

The electronic version of this file/report should have the file name:

Type of document.Spill Number.Year-Month.File *Year-Year* or Report name.pdf

letter. _____ . _____ - _____ .File spillfile _____ .pdf

report. V00353 . 1999 - 07-26 . OFF-SITE .pdf
SURFICIAL SOIL INVESTIGATION

Project Site numbers will be proceeded by the following:

Municipal Brownfields - b

Superfund - hw

Spills - sp

ERP - e

VCP - v

BCP - c

non-releasable - put .nf.pdf

Example: letter.sp9875693.1998-01.Filespillfile.nf.pdf



XCG CONSULTANTS LTD.



ENVIRONMENTAL ENGINEERING SPECIALISTS





DRAFT

ENVIRONMENTAL
ENGINEERING
SPECIALISTS

XCG File #5-997-01-11

July 26, 1999

DRAFT

OFF-SITE SURFICIAL
SOIL INVESTIGATION
3241 WALDEN AVENUE
DEPEW, NEW YORK

7/26/99

RECEIVED

JUL 27 1999

NYSDEC - REG. 9
REL FOIL
UNREL

Mr. Paul Stokes-Rees
Manager of Environment, North America
NORAMPAC, INC.
7830 Tranmere Drive
Mississauga, Ontario
L5S 1L9

DRAFT

Richard J. Rush, M.A.Sc., P.Eng., CEA
Partner

DRAFT

Basil Wong, M.Eng., P.Eng.
Project Manager

XCG Consultants Ltd.
Suite 904
50 Queen St. N.
Kitchener, ON
Canada
N2H 6P4
Tel: (519) 741-5774
Fax: (519) 741-5627
E-mail:
kitchener@xcg.com

5-997-01-11
5997-01.11\NR99701110.DOC



TABLE OF CONTENTS

1. INTRODUCTION 1-1
1.1 PROJECT BACKGROUND..... 1-1
1.2 OBJECTIVES AND SCOPE OF WORK 1-1
2. SITE DESCRIPTION 2-1
2.1 SITE BACKGROUND 2-1
3. FIELD INVESTIGATION 3-1
3.1 SOIL SAMPLING METHODOLOGY 3-1
3.2 QA/QC METHODS..... 3-1
4. APPLICABLE GUIDELINE CRITERIA 4-1
5. RESULTS 5-1
5.1 SOIL RESULTS..... 5-1
5.1.1 *Summary of Soil Results*..... 5-6
5.2 QA/QC..... 5-6
6. LIMITATIONS AND CONCLUSIONS 6-1
6.1 LIMITATIONS 6-1
6.2 CONCLUSIONS 6-1

FIGURE

FIGURE 1 Borehole Location Plan 1-2

TABLES

TABLE 1 Metals Analytical Results in Soil -
Adjacent West Property and Walden Avenue..... 5-2
TABLE 2 Metals Analytical Results in Soil - Railway Berm..... 5-4

APPENDIX

APPENDIX A Laboratory Certificates of Analyses

1. INTRODUCTION

1.1 Project Background

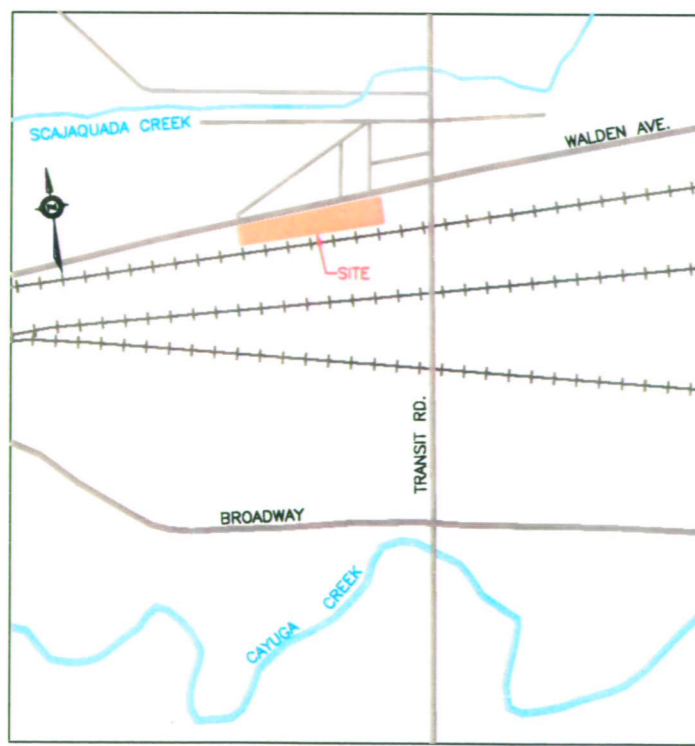
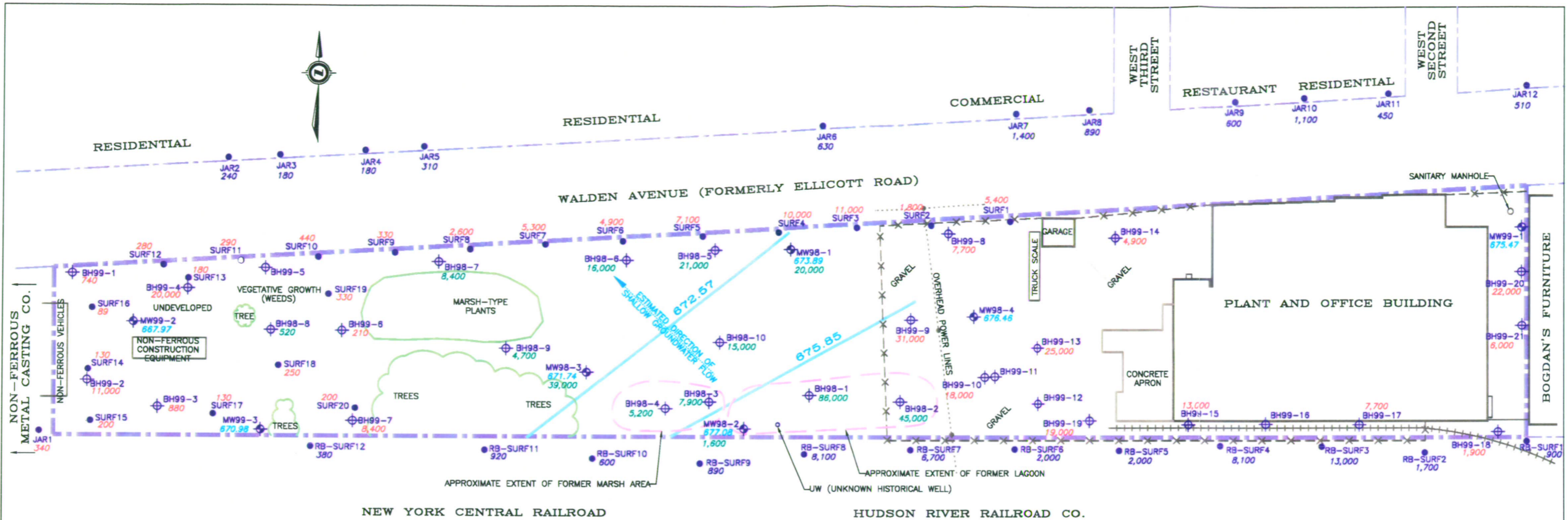
In June and July 1999, XCG Consultants Ltd. (XCG) was retained by Norampac, Inc. (Norampac) to carry out an Off-Site Surficial Soil Investigation of selected neighbouring properties located near 3241 Walden Avenue in Depew, New York. This study follows XCG's Limited Phase 2 Environmental Site Assessment (ESA) conducted between October 1998 and February 1999, and Additional Phase 2 ESA performed between April and May, 1999. The previous Phase 2 ESAs identified the presence of elevated levels of metals, such as lead, in the fill soils throughout the subject property.

