0	No odour
TP11	0-300	**TOP SOIL**, black with worms, moist, homogeneous	TP11 SA1	100 - 200	Agricultural	0	No odour
	300-1200	**SAND**, light brown, fine to medium grained, moist, homogeneous	TP11 SA2	400 - 500		0	No odour
			TP11 SA3	900 - 1000		0	No odour Groundwater infiltration observed at 1150 mm; wet 1150-1200 mm
	1200-1800	**SAND**, grey and silty, moist, homogeneous	TP11 SA4	1300 - 1500	PHC/BTEX	0	No odour

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP12	0-200	**FILL**, grey and dark brown sand with gravel and cobble, damp	TP12 SA1	50 - 150		0	No odour
	200-800	**SAND**, grey and silty, damp, homogeneous	TP12 SA2	400 - 500		0	No odour
			TP12 SA3	700 - 800		0	No odour; groundwater infiltration observed at 700 mm; wet 700-800 mm
	800-2800	**CLAYEY SILT**, grey and sandy, damp, homogeneous	TP12 SA4	1400 - 1500		0	
			TP12 SA5	1900 - 2000		0	
			TP12 SA6	2600 - 2800		0	No odour
TP13	0-300	**TOP SOIL**, black and moist	TP12 SA1	50 - 150		0	No odour
	300-700	**SAND**, brown and silty, damp, homogeneous	TP12 SA2	50 - 70		0	No odour
	700-2400	**CLAYEY SILT**, grey and brown and sandy, damp	TP12 SA3	1300 - 1500		0	No odour
			TP12 SA4	2100 - 2200		0	No odour

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP14	0-80	**ASPHALT**					
	80-300	**FILL,** dark brown sand with cobble and occasional pieces of asphalt, moist, heterogeneous	TP14 SA1	100 - 200		0	No odour
	300-700	**SAND**, light-brown and medium grained, moist,homogeneous	TP14 SA2	400 - 500		0	No odour
	700-2000	**CLAYEY SILT**, grey and brown and sandy, moist, homogeneous	TP14 SA3	1000 - 1200	PHC/BTEX	0	No odour
			TP14 SA4	1500 - 1700		0	No odour
	2000-3900	**CLAY**, grey and silty, damp, homogeneous	TP14 SA5	2100 - 2200	PHC/BTEX	85	Trace PHC odour
			TP14 SA6	2200 - 2300		75	
			TP14 SA7	3000 - 3200		540	Moderate PHC odour
			TP14 SA8	3700 - 3900	PHC/BTEX	30	Trace PHC odour

Test Pit Logs – Appendix D

DCS 2013 Test Pit	Soil Depth bgs (mm)	Description	Sample number	Sample depth bgs (mm)	Laboratory Testing	Soil Vapour Reading (ppm)	Field notes
TP15	0-100	**ASPHALT**, black					
	100-500	**FILL**, dark brown sand with gravel and cobble, moist, heterogeneous	TP15 SA1	100 - 200		0	No odour
			TP15 SA2	400 - 500		0	No odour
	500-700	**SAND**, light brown, medium grained, moist, homogeneous	TP15 SA3	600 - 700		0	No odour
	700-1000	**SAND**, grey and silty, damp, homogeneous	TP15 SA4	900 - 1000		0	No odour
	1000-3500	**CLAYEY SILT**, grey and sandy, grey, damp, homogeneous	TP15 SA5	1500 - 1700		0	No odour
			TP15 SA6	2000 - 2200		0	No odour
			TP15 SA7	3000 - 3200		0	No odour
TP16	0-700	**SAND**, light-brown and medium grained, moist, homogeneous	TP16 SA1	100 - 200			No odour
	700-2000	**CLAYEY SILT**, grey and brown and sandy, moist, homogeneous	TP16 SA2	900 - 1000			No odour
	2000-4000	**CLAY**, grey and silty, damp, homogeneous	TP16 SA3	3000 - 3200			No odour
Pipe start	0-750	**FILL**, brown sand with occasional cobble and gravel, dry, heterogeneous	'Pipe Start'	600 - 700	PHC/BTEX		Strong PHC odour
Pit	0-800	**FILL**, brown sand with occasional cobble and gravel, dry, heterogeneous	'Pit'	700 - 800	PHC/BTEX		Trace PHC odour

Notes: PHC = petroleum hydrocarbon; bgs = below ground surface
Soil Vapour Reading using an RKI Eagle

APPENDIX E

LABORATORY CERTIFICATES OF ANALYSIS

DCS

EXOVA OTTAWA

Certificate of Analysis

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307516
Date Submitted: 2013-04-25
Date Reported: 2013-05-02
Project: 450186
COC #: 135238

Dear Troy Austrins:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

APPROVAL: _____

Lorna Wilson
Inorganic Laboratory Supervisor

APPROVAL: _____

Charlie (Long) Qu
Organic Laboratory Supervisor

Certificate of Analysis

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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1023057 Soil 2013-04-24 TP1 SA1	1023058 Soil 2013-04-24 TP3 SA2	1023059 Soil 2013-04-24 TP4 SA1	1023060 Soil 2013-04-24 TP5 SA2
General Chemistry	Moisture	0.1	%			11.5	18.4	6.9	12.9
Hydrocarbons	F1 (C6-C10)	10	ug/g	CWS-30		<10	<10	<10	20
	F1-BTEX (C6-C10)	10	ug/g			<10	<10	<10	20
	F2 (C10-C16)	10	ug/g	CWS-150		<10	<10	<10	<10
	F3 (C16-C34)	20	ug/g	CWS-300		<20	<20	<20	30
	F4 (C34-C50)	20	ug/g	CWS-2800		<20	<20	<20	50
VOCs	Benzene	0.002	ug/g	CSQG-0.0068		<0.002	<0.002	<0.002	
		0.004	ug/g	CSQG-0.0068					<0.004
	Ethylbenzene	0.002	ug/g	CSQG-0.018		<0.002	<0.002	<0.002	
		0.004	ug/g	CSQG-0.018					0.022*
	m/p-xylene	0.002	ug/g			0.003	<0.002	<0.002	
		0.004	ug/g						0.005
	o-xylene	0.002	ug/g			<0.002	<0.002	<0.002	
		0.004	ug/g						<0.004
	Toluene	0.002	ug/g	CSQG-0.08		<0.002	<0.002	<0.002	
		0.004	ug/g	CSQG-0.08					<0.004
	Toluene-d8	1	%			101	95	100	110

Guideline = CCME - Res/Park - Soil *** = Guideline Exceedence**
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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1023061 Soil 2013-04-24 TP5 SA3	1023062 Soil 2013-04-24 TP5 SA6	1023063 Soil 2013-04-24 TP6 SA3	1023064 Soil 2013-04-24 TP9 SA3
General Chemistry	Moisture	0.1	%			10.8	32.0	25.8	17.8
Hydrocarbons	F1 (C6-C10)	10	ug/g	CWS-30		70*	360*	<10	<10
	F1-BTEX (C6-C10)	10	ug/g			70	340	<10	<10
	F2 (C10-C16)	10	ug/g	CWS-150		80	490*	<10	<10
	F3 (C16-C34)	20	ug/g	CWS-300		<20	220	<20	<20
	F4 (C34-C50)	20	ug/g	CWS-2800		<20	<20	<20	<20
VOCs	Benzene	0.002	ug/g	CSQG-0.0068				<0.002	<0.002
		0.004	ug/g	CSQG-0.0068		<0.004	<0.004		
	Ethylbenzene	0.002	ug/g	CSQG-0.018				0.009	<0.002
		0.004	ug/g	CSQG-0.018		0.69*	4.69*		
	m/p-xylene	0.002	ug/g					0.034	<0.002
		0.004	ug/g			0.86	14.04		
	o-xylene	0.002	ug/g					<0.002	<0.002
		0.004	ug/g			0.066	0.14		
	Toluene	0.002	ug/g	CSQG-0.08				<0.002	<0.002
		0.004	ug/g	CSQG-0.08		<0.004	0.002		
	Toluene-d8	1	%			107	104	114	103