1.2 Objectives and Scope of Work

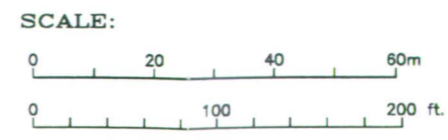
The overall objective of the Off-Site Surficial Soil Investigation was to investigate the concentrations of metals, specifically lead, on neighbouring properties near the subject site.

The Off-Site Surficial Soil Investigation was conducted in two phases. The initial samples were collected in June 1999, as verbally requested by Norampac. The second round of sampling was conducted in accordance with XCG's letter proposal under the title "Proposal for Additional Off-Site Sampling, Railway Berm, 3241 Walden Avenue, Depew, New York," dated July 9, 1999. Minor modifications were made to this proposal. The final scope of work completed on the neighbouring properties to the subject site included the following:

- Collecting one surficial soil sample at the southeast corner of the adjacent property to the west (see Figure 1);
- Collecting surficial soil samples at eleven locations on the grass boulevard located along the north side of Walden Avenue;
- Collecting surficial soil samples at twelve locations along the railway berm adjacent to the south side of the subject property;
- Submitting 25 soil samples for laboratory analyses of metals, including one blind duplicate for quality assurance/quality control (QA/QC) purposes; and
- Preparing a report outlining the subsurface environmental conditions at the investigated locations on the neighbouring properties.



- LEGEND:**
- PROPERTY BOUNDARY
 - x-x- FENCE
 - ◆ APPROXIMATE EXISTING MONITORING WELL LOCATION
 - ◆ APPROXIMATE EXISTING BOREHOLE LOCATION
 - SURFACE GRAB SAMPLE LOCATION
 - 1,600 LEAD CONCENTRATION (ppm) IN FILL MATERIAL (OCTOBER & DECEMBER 1998)
 - 7,700 LEAD CONCENTRATION (ppm) IN FILL MATERIAL (APRIL & JUNE 1999)
 - 2,000 LEAD CONCENTRATION (ppm) IN OFF-SITE MATERIAL (JUNE & JULY 1999)
 - 671.74 GEODETIC GROUNDWATER ELEVATION (ft) (APRIL 14&15, 1999)
 - 672.57 GEODETIC GROUNDWATER ELEVATION CONTOURS (ft) (APRIL 14&15, 1999)



BOREHOLE LOCATION PLAN		
OFF-SITE SURFICIAL SOIL INVESTIGATION 3241 WALDEN AVE. DEPEW, NEW YORK		
XCG XCG CONSULTANTS LTD.		
DATE	JOB NO.	FIGURE NO.
JULY 1999	5997-01.11	1

DRAWING REFERENCE: Based on survey drawing by Norampac, Inc. (Millard & McKay)
NOTE: Locations of buildings, underground utilities, etc. are for reference only and should not be relied upon for detail design, excavation, or construction purposes.

(file: 5997\01\WALDEN11.DWG)

2. SITE DESCRIPTION**2.1 Site Background**

The subject site is located at 3241 Walden Avenue in Depew, New York. It is situated on the south side of Walden Avenue, approximately 107 metres (350 feet) west of Transit Road. The site is located in a mixed commercial/industrial and residential area. Commercial/industrial properties adjoin the east and west sides of the subject site. Residential properties are predominantly located across the street, on the north side of Walden Avenue. A New York Central Railway line borders the south property line. This railway line is elevated by a berm approximately 1.2 to 1.5 metres (4 to 5 feet) high.