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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1023065 Soil 2013-04-24 TP10 SA3	1023066 Soil 2013-04-24 TP11 SA4	1023067 Soil 2013-04-24 TP10 SA1	1023068 Soil 2013-04-24 TP14 SA3
General Chemistry	Moisture	0.1	%			30.5	16.1	4.2	13.2
Hydrocarbons	F1 (C6-C10)	10	ug/g	CWS-30		<10	<10	<10	<10
	F1-BTEX (C6-C10)	10	ug/g			<10	<10	<10	<10
	F2 (C10-C16)	10	ug/g	CWS-150		<10	<10	<10	<10
	F3 (C16-C34)	20	ug/g	CWS-300		<20	<20	<20	<20
	F4 (C34-C50)	20	ug/g	CWS-2800		<20	<20	<20	<20
VOCs	Benzene	0.002	ug/g	CSQG-0.0068		<0.002		<0.002	<0.002
		0.004	ug/g	CSQG-0.0068			<0.004		
	Ethylbenzene	0.002	ug/g	CSQG-0.018		<0.002		<0.002	<0.002
		0.004	ug/g	CSQG-0.018			<0.004		
	m/p-xylene	0.002	ug/g			<0.002		<0.002	<0.002
		0.004	ug/g				0.020		
	o-xylene	0.002	ug/g			<0.002		<0.002	<0.002
		0.004	ug/g				<0.004		
	Toluene	0.002	ug/g	CSQG-0.08		<0.002		<0.002	<0.002
		0.004	ug/g	CSQG-0.08			<0.004		
	Toluene-d8	1	%			115	107	114	113

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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1023069 Soil 2013-04-24 TP14 SA5	1023070 Soil 2013-04-24 TP14 SA8	1023071 Soil 2013-04-24 DUP A	1023072 Soil 2013-04-24 TP2 SA1
Agri. - Metals	Mn (Index)	1	Ind.						18
	Zn (Index)	1	Ind.						24
Agri. - Soil	Base Saturation Ca	0.1	%						85.9
	Base Saturation K	0.1	%						1.7
	Base Saturation Mg	0.1	%						12.0
	Base Saturation Na	0.1	%						0.4
	Base Saturation Total	0.1	%						100
	Ca (NH4 Acetate Extractable)	100	ppm						3500
	CEC Ca	0.1	meq/100g						17.4
	CEC K	0.1	meq/100g						0.3
	CEC Mg	0.1	meq/100g						2.4
	CEC Na	0.1	meq/100g						<0.1
	CEC Total	1	meq/100g						20
	K (NH4 Acetate Extractable)	10	ppm						130
	Mg (NH4 Acetate Extractable)	10	ppm						300
	Na (NH4 Acetate Extractable)	10	ppm						20
	Organic Matter (@350C)	0.1	%						3.9
	P (NaHCO3 Extractable)	2	ppm						51
	pH	2.0		6-8					7.4
General Chemistry	Moisture	0.1	%			33.6	35.0	26.1	
Hydrocarbons	F1 (C6-C10)	10	ug/g	CWS-30		20	10	160*	
	F1-BTEX (C6-C10)	10	ug/g			20	<10	150	
	F2 (C10-C16)	10	ug/g	CWS-150		<10	<10	380*	
	F3 (C16-C34)	20	ug/g	CWS-300		<20	<20	180	
	F4 (C34-C50)	20	ug/g	CWS-2800		<20	<20	<20	
VOCs	Benzene	0.002	ug/g	CSQG-0.0068		<0.002	0.226*		

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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1023069 Soil 2013-04-24 TP14 SA5	1023070 Soil 2013-04-24 TP14 SA8	1023071 Soil 2013-04-24 DUP A	1023072 Soil 2013-04-24 TP2 SA1
VOCs	Benzene	0.004	ug/g	CSQG-0.0068				<0.004	
	Ethylbenzene	0.002	ug/g	CSQG-0.018		<0.002	0.714*		
		0.004	ug/g	CSQG-0.018				2.98*	
	m/p-xylene	0.002	ug/g			0.003	0.695		
		0.004	ug/g					8.90	
	o-xylene	0.002	ug/g			<0.002	0.019		
		0.004	ug/g					0.09	
	Toluene	0.002	ug/g	CSQG-0.08		<0.002	0.034		
		0.004	ug/g	CSQG-0.08				<0.004	
	Toluene-d8	1	%			108	115	107	

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1023073 Soil 2013-04-24 TP11 SA1
Agri. - Metals	Mn (Index)	1	Ind.			15
	Zn (Index)	1	Ind.			17
Agri. - Soil	Base Saturation Ca	0.1	%			91.1
	Base Saturation K	0.1	%			0.6
	Base Saturation Mg	0.1	%			7.9
	Base Saturation Na	0.1	%			0.4
	Base Saturation Total	0.1	%			100
	Ca (NH4 Acetate Extractable)	100	ppm			4400
	CEC Ca	0.1	meq/100g			22.0

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Group	Analyte	MRL	Units	Guideline	Lab I.D. 1023073 Sample Matrix Soil Sample Type Sampling Date 2013-04-24 Sample I.D. TP11 SA1
Agri. - Soil	CEC K	0.1	meq/100g		0.1
	CEC Mg	0.1	meq/100g		1.9
	CEC Na	0.1	meq/100g		0.1
	CEC Total	1	meq/100g		24
	K (NH4 Acetate Extractable)	10	ppm		50
	Mg (NH4 Acetate Extractable)	10	ppm		230
	Na (NH4 Acetate Extractable)	10	ppm		20
	Organic Matter (@350C)	0.1	%		9.8
	P (NaHCO3 Extractable)	2	ppm		7
	pH	2.0		6-8	7.0

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Sample Comment Summary

Sample ID: 1023060	TP5 SA2	BTEX MRL elevated due to matrix interference (dilution was done).
Sample ID: 1023061	TP5 SA3	BTEX MRL elevated due to matrix interference (dilution was done).
Sample ID: 1023062	TP5 SA6	BTEX MRL elevated due to matrix interference (dilution was done).
Sample ID: 1023066	TP11 SA4	BTEX MRL elevated due to matrix interference (dilution was done).
Sample ID: 1023071	DUP A	BTEX MRL elevated due to matrix interference (dilution was done).

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Petroleum Hydrocarbons - CCME Checklist

Samples were analysed by Exova Ottawa Method AMCCME2, "Petroleum Hydrocarbons in Water and Soil, CCME/TPH" This method complies with the reference method for the CCME CWS PHC and is validated for use in the laboratory. Exova Ottawa is accredited by CALA (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Data for QC samples (blank, duplicate, spike) are available on request.

Holding/Analysis Times	Yes/No	If NO, then reasons
All fractions analyzed within recommended hold times/analysis times?	Yes	
F1		
nC6 and nC10 response factors within 30% of toluene	Yes	
BTEX was subtracted from F1 fraction	Yes	
If YES, was F1-BTEX (C6-C10) reported	Yes	
F2		
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	Yes	
Linearity within 15% (F2-F4)	Yes	
Napthalene was subtracted from F2 fraction	No	Naphthalene (PAH) not requested/analysed
If YES was F2-Napthalene reported		
F3		
PAH (selected compounds) subtracted from F3 fraction	No	PAH not requested/analysed
If YES was F3-PAH reported		
F4		
C50 response factor within 70% of nC10+nC16+nC34 average	Yes	
Chromatogram descended to baseline by retention time of C50	Yes	
if NO was F4 (C34-C50) gravimetric reported		

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Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective.

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☐ 380 Vansickle Rd., Unit 630, St. Catharines, ON L2R 6P7, Ph: (905) 680-8887 Fax: (905) 680-4256

LABORATORY USE ONLY Report #: 1307516

Company Name: DCS	Address: 260 Hearst Way, Suite 512	☐ Fax Results to:
Report Attention: Jason Manchan / Troy Austrins	City/Prov: OTTAWA, ON	Postal Code: K2L 3H1
Phone: 613 230 2405 Ext:	Project #: 450186	* Quotation #: 130267
* Waterworks Name:	* Waterworks Number:	☑ E-mail Results to: jmanchan@dcsltd.ca
		☐ Copy of Results to:
		Note that for drinking water samples, all exceedances will be reported where (and how) the applicable legislation requires.

Invoice to: (if different from above)

SAMPLE ANALYSIS REQUIRED

Indicate: F=Filtered or P=Preserved

Sample ID	* Date/Time Collected	Sample Matrix i.e. Water, Soil, Paint	* Sample Type (see Codes below)	* MOE Reportable? Y = Yes N = No	# of Containers	** Service Required R=Rush S=Standard	BTEX-DP PHC F1-F4	Silica Gel cleanup	Criteria Required (i.e. Reg. 170, Reg. 153, CCME, PWQO etc.) Include sub-categories if appropriate	Laboratory Identification
TP1 SA1	24 APR 2013	Soil	n/a	N	1	S	✓	✓	CCME Agri	1073057
TP3 SA2							✓	✓		58
TP4 SA1							✓	✓		59
TP5 SA2							✓	✓		60
TP5 SA3							✓	✓		61
TP5 SA6							✓	✓		62
TP6 SA3							✓	✓		63
TP9 SA3							✓	✓		64
TP10 SA3							✓	✓		65
TP11 SA4							✓	✓		66

Sample Type Codes for Drinking Water Systems: **RW** = Raw Water, **RWFC** = Raw Water For Consumption, **TW** = Treated Water at point of entry to distribution, **DW** = Distribution/Plumbing Water
"MOE Reportable" refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer.