The property is approximately 3.04 hectares (7.5 acres) in size, of which approximately half is developed. There is one main building located on the east side of the subject property and a small garage situated to the west, at the north property line. Truck loading and unloading operations and trailer parking are conducted on the west side of the plant building. This area is surfaced with gravel and is surrounded by a chain-link fence. The area to the west of the trucking area is undeveloped. The east side of the site is paved with asphalt and is used for employee parking.

XCG conducted a Limited Phase 2 ESA on the subject property between October 1998 and February 1999. The findings are provided in XCG's Draft report under the title "Limited Phase 2 Environmental Site Assessment, 3241 Walden Avenue, Depew, New York," dated February 10, 1999. Subsequent to this initial study, XCG conducted a further Phase 2 ESA, the findings of which are provided in XCG's Draft report under the title "Additional Phase 2 Environmental Site Assessment, 3241 Walden Avenue, Depew, New York," dated May 18, 1999. Further, XCG completed a Limited Phase 1 ESA. A final report was issued under the title "Limited Phase 1 Environmental Site Assessment, Former N.L. Industries Site, 3241 Walden Avenue, Depew, New York," dated June 11, 1999. Copies of these reports have been provided to the New York State Department of Environmental Conservation (NYSDEC).

Details of these three studies are provided in the aforementioned reports. In brief, historical on-site operations have impacted a majority of the surficial soils with metals. The analytical results indicated that concentrations of selected metals (e.g. lead, copper, zinc) in the fill material exceeded the NYSDEC's TAGM 4046 Cleanup Objectives, or Eastern USA/New York State Background Values for metals where Cleanup Objectives have not been established. TCLP metals analyses indicated that the fill material in some areas is hazardous, according to 6NYCRR Part 371 (i.e. lead concentrations in leachate exceeding 5 mg/L). The previous Phase 2 ESAs focussed on sampling of soil situated on-site.

3. FIELD INVESTIGATION

The field investigation activities were conducted on June 17 and July 12, 1999. The first round of XCG's field activities were supervised by Mr. Luke Totzke, while the second set of off-site samples were collected by Mr. Basil Wong, P.Eng. A description of the field investigation methodology used is provided below.

3.1 Soil Sampling Methodology

The surficial soil samples were collected manually with a stainless steel trowel. The samples were obtained from surface to a depth of 0.05 metres (2 inches) below grade. The trowel was cleaned with distilled water and detergent between sampling locations to prevent cross-contamination. The surficial soil samples were placed in laboratory prepared glass jars and stored in a cooler (containing ice/cooler packs) prior to delivery to the laboratory. The samples were analyzed for metals and were conducted by Philip Analytical Services Corp. (PASC) of Burlington, Ontario. PASC's Burlington laboratory is certified with the New York State Department of Health (ELAP Certification, ID #10756).

The initial sampling locations (see Figure 1) were chosen with input from Mr. Paul Stokes-Rees, of Norampac, and Mr. Gerald Pietraszek, of the NYSDEC, who were both present during the first round of off-site sampling. Twelve off-site samples were collected. One of these samples was located near the southeast corner of the adjacent property to the west (JAR1), while the remaining samples were collected from the grass boulevard on the north side of Walden Avenue (JAR2 to JAR12).

The second round of off-site samples were collected along the railway berm adjacent to the south side of the subject property. Samples were collected from twelve locations and were identified as RB-SURF1 to RB-SURF12. The sampling locations were selected based on discussions between XCG and Norampac. The surficial soil samples were generally obtained from the edge of the railway berm, before it slopes down towards the subject property. The number of samples and locations were selected to be relatively consistent with the sampling conducted on the north side of Walden Avenue.

3.2 QA/QC Methods

A blind duplicate sample from RB-SURF8 was submitted for laboratory analyses for QA/QC purposes, and was identified as RB-BW1. PASC also has a standard internal QA/QC program. As part of these procedures, a lab method blank, method spiked blank, and matrix spike are analyzed during the testing of the

DRAFT

FIELD INVESTIGATION

samples. In addition, PASC conducts a laboratory duplicate analysis of one soil sample for every fourteen samples submitted. A laboratory duplicate analysis of metals was conducted for soil sample RB-SURF1.

4. APPLICABLE GUIDELINE CRITERIA

In New York State, analytical results of soil are compared to the criteria outlined in the NYSDEC Division of Technical and Administrative Guidance Memorandum (TAGM) 4046, under the title "Determination of Soil Cleanup Objectives and Cleanup Levels," dated January 24, 1994 (revised).

The TAGM 4046 Recommended Soil Cleanup Objectives for certain metals provide the option of using either the specified value or using site Background Values. For other metals, the Cleanup Objective is the site Background Value. Site-specific Background Values have not yet been established and agreed upon between Norampac and the NYSDEC. Therefore, the analytical metal results were initially compared to the specified Cleanup Objectives (where available) or were compared to the Eastern USA/New York State Background Values. A range of Eastern USA and New York State Background Values for most metals are provided in TAGM 4046. Background values at the subject property and surrounding area are expected to be affected by the fact that it is located in an industrial area and is adjacent to a railway corridor. Therefore, the higher values were used when comparing analytical results to the Eastern USA and New York State Background Values. Site-specific Cleanup Objectives will need to be established and agreed to by Norampac and the NYSDEC. For the purpose of this report, the metals results were compared to values identified in TAGM 4046.

5. RESULTS**5.1 Soil Results**

In total, 25 soil samples were submitted to PASC for analyses of metals. A summary of the analytical results is presented in Tables 1 and 2. Copies of the Certificates of Analyses from PASC are included in Appendix A.

Adjacent Property to the West

One surficial soil sample (JAR1) was obtained from the southeast corner of the adjacent property to the west. The analytical results of this sample are summarized in Table 1. Sample JAR1 contained concentrations of a number of metals that exceeded the TAGM 4046 Cleanup Objectives or Eastern USA/New York State Background Values (for metals where Cleanup Objectives have not been established), including beryllium, cadmium, calcium, chromium, copper, iron, magnesium, nickel, and zinc. However, the concentration of lead in this sample, which was 340 parts per million (ppm), was below the typical range of 200 to 500 ppm found in metropolitan areas (as identified in TAGM 4046). The lead concentrations of surficial soil samples collected from off-site locations are shown on Figure 1.

North Side of Walden Avenue

Surficial soil samples JAR2 to JAR12 were collected from the grass boulevard located along the north side of Walden Avenue. The analytical results (see Table 1) indicate that a number of metals in these eleven samples, similar to sample JAR1, exceeded the TAGM 4046 Cleanup Objectives or Eastern USA/New York State Background Values (for metals where Cleanup Objectives have not been established). The concentration of lead in samples JAR 6 (630 ppm), JAR 7 (1,400 ppm), JAR 8 (890 ppm), JAR 9 (600 ppm), JAR 10 (1,100 ppm), and JAR 12 (510 ppm) exceeded the typical range of 200 to 500 ppm found in metropolitan areas (as identified in TAGM 4046). These six samples were located on the grass boulevard on the north side of Walden Avenue, across from the eastern half of the subject site.

TABLE 1
METALS ANALYTICAL RESULTS IN SOIL - ADJACENT WEST PROPERTY AND WALDEN AVENUE

PARAMETER (ppm)	MDL	JAR 1	JAR 2	JAR 3	JAR 4	JAR 5	JAR 6	NYSDEC-TAGM 4046	
								Cleanup Objectives	Eastern USA Background
Depth (m)	-	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05		
Lab ID Number	-	032971 99	032972 99	032973 99	032974 99	032975 99	032976 99		
Sampling Date	-	99/06/17	99/06/17	99/06/17	99/06/17	99/06/17	99/06/17		
Aluminum	3	5,700	6,000	6,800	8,000	3,900	3,300	SB	33,000
Barium	0.1	170	71	66	67	75	51	300 or SB	15-600
Beryllium	0.1	0.2	0.4	0.4	0.5	0.3	0.3	0.16 or SB	0-1.75
Cadmium	0.2	2.4	3.7	1.0	1.2	3.5	2.2	1 or SB	0.1-1
Calcium	20	150,000	70,000	56,000	60,000	91,000	140,000	SB	130-35,000*
Chromium	0.4	150	51	38	36	74	50	10 or SB	1.5-40*
Cobalt	1	5.0	5.0	5.0	7.0	5.0	3.0	30 or SB	2.5-60*
Copper	0.6	280	210	150	130	320	620	25 or SB	1-50
Iron	1	39,000	19,000	18,000	19,000	20,000	17,000	2,000 or SB	2,000-550,000
Lead	2	340	240	180	180	310	630	SB**	**
Magnesium	5	9,800	15,000	13,000	17,000	16,000	17,000	SB	100-5,000
Manganese	0.5	2,200	430	400	450	430	380	SB	50-5,000
Molybdenum	1	18	3.0	2.0	2.0	5.0	3.0	NV	NV
Nickel	1	60	28	25	27	43	38	13 or SB	0.5-25
Phosphorus	6	460	620	600	770	420	290	NV	NV
Potassium	100	570	900	930	1,200	450	430	SB	8500-43,000*
Silver	1	<	<	<	<	<	<	SB	NV
Sodium	10	220	930	1,200	910	440	1,200	SB	6,000-8,000
Thallium	6	<	<	<	<	<	<	SB	NV
Vanadium	0.5	27	15	16	18	13	10	150 or SB	1-300
Zinc	0.5	530	410	360	320	690	790	20 or SB	9-50

NOTES:

NYSDEC New York State Department of Environmental Conservation

SB Site Background

Bold values indicate exceedance of Recommended Soil Cleanup Objectives

Analysis conducted by Philip Analytical Services Corporation, New York State ELAP ID #1075

** Background levels for lead vary widely. Undeveloped, rural areas may range from 4-61 ppm, Metropolitan or suburban areas or near highways may range from 200-500 ppm

TAGM 4046 NYSDEC Technical and Administrative Guidance Memorandum 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels" revised January 24, 1994, Recommended Soil Cleanup Objectives.

mg/kg ppm

NV No Value

MDL Method Detection Limit

* New York State Background

TABLE 1
METALS ANALYTICAL RESULTS IN SOIL - ADJACENT WEST PROPERTY AND WALDEN AVENUE (cont'd)