Sampled By: Print: JManchan Sig:	Date/Time: 24 Apr 2013 5pm	Relinquished By: Print: JManchan Sig:	Date/Time: 25 Apr 1300	Comments	Cooler Temp (°C) on Receipt
Work Authorized By (signature): Print: JManchan Sig:	Date/Time: 24 Apr 2013	Received By Lab: Print: Sig:	Date/Time: 4/25/13	17:30	—

*** Indicates a required field.** If not complete, analysis will proceed only on verification of missing information. A quotation number is required, if one was provided.
**** There may be surcharges applied to "Rush" service.** Please check with lab prior to submission of samples for rush analysis to confirm availability and pricing.

AFCOCR.2

Copies: White - Laboratory, Yellow - With Report, Pink - Sampler

CHAIN OF CUSTODY

128189

Exova Accutest

☑ 146 Colonnade Rd., Unit 8, Ottawa, ON K2E 7Y1, Ph: (613) 727-5692 Fax: (613) 727-5222

☐ 608 Norris Court, Kingston, ON K7P 2R9, Ph: (613) 634-9307 Fax: (613) 634-9308

☐ 380 Vansickle Rd., Unit 630, St. Catharines, ON L2R 6P7, Ph: (905) 680-8887 Fax: (905) 680-4256

LABORATORY USE ONLY Report #: 1307516

Company Name:	Address:	☐ Fax Results to:
Report Attention:	City/Prov: Postal Code:	☐ E-mail Results to:
Phone: Ext:	Project # * Quotation #	☐ Copy of Results to:
* Waterworks Name:	* Waterworks Number:	*Note that for drinking water samples, all exceedances will be reported where (and how) the applicable legislation requires.*

Invoice to:
(if different from above)

SAMPLE ANALYSIS REQUIRED ⇦ Indicate: F=Filtered or P=Preserved

Sample ID	* Date/Time Collected	Sample Matrix (i.e. Water, Soil, Paint)	* Sample Type (see Codes below)	* MOE Reportable? Y=Yes N=No	# of Containers	** Service Required R=Rush S=Standard	BTEX-DP PHC F1-F4	AGS-Farm Extra	Silica gel cleanup	Criteria Required (i.e. Reg. 170, Reg. 153, CCME, PWQO etc.) Include sub-categories if appropriate	Laboratory Identification
TP10 SA1	24 APR 2013	Soil	n/a	N	1	S	✓		✓	CCME Agri	023067
TP14 SA3	〃	〃	〃	〃	〃	〃	✓		✓	〃	68
TP14 SA5	〃	〃	〃	〃	〃	〃	✓		✓	〃	69
TP14 SA8	〃	〃	〃	〃	〃	〃	✓		✓	〃	70
DUP A	〃	〃	〃	〃	〃	〃	✓		✓	〃	71
TP2 SA1	24 APR 2013	Soil	n/a	N	1	S		✓			72
TP11 SA1	〃	〃	〃	〃	〃	〃		✓			73

Sample Type Codes for Drinking Water Systems: **RW** = Raw Water, **RWFC** = Raw Water For Consumption, **TW** = Treated Water at point of entry to distribution, **DW** = Distribution/Plumbing Water
"MOE Reportable" refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer.

Sampled By: Print: JMancha Sig:	Date/Time: 24 Apr 2013 5pm	Relinquished By: Print: JMancha Sig:	Date/Time: 25 Apr 1300	Comments: CCME Agricultural standard for BTEX PHC F1-F4	Cooler Temp (°C) on Receipt
Work Authorized By (signature): Print: JMancha Sig:	Date/Time: 24 Ap, 2013	Received By Lab: Print: Sig:	Date/Time: 4/25/13		

*** Indicates a required field.** If not complete, analysis will proceed only on verification of missing information. A quotation number is required, if one was provided.
**** There may be surcharges applied to "Rush" service.** Please check with lab prior to submission of samples for rush analysis to confirm availability and pricing.

White - Lab Yellow - With Report Pink - Sampler

EXOVA OTTAWA

Certificate of Analysis

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307846
Date Submitted: 2013-04-30
Date Reported: 2013-05-03
Project: 450186
COC #: 128206

Dear Troy Austrins:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

APPROVAL: _____

Charlie (Long) Qu
Organic Laboratory Supervisor

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307846
Date Submitted: 2013-04-30
Date Reported: 2013-05-03
Project: 450186
COC #: 128206

Group	Analyte	MRL	Units	Guideline	Lab I.D. 1023806 Sample Matrix Soil Sample Type Sampling Date 2013-04-29 Sample I.D. SA1
General Chemistry	Moisture	0.1	%		39.0
Hydrocarbons	F1 (C6-C10)	10	ug/g		10
	F1-BTEX (C6-C10)	10	ug/g		10
	F2 (C10-C16)	10	ug/g		<10
	F3 (C16-C34)	20	ug/g		<20
	F4 (C34-C50)	20	ug/g		<20
VOCs	Benzene	0.004	ug/g		<0.004
	Ethylbenzene	0.004	ug/g		<0.004
	m/p-xylene	0.004	ug/g		<0.004
	o-xylene	0.004	ug/g		<0.004
	Toluene	0.004	ug/g		<0.004
	Toluene-d8	1	%		99

Group	Analyte	MRL	Units	Guideline	Lab I.D. 1023807 Sample Matrix Soil Sample Type Sampling Date 2013-04-29 Sample I.D. SA2
General Chemistry	Moisture	0.1	%		41.8
Hydrocarbons	F1 (C6-C10)	10	ug/g		<10
	F1-BTEX (C6-C10)	10	ug/g		<10
	F2 (C10-C16)	10	ug/g		<10
	F3 (C16-C34)	20	ug/g		<20
	F4 (C34-C50)	20	ug/g		<20
VOCs	Benzene	0.002	ug/g		<0.002

Guideline = *** = Guideline Exceedence**
** = Analysis completed at Mississauga, Ontario.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307846
Date Submitted: 2013-04-30
Date Reported: 2013-05-03
Project: 450186
COC #: 128206

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. 1023807 Soil 2013-04-29 SA2
VOCs	Ethylbenzene	0.002	ug/g		0.008
	m/p-xylene	0.002	ug/g		0.032
	o-xylene	0.002	ug/g		<0.002
	Toluene	0.002	ug/g		<0.002
	Toluene-d8	1	%		98

Guideline = *** = Guideline Exceedence**
** = Analysis completed at Mississauga, Ontario.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307846
Date Submitted: 2013-04-30
Date Reported: 2013-05-03
Project: 450186
COC #: 128206

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 249891 **Analysis Date** 2013-05-03 **Method** CCME			
F2 (C10-C16)	<10 ug/g	94	50-120
F3 (C16-C34)	<20 ug/g	94	50-120
F4 (C34-C50)	<20 ug/g	94	50-120
Run No 249896 **Analysis Date** 2013-05-03 **Method** C SM2540B			
Moisture	<0.1 %	100	80-120
Run No 249899 **Analysis Date** 2013-05-03 **Method** V 8260B			
Benzene	<0.004 ug/g	94	70-130
Ethylbenzene	<0.004 ug/g	81	70-130
m/p-xylene	<0.004 ug/g	87	70-130
o-xylene	<0.004 ug/g	81	70-130
Toluene	<0.004 ug/g	100	70-130
Toluene-d8	106 %	104	70-130
Run No 249902 **Analysis Date** 2013-05-03 **Method** CCME			
F1 (C6-C10)	<10 ug/g	95	80-120

Guideline = *** = Guideline Exceedence**
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Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307846
Date Submitted: 2013-04-30
Date Reported: 2013-05-03
Project: 450186
COC #: 128206

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 249903 **Analysis Date** 2013-05-03 **Method** CCME			
F1-BTEX (C6-C10)			

Guideline = *** = Guideline Exceedence**
** = Analysis completed at Mississauga, Ontario.
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Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Decommissioning Consulting Services Limited
260 Hearst Way, Suite 512
Ottawa, ON
K2L 3H1
Attention: Mr. Troy Austrins
PO#:
Invoice to: Decommissioning Consulting Services Limited

Report Number: 1307846
Date Submitted: 2013-04-30
Date Reported: 2013-05-03
Project: 450186
COC #: 128206

Sample Comment Summary

Sample ID: 1023806 SA1 BTEX MRL elevated due to matrix interference (dilution was done).

Guideline = *** = Guideline Exceedence**
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Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective.