PARAMETER (ppm)	MDL	JAR 7	JAR 8	JAR 9	JAR 10	JAR 11	JAR 12	NYSDEC-TAGM 4046	
								Cleanup Objectives	Eastern USA Background
Depth (m)	-	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05		
Lab ID Number	-	032977 99	032978 99	032979 99	032980 99	032981 99	032982 99		
Sampling Date	-	99/06/17	99/06/17	99/06/17	99/06/17	99/06/17	99/06/17		
Aluminum	3	3,500	3,600	4,100	4,000	4,400	4,200	SB	33,000
Barium	0.1	57	72	80	60	64	76	300 or SB	15-600
Beryllium	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.16 or SB	0-1.75
Cadmium	0.2	2.7	1.9	2.5	2.6	2.8	2.8	1 or SB	0.1-1
Calcium	20	89,000	88,000	80,000	83,000	83,000	78,000	SB	130-35,000*
Chromium	0.4	53	56	47	48	62	65	10 or SB	1.5-40*
Cobalt	1	4.0	4.0	4.0	4.0	4.0	5.0	30 or SB	2.5-60*
Copper	0.6	940	670	460	520	340	290	25 or SB	1-50
Iron	1	19,000	21,000	22,000	21,000	23,000	22,000	2,000 or SB	2,000-550,000
Lead	2	1,400	890	600	1,100	450	510	SB**	**
Magnesium	5	14,000	13,000	13,000	13,000	15,000	15,000	SB	100-5,000
Manganese	0.5	400	410	410	430	470	470	SB	50-5,000
Molybdenum	1	5.0	4.0	4.0	4.0	4.0	4.0	NV	NV
Nickel	1	38	39	32	35	34	31	13 or SB	0.5-25
Phosphorus	6	440	490	400	430	430	620	NV	NV
Potassium	100	360	400	440	370	520	430	SB	8500-43,000*
Silver	1	<	<	<	<	<	<	SB	NV
Sodium	10	840	610	670	1,000	570	1,400	SB	6,000-8,000
Thallium	6	<	<	<	<	<	<	SB	NV
Vanadium	0.5	11	11	12	13	15	15	150 or SB	1-300
Zinc	0.5	2,000	1,300	950	1,100	840	830	20 or SB	9-50

NOTES:

NYSDEC New York State Department of Environmental Conservation

SB Site Background

Bold values indicate exceedance of Recommended Soil Cleanup Objectives

Analysis conducted by Philip Analytical Services Corporation, New York State ELAP ID #1075

** Background levels for lead vary widely. Undeveloped, rural areas may range from 4-61 ppm, Metropolitan or suburban areas or near highways may range from 200-500 ppm

TAGM 4046 NYSDEC Technical and Administrative Guidance Memorandum 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels" revised January 24, 1994, Recommended Soil Cleanup Objectives.

mg/kg ppm

NV No Value

MDL Method Detection Limit

* New York State Background

TABLE 2
METALS ANALYTICAL RESULTS IN SOIL - RAILWAY BERM

PARAMETER (ppm)	MDL	RB-SURF1	RB-SURF1 DUP	RB-SURF2	RB-SURF3	RB-SURF4	RB-SURF5	RB-SURF6	NYSDEC-TAGM 4046	
									Cleanup Objectives	Eastern USA Background
Depth (m)	-	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05		
Lab ID Number	-	037804 99	037804 99	037805 99	037806 99	037807 99	037808 99	037809 99		
Sampling Date	-	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12		
Aluminum	3	6,100	6,200	5,600	6,200	6,400	4,500	4,700	SB	33,000
Barium	0.1	170	150	72	100	160	72	91	300 or SB	15-600
Beryllium	0.1	0.7	0.7	0.5	0.7	0.8	0.7	0.6	0.16 or SB	0-1.75
Cadmium	0.2	2.2	2.2	2.1	5.1	5.7	2.1	2.6	1 or SB	0.1-1
Calcium	20	89,000	86,000	65,000	10,000	19,000	38,000	54,000	SB	130-35,000*
Chromium	0.4	25	25	30	53	62	25	40	10 or SB	1.5-40*
Cobalt	1	6.0	6.0	7.0	5.0	7.0	6.0	8.0	30 or SB	2.5-60*
Copper	0.6	760	780	1,300	19,000	12,000	1,700	1,600	25 or SB	1-50
Iron	1	25,000	25,000	33,000	32,000	42,000	50,000	52,000	2,000 or SB	2,000-550,000
Lead	2	900	930	1,700	13,000	8,100	2,000	2,000	SB**	**
Magnesium	5	11,000	11,000	13,000	3,000	5,100	4,200	4,600	SB	100-5,000
Manganese	0.5	370	360	410	370	450	370	430	SB	50-5,000
Molybdenum	1	2.0	3.0	3.0	4.0	6.0	4.0	6.0	NV	NV
Nickel	1	34	35	42	75	65	49	58	13 or SB	0.5-25
Phosphorus	6	680	670	710	720	800	530	820	NV	NV
Potassium	100	980	1,000	1,000	740	820	650	630	SB	8500-43,000*
Silver	1	<	<	<	8.1	5.3	<	<	SB	NV
Sodium	10	190	190	220	190	240	210	290	SB	6,000-8,000
Thallium	6	<	<	9.0	7.0	8.0	10	12	SB	NV
Vanadium	0.5	23	23	19	19	23	19	24	150 or SB	1-300
Zinc	0.5	850	840	1,900	4,300	4,100	2,500	2,700	20 or SB	9-50

NOTES:

NYSDEC New York State Department of Environmental Conservation

SB Site Background

Bold values indicate exceedance of Recommended Soil Cleanup Objectives

Analysis conducted by Philip Analytical Services Corporation, New York State ELAP ID #1075

** Background levels for lead vary widely. Undeveloped, rural areas may range from 4-61 ppm, Metropolitan or suburban areas or near highways may range from 200-500 ppm

TAGM 4046 NYSDEC Technical and Administrative Guidance Memorandum 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels" revised January 24, 1994, Recommended Soil Cleanup Objectives.

mg/kg ppm

NV No Value

MDL Method Detection Limit

* New York State Background

TABLE 2
METALS ANALYTICAL RESULTS IN SOIL - RAILWAY BERM (cont'd)