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128206

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☐ 380 Vansickle Rd., Unit 630
St. Catharines, ON L2R 6P7
Ph: (905) 680-8887 Fax: (905) 680-4256

LABORATORY USE ONLY
Report #: 1307846

Company Name: DCS	Address: 260 Hearst Way #512	☐ Fax Results to:
Report Attention: Troy Austrins	City/Prov: Ontario Postal Code: K2L 3H1	☒ E-mail Results to: taustrins@dcsltd.ca
Phone: 613-230-2405 Ext:	Project #: 450186 * Quotation #	☐ Copy of Results to:
* Waterworks Name:	* Waterworks Number:	*Note that for drinking water samples, all exceedances will be reported where (and how) the applicable legislation requires.*

Invoice to:
(if different from above)

SAMPLE ANALYSIS REQUIRED

Sample ID	* Date/Time Collected	Sample Matrix i.e. Water, Soil, Paint	* Sample Type (see Codes below)	* MOE Reportable? Y = Yes N = No	# of Containers	** Service Required R=Rush S=Standard	PHC/BTEX	Criteria Required (i.e. Reg. 170, Reg. 153, CCME, PWQO etc.) Include sub-categories if appropriate	Laboratory Identification
SA1	29-04-13/16:00	S		N	1	S	X	CCME	1023806
SA2	29-04-13/16:00	S		N	1	S	X	CCME	801

⇦ Indicate: F=Filtered or P=Preserved

Sample Type Codes for Drinking Water Systems: **RW** = Raw Water, **RWFC** = Raw Water For Consumption, **TW** = Treated Water at point of entry to distribution, **DW** = Distribution/Plumbing Water
"MOE Reportable" refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer.

Sampled By: M. Fulleringer Print: Sig:	Date/Time:	Relinquished By: M Fulleringer Print: Sig:	Date/Time: Apr 30-13/5:25	Comments
Work Authorized By (signature): Print: Sig:	Date/Time:	Received By Lab: Print: Y K Sig:	Date/Time: 30/4/13 8:30	Cooler Temp (°C) on Receipt: —

*** Indicates a required field.** If not complete, analysis will proceed only on verification of missing information. A quotation number is required, if one was provided.
**** There may be surcharges applied to "Rush" service.** Please check with lab prior to submission of samples for rush analysis to confirm availability and pricing.

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www.paracellabs.com

Certificate of Analysis

Decommissioning Consulting Services Ltd. (Ottawa)

260 Hearst Way Suite 512
Kanata, ON K2L 3H1
Attn: Troy Austrins

Phone: (613) 230-2405
Fax: (613) 230-1403

Client PO: 450174-3
Project: 16 Tauvette
Custody: 8159

Report Date: 25-Mar-2013
Order Date: 19-Mar-2013

Order #: 1312111

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1312111-01	Pipe Start - 16 Tauvette

Approved By:

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	20-Mar-13	21-Mar-13
PHC F1	CWS Tier 1 - P&T GC-FID	20-Mar-13	21-Mar-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	20-Mar-13	21-Mar-13
Solids, %	Gravimetric, calculation	20-Mar-13	20-Mar-13

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

	Client ID:	Pipe Start - 16 Tauvette	-	-	-
	Sample Date:	19-Mar-13	-	-	-
	Sample ID:	1312111-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	91.8	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	0.38 [1]	-	-	-
Ethylbenzene	0.05 ug/g dry	8.10 [1]	-	-	-
Toluene	0.05 ug/g dry	6.46 [1]	-	-	-
m,p-Xylenes	0.05 ug/g dry	23.8 [1]	-	-	-
o-Xylene	0.05 ug/g dry	16.0 [1]	-	-	-
Xylenes, total	0.05 ug/g dry	39.7 [1]	-	-	-
Toluene-d8	Surrogate	92.5% [1]	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	973	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	4460	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	3800	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	427	4	ug/g dry	327			26.6	30	
F3 PHCs (C16-C34)	352	8	ug/g dry	283			21.8	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	74.5	0.1	% by Wt.	74.8			0.4	25	

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	205	7	ug/g	ND	102	80-120			
F2 PHCs (C10-C16)	410	4	ug/g	327	83.5	60-140			
F3 PHCs (C16-C34)	514	8	ug/g	283	93.6	60-140			
F4 PHCs (C34-C50)	134	6	ug/g	ND	90.0	60-140			

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Qualifier Notes:

Sample Qualifiers :

1 : Not able to complete VOC-low level analysis due to elevated hydrocarbon background. VOC-high level analysis completed in its place.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Chain of Custody
(Lab Use Only)
Nº 8159

Page 1 of 1

Client Name: DCS Limited	Project Reference: 16 Tauvette	TAT: [ ] Regular [ ] 3 Day [ ] 2 Day [ ] 1 Day
Contact Name: Troy Austrin	Quote # —	
Address: 260 Hearst way - unit 512 Ottawa	PO # 450174-3	
Telephone: 613-230-2405	Email Address: taustrin@dcsltd.ca	Date Required:

Criteria: [ ] O. Reg. 153/04 Table __ [ ] O. Reg. 153/11 (Current) Table __ [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [✓] SUB (Storm) [ ] SUB (Sanitary) Municipality: _____ [ ] Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number:
1312109 - Pit 1
1312111 - Pipe Start

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	TCLP metals / inorganics	TCLP benzo(a)pyrene	ACLP benzene	F1-F4 PHC + BTEX	Flammability					
1	Pit 1 - 16 Tauvette	S	—	2	19 March	12:~~45~~30	X	X	X	X		X		2 x 120 ml		
2	Pipe start - 16 Tauvette	S	—	2	—11—	12:~~45~~30				X					1	
3																
4																
5																
6																
7																
8																
9																
10																

Comments: * Comparing to CCME (residential) per Troy. - MC

Method of Delivery: Walk-in

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
T. Austrin	Manaiche 12:45	MC	MC
Date/Time: 19 March 13 12:41	Date/Time: 12:41 March 19/13	Date/Time: Mar 19/13 3:05	Date/Time: Mar 19/13 4:45
	Temperature: 5.0 °C	Temperature: 6.6 °C	pH Verified [N] By: N/A

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www.paracellabs.com

Certificate of Analysis

Decommissioning Consulting Services Ltd. (Ottawa)

260 Hearst Way Suite 512
Kanata, ON K2L 3H1
Attn: Troy Austrins

Phone: (613) 230-2405
Fax: (613) 230-1403

Client PO: 450174-3
Project: 16 Tauvette
Custody: 8159

Report Date: 25-Mar-2013
Order Date: 19-Mar-2013

Order #: 1312109

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1312109-01	Pit 1 - 16 Tauvette

Approved By:

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 25-Mar-2013
Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS, low level	EPA 8260 - P&T GC-MS, low level	20-Mar-13	21-Mar-13
Ignitability	Match Test	25-Mar-13	25-Mar-13
Metals, ICP-MS	EPA 6020 - ICP-MS, digestion	22-Mar-13	22-Mar-13
PHC F1	CWS Tier 1 - P&T GC-FID	20-Mar-13	21-Mar-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	20-Mar-13	21-Mar-13
REG 558 - Benzene	EPA 624 - P&T GC-MS	22-Mar-13	22-Mar-13
REG 558 - Cyanide	MOE E3015- Auto Colour	25-Mar-13	25-Mar-13
REG 558 - Fluoride	EPA 340.2 - ISE	25-Mar-13	25-Mar-13
REG 558 - Mercury by CVAA	EPA 7471A - Cold Vapour AA	21-Mar-13	21-Mar-13
REG 558 - NO3/NO2	EPA 300.1 - IC	21-Mar-13	21-Mar-13
REG 558 - PAHs	EPA 625 - GC-MS	21-Mar-13	21-Mar-13
Solids, %	Gravimetric, calculation	20-Mar-13	20-Mar-13
TCLP Extraction , Metals/SVOCs	EPA 1311 TCLP Extraction Procedure	20-Mar-13	22-Mar-13

PARACEL LABORATORIES LTD.

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Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

	Client ID:	Pit 1 - 16 Tauvette	-	-	-
	Sample Date:	19-Mar-13	-	-	-
	Sample ID:	1312109-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	71.4	-	-	-
Ignitability	N/A	Negative	-	-	-
EPA 1311 - TCLP Leachate Inorganics					
Arsenic	0.05 mg/L	<0.05	-	-	-
Barium	0.05 mg/L	0.71	-	-	-
Boron	0.05 mg/L	0.05	-	-	-
Cadmium	0.01 mg/L	<0.01	-	-	-
Chromium	0.05 mg/L	<0.05	-	-	-
Lead	0.05 mg/L	<0.05	-	-	-
Mercury	0.005 mg/L	<0.005	-	-	-
Selenium	0.05 mg/L	<0.05	-	-	-
Silver	0.05 mg/L	<0.05	-	-	-
Uranium	0.05 mg/L	<0.05	-	-	-
Fluoride	0.05 mg/L	0.14	-	-	-
Nitrate as N	1 mg/L	<1	-	-	-
Nitrite as N	1 mg/L	<1	-	-	-
Cyanide, free	0.02 mg/L	<0.02	-	-	-
Initial pH	0.05 pH Units dry	8.09	-	-	-
Final pH	0.05 pH Units dry	5.32	-	-	-
EPA 1311 - TCLP Leachate Organics					
Benzene	0.0005 mg/L	<0.0005	-	-	-
Toluene-d8	Surrogate	83.9%	-	-	-
Benzo [a] pyrene	0.0001 mg/L	<0.0001	-	-	-
Terphenyl-d14	Surrogate	125%	-	-	-
Volatiles					
Benzene	0.002 ug/g dry	<0.002	-	-	-
Ethylbenzene	0.002 ug/g dry	<0.002	-	-	-
Toluene	0.002 ug/g dry	<0.002	-	-	-
m,p-Xylenes	0.002 ug/g dry	<0.002	-	-	-
o-Xylene	0.002 ug/g dry	<0.002	-	-	-
Xylenes, total	0.002 ug/g dry	<0.002	-	-	-
Toluene-d8	Surrogate	98.8%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-

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	Client ID:	Pit 1 - 16 Tauvette	-	-	-
	Sample Date:	19-Mar-13	-	-	-
	Sample ID:	1312109-01	-	-	-
	MDL/Units	Soil	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	44	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	169	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	31	-	-	-

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Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	ND	0.05	mg/L						
Barium	ND	0.05	mg/L						
Boron	ND	0.05	mg/L						
Cadmium	ND	0.01	mg/L						
Chromium	ND	0.05	mg/L						
Lead	ND	0.05	mg/L						
Mercury	ND	0.005	mg/L						
Selenium	ND	0.05	mg/L						
Silver	ND	0.05	mg/L						
Uranium	ND	0.05	mg/L						
Fluoride	ND	0.05	mg/L						
Nitrate as N	ND	1	mg/L						
Nitrite as N	ND	1	mg/L						
Cyanide, free	ND	0.02	mg/L						
EPA 1311 - TCLP Leachate Organics									
Benzene	ND	0.0005	mg/L						
Surrogate: Toluene-d8	*0.0343*		*mg/L*		*107*	*76-118*			
Benzo [a] pyrene	ND	0.0001	mg/L						
Surrogate: Terphenyl-d14	*0.248*		*mg/L*		*124*	*37.1-155.6*			
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.002	ug/g						
Ethylbenzene	ND	0.002	ug/g						
Toluene	ND	0.002	ug/g						
m,p-Xylenes	ND	0.002	ug/g						
o-Xylene	ND	0.002	ug/g						
Xylenes, total	ND	0.002	ug/g						
Surrogate: Toluene-d8	*0.145*		*ug/g*		*107*	*76-118*			

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Order Date:19-Mar-2013

Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	ND	0.05	mg/L	ND			0.0	29	
Barium	0.736	0.05	mg/L	0.769			4.4	34	
Boron	0.540	0.05	mg/L	0.550			1.7	33	
Cadmium	ND	0.01	mg/L	ND			0.0	33	
Chromium	ND	0.05	mg/L	0.052			0.0	32	
Lead	ND	0.05	mg/L	ND			0.0	32	
Mercury	ND	0.005	mg/L	ND			0.0	20	
Selenium	ND	0.05	mg/L	ND			0.0	28	
Silver	ND	0.05	mg/L	ND			0.0	28	
Uranium	ND	0.05	mg/L	ND			0.0	27	
Fluoride	0.14	0.05	mg/L	0.14			3.3	20	
Nitrate as N	ND	1	mg/L	ND				20	
Nitrite as N	ND	1	mg/L	ND				20	
Cyanide, free	ND	0.02	mg/L	ND				20	
EPA 1311 - TCLP Leachate Organics									
Benzene	ND	0.0005	mg/L	ND				25	
Surrogate: Toluene-d8	*0.0327*		*mg/L*	*ND*	*102*	*76-118*			
Benzo [a] pyrene	ND	0.0001	mg/L	ND				50	
Surrogate: Terphenyl-d14	*0.237*		*mg/L*	*ND*	*118*	*37.1-155.6*			
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	427	4	ug/g dry	327			26.6	30	
F3 PHCs (C16-C34)	352	8	ug/g dry	283			21.8	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	74.5	0.1	% by Wt.	74.8			0.4	25	
Volatiles									
Benzene	ND	0.002	ug/g dry	ND				50	
Ethylbenzene	ND	0.002	ug/g dry	ND				34	
Toluene	ND	0.002	ug/g dry	ND				32	
m,p-Xylenes	ND	0.002	ug/g dry	ND				35	
o-Xylene	ND	0.002	ug/g dry	ND				50	
Surrogate: Toluene-d8	*0.188*		*ug/g dry*	*ND*	*98.7*	*76-118*			

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Client: **Decommissioning Consulting Services Ltd. (Ottawa)**
Client PO: 450174-3 Project Description: 16 Tauvette

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	49.1		ug/L	0.103	98.1	83-119			
Barium	118		ug/L	76.9	81.4	83-116			QM-4X
Boron	96.5		ug/L	55.0	83.0	71-128			
Cadmium	66.3		ug/L	ND	133	78-119			QM-07
Chromium	56.7		ug/L	5.21	103	80-124			
Lead	47.1		ug/L	1.41	91.4	77-126			
Mercury	0.0290	0.005	mg/L	ND	96.5	78-134			
Selenium	45.5		ug/L	0.214	90.6	81-125			
Silver	61.1		ug/L	0.101	122	70-128			
Uranium	47.9		ug/L	0.090	95.7	70-131			
Fluoride	0.61	0.05	mg/L	0.14	94.6	0-200			
Nitrate as N	1		mg/L	ND	104	81-112			
Nitrite as N	1		mg/L	ND	101	76-107			
Cyanide, free	0.030	0.02	mg/L	ND	98.9	60-136			
EPA 1311 - TCLP Leachate Organics									
Benzene	0.037	0.0005	mg/L	ND	92.8	55-141			
Surrogate: Toluene-d8	*0.0288*		*mg/L*		*90.1*	*76-118*			
Benzo [a] pyrene	0.0428	0.0001	mg/L	ND	85.6	39-123			
Hydrocarbons									
F1 PHCs (C6-C10)	205	7	ug/g	ND	102	80-120			
F2 PHCs (C10-C16)	410	4	ug/g	327	83.5	60-140			
F3 PHCs (C16-C34)	514	8	ug/g	283	93.6	60-140			
F4 PHCs (C34-C50)	134	6	ug/g	ND	90.0	60-140			
Volatiles									
Benzene	0.0772	0.002	ug/g	ND	114	55-141			
Ethylbenzene	0.0566	0.002	ug/g	ND	83.2	61-139			
Toluene	0.0613	0.002	ug/g	ND	90.2	54-136			
m,p-Xylenes	0.0912	0.002	ug/g	ND	67.1	61-139			
o-Xylene	0.0509	0.002	ug/g	ND	74.8	60-142			

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Qualifier Notes:

Sample Qualifiers :

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QM-4X : The spike recovery was outside of QC acceptance limits due to elevated analyte concentration.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

Head Office
300-2319 St. Laurent Blvd.
Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com
www.paracellabs.com

OTTAWA ◉ KINGSTON ◉ NIAGARA ◉ MISSISSAUGA ◉ SARNIA

Chain of Custody
(Lab Use Only)
Nº 8159

Page 1 of 1

Client Name: DCS Limited	Project Reference: 16 Tauvette	TAT: [ ] Regular [ ] 3 Day [ ] 2 Day [ ] 1 Day
Contact Name: Troy Austrin	Quote # —	
Address: 260 Hearst way - unit 512 Ottawa	PO # 45074-3	
Telephone: 613-230-2405	Email Address: taustrin@dcsltd.ca	Date Required:

Criteria: [ ] O. Reg. 153/04 Table __ [ ] O. Reg. 153/11 (Current) Table __ [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality:_____ [ ] Other:_____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number:
1312109 - Pit 1
1312111 - Pipe Start

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	TCLP metals / inorganics	TCLP benzo(a)pyrene	TCLP benzene	F1-F4 PHC	BTEX	Flammability				
1	Pit 1 - 16 Tauvette	S	—	2	19 March	12:~~44~~30	X	X	X	X		X		2 x 120 ml		
2	pipe start - 16 Tauvette	S	—	2	—11—	12:~~44~~30				X				1		
3																
4																
5																
6																
7																
8																
9																
10																

Comments: * Comparing to CCME (residential) per Troy. - MJC

Method of Delivery: Walk-in

Relinquished By (Print & Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
T. Austrin	Manache 12:45 March 19/13	MJC	MJC
Date/Time: 19 March 13 12:41	Date/Time: 12:41	Date/Time: Mar 19/13 3:05	Date/Time: Mar 19/13 4:45
	Temperature: 5.0 °C	Temperature: 6.6 °C	pH Verified [N] By: N/A

APPENDIX F

QUALIFICATIONS OF THE ASSESSORS

DCS

Troy Austrins, P.Eng.