PARAMETER (ppm)	MDL	RB-SURF7	RB-SURF8	RB-BW1	RB-SURF9	RB-SURF10	RB-SURF11	RB-SURF12	NYSDEC-TAGM 4046	
									Cleanup Objectives	Eastern USA Background
Depth (m)	-	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05	0 - 0.05		
Lab ID Number	-	037810 99	037811 99	037816 99	037812 99	037813 99	037814 99	037815 99		
Sampling Date	-	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12		
Aluminum	3	6,800	5,500	5,700	3,900	4,100	4,700	4,900	SB	33,000
Barium	0.1	76	82	81	63	60	96	88	300 or SB	15-600
Beryllium	0.1	0.8	0.7	0.8	0.7	0.6	0.8	0.9	0.16 or SB	0-1.75
Cadmium	0.2	2.8	3.7	3.8	1.5	1.3	2.1	1.4	1 or SB	0.1-1
Calcium	20	17,000	28,000	26,000	26,000	59,000	13,000	14,000	SB	130-35,000*
Chromium	0.4	21	20	19	21	28	27	23	10 or SB	1.5-40*
Cobalt	1	8.0	9.0	9.0	5.0	6.0	5.0	7.0	30 or SB	2.5-60*
Copper	0.6	6,400	5,900	6,300	700	500	540	330	25 or SB	1-50
Iron	1	36,000	40,000	39,000	47,000	41,000	36,000	49,000	2,000 or SB	2,000-550,000
Lead	2	6,700	8,100	8,700	890	600	920	380	SB**	**
Magnesium	5	2,500	3,700	4,100	2,700	4,400	900	1,300	SB	100-5,000
Manganese	0.5	310	340	330	320	310	340	350	SB	50-5,000
Molybdenum	1	8.0	6.0	6.0	4.0	4.0	4.0	4.0	NV	NV
Nickel	1	130	110	120	34	33	29	30	13 or SB	0.5-25
Phosphorus	6	1,000	810	860	490	470	680	500	NV	NV
Potassium	100	830	800	850	690	630	980	860	SB	8500-43,000*
Silver	1	1.1	1.3	1.3	<	<	<	<	SB	NV
Sodium	10	500	320	330	200	340	160	150	SB	6,000-8,000
Thallium	6	<	9.0	<	8.0	6.0	7.0	<	SB	NV
Vanadium	0.5	19	19	19	17	21	21	21	150 or SB	1-300
Zinc	0.5	12,000	7,000	7,400	1,100	880	850	470	20 or SB	9-50

NOTES:

NYSDEC New York State Department of Environmental Conservation mg/kg ppm SB Site Background
 NV No Value

Bold values indicate exceedance of Recommended Soil Cleanup Objectives MDL Method Detection Limit
 Analysis conducted by Philip Analytical Services Corporation, New York State ELAP ID #1075 * New York State Background
 ** Background levels for lead vary widely. Undeveloped, rural areas may range from 4-61 ppm, Metropolitan or suburban areas or near highways may range from 200-500 ppm

TAGM 4046 NYSDEC Technical and Administrative Guidance Memorandum 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels" revised January 24, 1994, Recommended Soil Cleanup Objectives.

Railway Berm

The analytical results of the surficial soil samples collected from the railway berm (RB-SURF1 to RB-SURF12) are summarized in Table 2. Similar to the other off-site soil samples, the samples collected from the railway berm contained a number of metals, including beryllium, cadmium, calcium, chromium, copper, iron, manganese, nickel, and zinc that exceeded the TAGM 4046 Cleanup Objectives or Eastern USA/New York State Background Values. The concentrations of lead in all twelve sampling locations, except for RB-SURF12 (380 ppm), exceeded the typical range of 200 to 500 ppm found in metropolitan areas (as identified in TAGM 4046). The highest lead concentrations were found along the east half of the railway berm, from the former lagoon to the east side of the subject property. The concentrations in this area ranged from 900 ppm in RB-SURF1 to 13,000 ppm in RB-SURF3 (see Figure 1).

5.1.1 *Summary of Soil Results*

In summary, the analytical data has shown that various levels of metals exist at selected off-site properties near the subject site. A number of metals, including lead, exceeded the TAGM 4046 Cleanup Objectives or Eastern USA/New York State Background Values (for metals where Cleanup Objectives have not been established). Off-site surficial soil samples were collected from 24 locations, mainly to the north and south of the subject property. The lead concentrations ranged from 180 ppm to 13,000 ppm.

5.2 *QA/QC*

A blind field duplicate of soil sample RB-SURF8, identified as RB-BW1, was analyzed for metals for QA/QC purposes. As shown on Table 2, the analytical results of the duplicate sample were comparable to the results of the original sample. In addition, the results of a laboratory duplicate of RB-SURF1 were similar to the concentrations of the original sample. Further, the results of PASC's internal QA/QC program (i.e. method blanks, spiked blanks, and matrix spike recoveries) were considered representative.

6. LIMITATIONS AND CONCLUSIONS

6.1 Limitations

This Off-Site Surficial Soil Investigation focused on identifying the metals concentrations in surficial soils at selected neighbouring properties near 3241 Walden Avenue in Depew, New York.

The conclusions drawn from the Off-Site Surficial Soil Investigation were based on information at selected observation and sampling locations on June 17 and July 12, 1999. In addition, the conclusions were based on the parameters that were chemically analyzed. Conditions between and beyond these locations may become apparent, during future investigations or on-site work, which could not be detected or anticipated at the time of this study. The off-site sample locations were chosen based on discussions with both Norampac, Inc. and the New York State Department of Environmental Conservation. The testing program was based on limited information provided by persons knowledgeable about the past and current activities on the site. As such, XCG cannot be held responsible for environmental conditions that were not apparent from the available information.