PROJECT MANAGER
REGIONAL ENGINEER - OTTAWA

EDUCATION

B.Eng., Civil Engineering, Ryerson Polytechnical University, Toronto, Ontario, 1991

Environmental Science & Engineering Certificate, Ryerson Polytechnical University, Toronto, Ontario, 2002

PROFESSIONAL AFFILIATIONS

Professional Engineers of Ontario
Ontario Society of Professional Engineers
Canadian Geotechnical Society

SUPPLEMENTAL CERTIFICATION

2011 Operation of Small Drinking Water systems; Emergency Level 1st Aid/CPR-AED; Hazardous Waste Operations and Emergency Response- HAZWOPER -Refresher
2009 Radiation Safety, Gauge Operation, Transportation of Dangerous Goods, Class 7 Radioactive Radioisotope Licenses and Other Regulatory Requirements, Emergency Procedures- AECBC
2007 Fall Arrest; Confined Space; WHMIS Training; Pleasure Craft Operator
2005 40-hour HAZWOPER
2002 Hydro One- Electrical Safety Awareness course including on-site grounding/bonding instruction; Traffic Control Training.

EXPERIENCE

2001 - present — Decommissioning Consulting Services Limited, Richmond Hill and Ottawa, Ontario

Since 2005, Regional Engineer in the DCS/SENES Ottawa office, responsible for completion of environmental site assessments, hazardous materials surveys and contaminated site remediation projects in addition to environmental and associated auditing programs. Responsibilities as a project manager include indoor air quality assessments, designated substances surveys (DSS), mould and asbestos assessments, and the design and completion of Phase I and Phase II environmental site audits and remediation projects.

- Phase I /Phase II ESA and Geotechnical program for 400 Clarence St. parkland property for City of Ottawa
- Phase I ESA- Franktown property for PWGSC
- Phase II ESA- Sault Ste. Marie property for PWGSC
- Phase II ESA and Remedial Options Study- Pembroke garage facility- Infrastructure Ontario
- Phase I/ Phase II ESA/Remedial Options Review- Booth Street, Ottawa, autobody and automotive service property
- Phase I ESA/ DSS/ Tank Compliance Audit- Hawthorne Road facility, Ottawa
- Phase I and Limited Phase II ESA, Capital Drive industrial property, Ottawa- private business
- Phase I/II ESA- Portsmouth Harbour (east wharf), Kingston on behalf of DFO
- Phase I/II ESA and PQRA at Walkley Road property for National Capital Commission, Ottawa
- Phase I ESA for Defense Construction Canada, Pembroke property – Mckay Street
- Fuel storage tank compliance audits for Canada Dept. of Fisheries and Oceans for 5 facilities in NWT, Manitoba and Nunavut
- Phase I ESA and environmental/ health & safety audit- Drinking water plant in Mirabel, Quebec
- Phase II ESAs and PQRAs for several NCC properties including Neil Way, Prince of Wales and McCarthy corridor, Ottawa
- Phase I ESA and environmental/ health & safety audit- Metal foundry and fabrication facility in Belleville of 11,000 m^2 size
- Phase I ESA/ health and safety-environmental audit of a Kimberly-Clark tissue rendering facility in Quebec
- Phase I ESA- NCC property on Carling Ave.
- Phase II ESA- Paint processing/distribution facility, Quebec City, Quebec
- Phase I ESAs- several parcels in Gatineau and Ottawa for National Capital Commission
- Phase I ESA/ health and safety-environmental audit/ asbestos survey of a 26,000 m2 semi-conductor manufacturing facility, Ottawa in addition to a second semi-conductor manufacturing facilty
- Phase I ESA and Geotechnical investigation, proposed Medical office building, Aylmer, Quebec
- Phase I ESA Update, rural residential and industrial site, Bowmanville, Ontario
- Phase I ESA- NCC Confederation Park property, Ottawa;
- Phase I and Phase II ESA of 12 hectare Moodie Drive property, Ottawa
- Phase II ESA- Deep River Small Craft Harbour-Dept. of Fisheries and Oceans
- Completed Asbestos abatement Air Clearance Testing- O.Reg. 278/05 protocols- CFB Petawawa – Residence renovation project
- Phase II ESA, Sussex Drive, Ottawa- Aga Khan Foundation
- Soil sampling; Shannonville for INAC Property Transfer Assessment
- PWGSC-DND; Groundwater sampling and well decommissioning (CFSU Uplands & Leitrim)
- Site decommissioning/soil remediation for MNR property (former Jr. Ranger Camp) including Phase I, Phase II ESA via testpits and boreholes, asbestos removal, well decommissioning, septic system removal, concrete removal and remediation of petroleum impacted soils
- Auto parts lot/scrap yard, Greely- review of Phase I ESA data leading to Phase II investigation and resolution to MOE imposed clean-up order
- Completed asbestos surveys and asbestos remediation repair inspections for Toronto Catholic School Board
- Construction maintenance garage and yard, Renfrew- Phase I ESA, Phase II ESA and Phase III remediation program including site asbestos review
- UST removal program- Merivale Road garage property, Ottawa- CTV Television

- Colomac Gold Mine, Yellowknife, NT- Conducted Designated Substances Survey and hazardous materials evaluation and assisted in the decommissioning study of the former gold mine
- ABP Recycling- Philip Services Corp. Hamilton (liquid waste chemical bulking & transfer station/ oil filter recycling centre/ auto wrecker yard)- Hamilton- Phase I and Phase II ESA
- Purolator Courier / Ontario Power Generation facility and yard- Phase II ESA and facility audit/ mould assessment, Etobicoke
- Supervised several Hydro One Phase II ESA programs across Southern Ontario, and provided reporting of site studies. Supervised subsequent remediation programs and completed site closure reporting. Phase II ESA studies were conducted at seven sites with remediation programs undertaken at five distribution station properties
- Phase I ESA at Textile plant in Scarborough, Ontario
- Conducted 24 residential property remediation programs and supplemental air monitoring in the Niagara region including construction management, construction property assessments, water testing and final verification reporting. Supervisory work included Niton XRF sampling at excavation extents to provide same-day authorization to allow for backfill and property restoration
- Phase I ESA conducted at Electrical Transformer manufacturing Plant in Scarborough, Ontario
- Phase I ESA conducted at two 10,000 m^2 Metal stamping/fabricating plants in Mississauga, Ontario
- Conducted studies and supervision of on site testing programs and final reporting for numerous Phase II investigations of soil and ground water contamination on properties, determining source and extent of contamination
- Scarborough industrial site Phase II ESA and site remediation program in vicinity of gasoline fuelling and heating oil underground tanks. Remediation program required compaction control in advance of renovations/addition to main warehouse
- Performed supplemental site sampling, delineation and remediation management planning for Kitchener trucking firm
- Removal of large underground heating oil tank for the Halton District School Board
- Coordinated remediation of basement lead contamination at former industrial facility including liaison with government authorities, site sampling and completion reporting
- Completed numerous tank removal and decommissioning projects in the Toronto area in order to achieve compliance with MOE cleanup criteria

1992 - 2001 — Bruce A Brown Associates Limited, Toronto, Ontario- Environmental Project Manager

- Completed numerous Phase I and Phase II environmental assessment project for varied sites in the Greater Toronto area ranging from industrial facilities, educational institutions, residential properties and vacant lands
- Undertook pre-demolition evaluations of buildings and structures for PCB's, asbestos and other contaminants requiring special programs prior to general demolition and clean-up. Supervision of field demolition programs to ensure safety and environmental quality
- PCB-containing drum identification, sorting and sampling program on shipping dock and tractor trailers at King St./Sudbury Ave. industrial facility, Toronto
- Monitored airborne asbestos and other contaminants during abatement programs for several industrial properties in Brampton
- Remediation of heating oil contamination of subsurface soils at several apartment buildings on Islington Rd., Toronto
- Managed Dispersion Modelling and Emission Summary reporting in aid of Regulation 346 Certificate of Approval (air) submissions for industrial facilities in Brampton , Cambridge and Scarborough
- Undertook Phase III environmental remediation project co-ordination including contractor & landfill arrangement, backfill control, excavation face sampling, laboratory submissions, compaction testing and final reporting for many sites in the Greater Toronto area and Hamilton/Burlington region. Such projects included numerous UST removals and subsequent soil and groundwater investigations leading to final MOE Record of Site Condition submissions. Work programs included liaison with Ministry of Environment, peer review consultant and property owners concerning off-site spread of contaminants. Supervised methane collection trench installation adjacent to former landfill and conducted quarterly to bi-annual methane monitoring
- Conducted studies and supervision of on site testing programs for numerous Phase II investigations of soil and ground water contamination on properties, determining source and extent of contamination and potential migration pathways in the Greater Toronto area
- Conducted all facets of construction excavation monitoring including pre-excavation review of potential impacts, costs review to manage possible subsurface contaminants, disposal site liaison and confirmation, communication with excavation contractors in regard to scheduling and management of impaired materials in addition to full-time site monitoring of truck load removals, truck manifesting and standard construction progress meetings, onto final site verification reporting at Greater Toronto Area construction sites

Barry H. Cooke, P.Eng.