The scope of this report is limited to the matters expressly covered. This report was prepared for the sole benefit of Norampac, Inc. and may not be relied upon by any other person or entity without written authorization of XCG Consultants Ltd. As such, any use or reuse of this document (or the findings, conclusions, or recommendations represented herein), by parties other than Norampac, Inc., is at the sole risk of those parties.

6.2 Conclusions

The overall conclusion from this Off-Site Surficial Soil investigation is that surficial material at neighbouring properties near the subject site contains metals concentrations that exceed the TAGM 4046 Cleanup Objectives or Eastern USA/New York State Background Values. The lead concentrations ranged from 180 ppm to 13,000 ppm.

Supporting conclusions are as follows:

1. With respect to analytical results:
 - Analytical testing for metals was conducted in the surficial soil at 24 locations, mainly from the properties located to the north and south of the subject site.

- At the **adjacent property to the west**, one soil surficial soil sample was collected. The concentrations of a number of metals, including beryllium, cadmium, calcium, chromium, copper, iron, magnesium, nickel, and zinc exceeded the Cleanup Objectives or Eastern USA/New York State Background Values. However, the concentration of lead (340 ppm) was below the typical range found in metropolitan areas, as identified in TAGM 4046.
- At the **grass boulevard on the north side of Walden Avenue**, eleven surficial soil samples were collected for laboratory analyses. A number of metals in each sample exceeded the Cleanup Objectives or Eastern USA/New York State Background Values. The concentrations of lead in these samples ranged from 180 ppm to 1,400 ppm. The lead concentrations in six of these samples exceeded the typical range found in metropolitan areas, as identified in TAGM 4046.
- At the **railway berm**, surficial soil samples were collected from twelve locations. A number of metals exceeded the Cleanup Objectives or Eastern USA/New York State Background Values. The concentrations of lead in these samples ranged from 380 ppm to 13,000 ppm. The concentrations of lead in eleven of the twelve locations exceeded the typical range found in metropolitan areas, as identified in TAGM 4046.

APPENDIX A
LABORATORY CERTIFICATES
OF ANALYSES



RECEIVED JUL - 7 1999

Certificate of Analysis

CLIENT INFORMATION

Attention: Basil Wong
Client Name: XCG Consultants Ltd.
Project: S-997-01-01
Project Desc:

Address: 1 Port St., East
 Suite 201
 Mississauga, Ontario
 L5G 4N1

Fax Number: 905 891-2554
Phone Number: 905 891-2400

LABORATORY INFORMATION

Contact: Ada Blythe, B.Sc., C.Chem.
Project: AN981300
Date Received: 99/06/21
Date Reported: 99/06/28

Submission No.: 9F0766
Sample No.: 032970-032982

NOTES:

'L' = not analysed 'L' = less than Method Detection Limits (MDL) 'NA' = no data available
LOQ can be determined for all analytes by multiplying the appropriate MDL X 3.33
All organic data is blank corrected except for PCDD/F, HI-Res MS and CLP volatile analyses
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DED/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Nineteenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

Certified by: 

Page 1

	Method	Blank	% Recovery	JAR 1	JAR 2	JAR 3	JAR 4	JAR 5	JAR 6	JAR 7	JAR 8		
Client ID:	Blank	Spike		(0-0.05)	(0-0.05)	(0-0.05)	(0-0.05)	(0-0.05)	(0-0.05)	(0-0.05)	(0-0.05)		
Lab No.:	032970 99	032970 99	032970 99	032971 99	032972 99	032973 99	032974 99	032975 99	032976 99	032977 99	032978 99		
Date Sampled:	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18	99/06/18		
Component	MDL	Units											
Aluminum	3	mg/kg	<	210	100	5700	6000	6800	8000	3900	3300	3500	3600
Barium	0.1	"	<	110	110	170	71	66	67	75	51	57	72
Beryllium	0.1	"	<	52	100	0.2	0.4	0.4	0.5	0.3	0.3	0.3	0.3
Cadmium	0.2	"	<	50	100	2.4	3.7	1.0	1.2	3.5	2.2	2.7	1.9
Calcium	20	"	<	1000	100	150000	70000	56000	60000	91000	140000	89000	88000
Chromium	0.4	"	<	100	100	150	51	38	36	74	50	53	56
Cobalt	1	"	<	100	100	5.0	5.0	5.0	7.0	5.0	3.0	4.0	4.0
Copper	0.6	"	1.3	100	100	280	210	150	130	320	620	940	670
Iron	1	"	<	1300	110	39000	19000	18000	19000	20000	17000	19000	21000
Lead	2	"	<	100	100	340	240	180	180	310	630	1400	890
Magnesium	5	"	<	1100	100	9800	15000	13000	17000	16000	17000	14000	13000
Manganese	0.5	"	<	100	100	2200	430	400	450	430	380	400	410
Molybdenum	1	"	<	50	100	18	3.0	2.0	2.0	5.0	3.0	5.0	4.0
Nickel	1	"	<	53	110	60	28	25	27	43	38	38	39
Phosphorus	6	"	<	520	100	460	620	600	770	420	290	440	490
Potassium	100	"	<	1000	100	570	900	930	1200	450	430	360	400
Silver	1.0	"	<	51	100	<	<	<	<	<	<	<	<
Sodium	10	"	<	1000	100	220	930	1200	910	440	1200	840	610
Thallium	6	"	<	100	100	<	<	<	<	<	<	<	<
Vandium	0.5	"	<	50	100	27	15	16	18	13	10	11	11
Zinc	0.5	"	0.7	200	100	530	410	360	320	690	790	2000	1300