VICE PRESIDENT

EDUCATION

B.Eng. Civil Engineering, McGill University, 1975
Cost Engineering, University of Toronto, 1985
Project Management, University of Toronto, 1986
Inchcape Executive Management Training, Cornell University, 1993
Finance & Accounting Fundamentals, American Management Association, 1995
Contaminated & Hazardous Waste Site Management, Gowen Environmental, 1996

PROFESSIONAL AFFILIATIONS

Professional Engineers Ontario (Designated Consulting Engineer)
Order of Engineers of Quebec
The Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories
Canadian Geotechnical Society
Tunnelling Association of Canada

EXPERIENCE

1996-date - Decommissioning Consulting Services Limited

Mr. Cooke is a Vice President at DCS, and has a background in geotechnical and geo-environmental engineering. He is involved in a wide range of projects including subsurface contamination investigations; geotechnical studies and analyses; erosion control; environmental audits; environmental liability assessments; and the development, design and supervision of site remediation programs. He is a Qualified Person as designated by the MOE for preparation of Records of Site Conditions based on Phase I and II ESAs and Risk Assessments. Projects in which he has been involved include:

- Completed assessment of environmental conditions at the Bruce nuclear power station in Tiverton, Ontario as part of due diligence activities completed prior to the purchase of Bruce Nuclear. Studies focused on soil and groundwater contamination as well as monitoring of the 40 ha on site landfill.
- Project manager for a Phase II ESA at Cameco's Port Hope Conversion Facility. 61 boreholes were drilled with both radiological and non radiological testing completed on soils and groundwater. Purpose of the work was to assist Cameco in planning the decommissioning of the facility and subsequent disposal of low level radioactive wastes. Also directed a study to determine build up of uranium in surface soils within a 2 km radius of the facility. Completed several other ESAs at other Cameco properties in Port Hope and Cobourg.
- Participated in environmental assessments of several abandoned mine sites in the NWT, including Port Radium, Contact Lake and El Bonanza.
- Project Manager for dozens of PWGSC assignments including enhanced Phase I ESAs, Phase II and III ESAs and site specific risk assessments for several small craft harbours and lightstations in Lakes Ontario, Huron and Superior.
- Project Director providing project coordination for hundreds of ESAs, sediment toxicity assessments and risk assessments completed by eight consultants retained PWGSC on behalf of the Department of Fisheries and Oceans.
- Providing peer review services to the MOE for Pre-submission Forms and Risk Assessments prepared under O. Reg 153/04.
- Project manager for site characterization and remediation of a former Sunoco service station in Etobicoke. This site had been previously assessed by several consultants and incompletely remediated, and it was necessary to first determine the current state of subsurface contamination and to devise a remediation plan. Ultimately, several hundred cubic metres of petroleum hydrocarbon contaminated soil were removed from the location of the original gasoline UST nest and from beneath the floor of the building where a waste oil UST and several hydraulic hoists had been located. Project Director for Phase I and II ESAs completed for a proposed gas fired power plant at two neighboring sites in Etobicoke.
- Project manager for construction of a new ash landfill cell in an area of discontinuous permafrost near Calstock, Ontario, and for preparation of closure plan for the landfill.
- Project manager for site characterization of the 20 ha City Place development west of SkyDome. Several dozen boreholes to bedrock and test pits were put down, hundreds of soil and groundwater samples analysed and a comprehensive report was prepared detailing the environmental liabilities attending the site, all within a four week due diligence period.
- Project Director for Phase II ESAs completed on Ford Motor Company's former power plant in Oakville that was proposed to house a new gas fired power station.
- Project manager for site characterization of 12 ha Foster Wheeler Ltd. Facility in St. Catharines. Several dozen boreholes and test pits, laboratory analyses, and asbestos and PCB surveys were carried out and a report outlining the degree of contamination at the century old industrial site prepared. Follow up included remediation of the site and retaining and supervising several contractors involved in performing remediation activities.
- Project Manager for site characterization and site specific risk assessment for a commercial property in North York. The site formerly was the location of the CCM manufacturing facility, and the groundwater beneath the site was contaminated with chlorinated solvents.
- Project Director for a Phase II ESA completed on the site of OPG's former Keith Generating Station in Windsor that has been successfully redeveloped with a gas fired power station.
- Project manager for site characterization of the 2.8 ha site of the Canadian Pacific Express Transport site in the Toronto Portlands. The site had been occupied historically by several different companies, and the subsurface contamination included solvents, PAHs and petroleum hydrocarbons. A Site Specific Risk Assessment was conducted to minimize remedial requirements for redevelopment.
- Directed several site assessments of the former Inglis property and adjacent lands which were assembled into a 13-ha commercial and residential redevelopment. The site was underlain by soil and groundwater with elevated levels of chlorinated solvents and a site specific risk assessment was completed to assess the effect of off site contaminant sources.
- Completed detailed site assessments of the Waterloo Town Square and adjacent properties formerly owned by Seagram's Distilleries as part of a large commercial redevelopment in downtown Waterloo. Part of the Mall was underlain by a plume of PCE-contaminated groundwater which originated from a former dry-cleaning store in the Mall.
- Project manager for the site characterization of a former oil recycling facility in the Toronto Port Area. Subsurface soils and groundwater were contaminated with chlorinated solvents, petroleum hydrocarbons and PCBs. Directed the preparation of a Remedial Action Plan to remediate both on- and off-site contamination, after completion of a risk assessment.
- Prepared remediation plan and cost estimates to remove over 1000 m^3 of soil contaminated with PCBs at a surfactant manufacturing plant near Orillia. The plant was over 100 years old and extensive shoring and underpinning was required to preserve the structural integrity of the building.
- Providing peer review services for the redevelopment of Lynden Pindling International Airport in Nassau, the

Bahamas. Project featured an extensive LNAPL mass under the airport's apron.
- Project manager for environmental assessment of a 350 ha area containing groundwater contaminated with H-acid in Bichhri Village, Rajasthan, India. Project included geophysical studies, installation of over 50 monitoring wells in hard rock, analysis of soil and groundwater samples, hydrogeologic modelling, bench tests, and evaluation of various remediation technologies.
- Project manager for site characterization and site-specific risk assessment for 1.1 ha former metal recovery facility in the Toronto Portlands, where up to 2.0 m of leachate toxic fly ash was spread. A risk management scheme involving the application of a soil/geomembrane cover was designed and accepted by the MOE, and was successfully implemented, and a Record of Site Condition was submitted to the MOE.
- Project manager for environmental assessment of an industrial property in Leaside which was underlain by a plume of VOC contaminated groundwater. A site specific risk assessment was undertaken to demonstrate that remediation of the VOC contamination was unnecessary. Also supervised remediation of petroleum hydrocarbon contamination remaining after removal of a heating oil UST in another part of the site.
- Provided geotechnical and environmental services at a 2 ha former metal recycler in the Toronto Portlands. A risk assessment was prepared for the site and an RSC acknowledged by the MOE. Provided construction supervision services.

1989-1996 - Inchcape Testing Services NA Ltd. (formerly Warnock Hersey)

General Manager

Managed the Ontario and Atlantic Operations. Fully responsible for P&L, sales, engineering/testing operations and new business development. Managed up to 60 employees through six direct reports. As part of regional management team, played a key role in developing and implementing company's strategies and objectives. Worked closely with offices in Canada, U.S.A. and worldwide.

1987-1989 - Bruce A. Brown Associates Ltd.

Vice President

Responsible for managing geotechnical and environmental investigations, including:

- ongoing studies of environmental contamination, and its remediation, of the former railway lands near SkyDome;
- geotechnical and environmental investigations for railway lands in the West Don Lands and in eastern Toronto;
- geotechnical and environmental investigations for the redevelopment of the Weston Sewage Treatment Plant into two 29-storey residential towers;
- geotechnical and environmental investigations for the redevelopment of the Massey Ferguson properties in Toronto.

1975-1987 - Lavalin Inc. (now SNC-Lavalin Inc.)

Junior Engineer to Senior Project Engineer

Participated in, and managed, hundreds of engineering studies across Canada and internationally, including:

- Engineering studies of several mine tailings disposal schemes including grass roots designs of facilities for Inco in Copper Cliff, Ontario; BP Resources at Hope Brook, Nfld.; CalGraphite in Burk's Falls, Ontario; and Falconbridge in Winston Lake, Ontario; and studies on existing tailings areas for Inco in Copper Cliff, Ontario; Falconbridge in Garson, Ontario; Gaspé Copper Mines in Murdochville, Québec; Cogema in Rabbit Lake, Saskatchewan and Amok in Cluff Lake, Saskatchewan.
- Geotechnical studies for the SkyDome Stadium in Toronto. Project featured mass excavation below the level of Lake Ontario through contaminated soils, into shale bedrock which possessed clay seams and fractured zones. Comprehensive plate load tests on the shale bedrock were carried out to accurately determine the stress strain characteristics of the bearing formation.
- Geotechnical studies for the John Street Pumping Station, which was relocated to make way for the SkyDome Stadium. Project featured tunnels beneath the SkyDome and adjacent structures, in shale bedrock known to squeeze significantly over time. Complex laboratory testing was performed to determine stress-strain-time relationships to aid in tunnel lining design. Monitoring of tunnel squeeze during construction was carried out.
- Studies in The Gambia to locate reserves of road building materials. The absence of hard rock in the country led to the decision to use crushed cockle shells as a coarse aggregate, and an extensive test pit exploration program, employing over 70 local workers, was undertaken to locate new deposits of shells.
- Supervision of the construction of a 3 km-long earth irrigation dam in northern Nigeria. Special aspects of the work included ensuring that adequate compaction of laterite core was consistently achieved in a semi-desert environment.
- Geotechnical investigation for a 40 km-long water supply pipeline for Yaounde, Cameroon. Terrain traversed included rivers, jungles and foothills.
- Geotechnical studies for a cement plant in Utah. Project featured construction over deep alluvial and aeolian deposits, some of which were prone to significant collapse when wetted.
- Geotechnical design and field investigation for a 15 m-high ore truck dump at a nickel mine in the Dominican Republic. Dump was constructed over bedrock possessing weak soil infilling.

PROFESSIONAL ACTIVITIES

Tunnelling Association of Canada
Treasurer, 1989-1993
Associate Editor of Canadian Tunnelling, 1993-2006

Canadian Council of Independent Laboratories
(formerly Canadian Testing Association)
National Director, 1990-1992, 1993-1996
Vice President, Ontario Chapter, 1986-1990
President, Ontario Chapter, 1990-1992
Chair, Conformity Assessment Division, 1993-1996
Newsletter Editor, 1995-1996

PUBLICATIONS

Design of buried structures in squeezing rock in Toronto, Canada, with K.Y. Lo and D.D. Dunbar. Canadian Geotechnical Journal, 1987, Vol. 24, pp. 232-241.

Foundation design for the SkyDome Stadium, Toronto, with K.Y. Lo, Canadian Geotechnical Journal, 1989, Vol. 26, pp. 22-33.

JASON D. MAUCHAN, M.ENG.

FIELD ENGINEER

EDUCATION

BACHELOR OF CIVIL ENGINEERING, QUEENS UNIVERSITY, KINGSTON, 2000

MASTER OF ENVIRONMENTAL ENGINEERING, ROYAL MILITARY COLLEGE OF CANADA, 2003

TEACHER'S COLLEGE, UNIVERSITY OF CANTERBURY, NEW ZEALAND, 2004

EXPERIENCE

2010 – Present

Decommissioning Consulting Services Limited, Ottawa & Yellowknife offices:

Responsibilities include the site supervision and management of site decommissioning for various sites in the Northwest Territories and also providing site assessment and remediation supervision for various ongoing projects. Responsibilites in Ottawa providing engineering services for various Phase I and II ESA, Remediation and Risk Assessment Projects.

- DEW line site PIN-B on the Arctic Ocean in Nunavut. The job involved supervising contractor's remedial works which included demolition of structures (wood and steel), confirmation and verification testing (bulk sampling and Petro-flag field kit testing) for PHCs, construction supervision for the non-hazardous material landfill, PCB waste management and documentation preparation, quantity tracking and daily reporting.
- Field Engineer for Geotechnical Investigation and Phase II ESA of 400 Clarence Street Ottawa for the City of Ottawa. Supervised drilling of geotechnical and environmental boreholes.
- Great Bear Lake Phase I Remediation Program The Project entailed the processing of over 11,000 drums, the clean-up of waste debris and hazardous materials, building demolition, regulatory documentation, and hydrocarbon-contaminated soils excavation work. Mr. Mauchan presented the remediation details to elders at the Community Meetings in Déline, January 2011.

- McGee Former Landfill Monitoring – work included field sampling of 14 existing site monitoring wells for PHC, PAH, VOC, Metals, Phenoxy Herbicide, OC and OP Pesticide parameters, as well as shipment of samples to lab and preparation of chain of custody forms. In office duties included creating comparison tables of current and historical results of the groundwater monitoring, which entailed compilation and re formatting of data from reports produced by multiple environmental firms.
- Hawthorne Road Phase II ESA, Ottawa – duties included supervising borehole advancement and conduction sampling for suspected PHC contamination in former and current fuel storage tank locations.
- McGee Former Landfill Monitoring - included field sampling of 14 existing site monitoring wells for PHC, PAH, VOC, Metals, Phenoxy Herbicide, OC and OP Pesticide parameters, as well as shipment of samples to lab and preparation of chain of custody forms.
- Kingsview Park Preliminary Quantitative Risk Assessment and Erosion Study, Kingsview Park. Conducted the primary field investigations which involved determining shoreline elevations and slope at various transect locations photographing general site conditions and shoreline conditions for the purposes of describing impacts of shoreline erosion.

2005 – 2006

AMEC Earth and Environmental, North Wales, UK

- Phase I and II ESAs; various locations in Northern England and Wales. Work scope included test pit programs, groundwater well installations and ground gas monitoring. Developed liaising skills through frequent stakeholder meetings.
- Surface Water Quality projects; project manager for lake surveying and on-going water monitoring program at Chester Business Park and Handsworth Park, Birmingham. Constructed in-situ oxygen diffuser systems for lakes across the UK. Developed knowledge of compliance with government regulations.

2001 – 2003

Environmental Sciences Group, Kingston, Ontario

- Tank Removal/ Fuel Pad Delineation; conducted at Dye-Main DEW Line site on Baffin Island, Nunavut. Two field seasons spent conducting delineation work at Cape Dyer. Phase II ESA delineation work completed in addition to Phase III

ESA remediation program. Hydrocarbon – contaminated soils were land-farmed as a bio-remediation strategy.

- Lennard Island Lighthouse Station Phase II ESA; project involved the Phase II ESA delineation of the Canadian Coast Guard lighthouse garden soils. Responsibilities included GPS mapping of the site. GIS skills were developed.
- Contaminant Mapping at various DEW Line sites; soil and groundwater monitoring was completed at the Fox-M, Fox-B, Fox-5 and Baf-3 radar sites. Project management and coordination skills were developed during work completed at these remote northern sites.

2000 – 2002

Researcher; Royal Military College of Canada, Kingston, Ontario

- Bioremediation of Hydrocarbon-Contaminated Soils; Field research was completed at Canadian Forces Station Alert, Ellesmere Island, Nunavut. Three field seasons on-site at in Alert. Supervised construction of biopiles and landfarms. Monitoring was completed for contaminant levels in soils. Developed Standard Operating Procedures for clean-up of diesel spills. Laboratory work included analyzing F1-F4 hydrocarbon levels. Reporting was provided to the Department of National Defense. Public speaking skills were developed through numerous presentations to military officials.

1999

Volunteer; Mushkegowuk Council- James Bay Region, Ontario

- Mid-Canada Line Soil Delineation Program; Soil sampling of PCB contamination was completed in Fort Albany, Ontario. Assisted in the Phytoremediation of PCBs pilot project. Met with Cree Elders. Developed community liaison skills.

SHORT COURSES

2011 First Aid and CPR re-certification
2011 Asbestos Awareness Training (per OSHA Title29 CFR 1926.1101.)
2010 Operation of Small Drinking Water Systems
2010 8-hr Hazmat Refresher Course
2009 Wilderness First Aid
2006 Power Boating Safety Certificate, Liverpool
2002 40 –hr Hazmat OSHA Course
1999 Rock climbing Level 1 Certificate