6/28/99

PASC - Certificate of Analysis

Page 3 of 4

			JAR 9	JAR 10	JAR 11	JAR 12
Client ID:			(0-0.05)	(0-0.05)	(0-0.05)	(0-0.05)
Lab No.:			032979 99	032980 99	032981 99	032982 99
Date Sampled:			99/06/18	99/06/18	99/06/18	99/06/18
Component	MDL	Units				
Aluminum	3	mg/kg	4100	4000	4400	4200
Barium	0.1	"	80	60	64	76
Beryllium	0.1	"	0.3	0.3	0.3	0.3
Cadmium	0.2	"	2.5	2.6	2.8	2.8
Calcium	20	"	80000	83000	83000	78000
Chromium	0.4	"	47	48	62	65
Cobalt	1	"	4.0	4.0	4.0	5.0
Copper	0.6	"	460	520	340	290
Iron	1	"	22000	21000	23000	22000
Lead	2	"	600	1100	450	510
Magnesium	5	"	13000	13000	15000	15000
Manganese	0.5	"	410	430	470	470
Molybdenum	1	"	4.0	4.0	4.0	4.0
Nickel	1	"	32	35	34	31
Phosphorus	6	"	400	430	430	620
Potassium	100	"	440	370	520	430
Silver	1.0	"	<	<	<	<
Sodium	10	"	670	1000	570	1400
Thallium	6	"	<	<	<	<
Vanadium	0.5	"	12	13	15	15
Zinc	0.5	"	950	1100	840	830

JUL-26-99 MON 02:56 PM XCG

FAX NO. 905 891 2554

P. 05/11

6/28/99

PASC - Summary of Analysis Pre. Dates

Page MS-4 of 4

Batch Code:	0624HSB1
Aluminum	032970 99
	032971 99
	032972 99
	032973 99
	032974 99
	032975 99
	032976 99
	032977 99
	032978 99
	032979 99
	032980 99
	032981 99
	032982 99
Run Date:	99/06/25
Date of Sample Prep:	99/06/24



PHILIP ANALYTICAL SERVICES CORPORATION
 5735 McAdam Road
 Mississauga, Ontario L4Z 1N9

Tel: (905) 890 8566
 Fax: (905) 890-8575
 Wats: 1-800-263 9040

Work Order: _____
 Comments: _____

LABORATORY USE ONLY

CHAIN OF CUSTODY RECORD

Client: XCL CONSULTANTS
1 PORT ST. EAST
MISSISSAUGA, ONTARIO L5L 4N2
 Contact: KASIL WONG
 Phone: 905-891-2400 Fax: 905-891-2554

PASC Quote #: As per previous project Page 1 of 2
 Client P.O. #: _____
 Client Project #: 5-997-01-11
 Sampled by: Basil Wong
 Please specify Guidelines (if applicable) Burlington Lab to Analyze (i.e. ELAP (B1))

Invoice to (if other than above):

Paul Stokes-Rice
Newmarket, Ont.
7300 Transcanada Drive
Mississauga, Ont L5S 1L9

Analysis Required:

Sample #	Client Sample I.D.	Date Sampled	Time Sampled	Analysis
1	RB-SURF 1	Jul 12 '99		/
2	RB-SURF 2	"		/
3	RB-SURF 3	"		/
4	RB-SURF 4	"		/
5	RB-SURF 5	"		/
6	RB-SURF 6	"		/
7	RB-SURF 7	"		/
8	RB-SURF 8	"		/
9	RB-SURF 9	"		/
10	RB-SURF 10	"		/
11	RB-SURF 11	"		/
12	RB-SURF 12	"		/

TAT (Turnaround Time)

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

*some exceptions apply, please contact Lab
 SID 5-7 Business Days

RUSH Specify Date _____

Time

Sample Matrix	No. of Containers	Comments/Contamination/ Site History
Soil	1	
"	"	
"	"	
"	"	
"	"	
"	"	
"	"	
"	"	
"	"	
"	"	
"	"	
"	"	

Samples Relinquished to PASC by:
 (Client Signature) [Signature]
 Samples Received in Lab by: [Signature]

Date: 7-12-99 Time: 4:30
 Date: 7-12-99 Time: 9:00

Method of Shipment

Condition of samples upon receipt at lab:

White: Philip Yellow: Mail Pink: Receiver Goldenrod: Client

COC60799

JUL-26-99 MON 02:56 PM XCG
 07/26/99 MON 09:30 FAX 905 878 7462
 SOMERVILLE PACKAGING
 FAX NO. 905 891 2554
 P. 07/11
 0002



PHILIP ANALYTICAL SERVICES CORPORATION

5735 McAdam Road
Mississauga, Ontario L4Z 1N9

Tel: (905) 890-8566
Fax: (905) 890-8575
Wats: 1-800-263-9040

Work Order: _____

Comments: _____

CHAIN OF CUSTODY RECORD

Client: ALCO CONSULTANTS

PASC Quote #: As per previous project Page 2 of 2

Contact: Basel Wong

Client P.O. #: _____

Client Project #: 5-497-01-11

Phone: 905-891-7400 Fax: 905-891-7561

Sampled by: Basel Wong

Please specify Guideline (if applicable): Sanitation Lab to analyze (in BLAP Cont)

Invoice to (if other than above):
Point Source Port

Analysis Required:

TAT (Turnaround Time)

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

*some exceptions apply, please contact Lab
STD 5-7 Business Days

RUSH Specify Date _____

Time

Sample #	Client Sample ID.	Date Sampled	Time Sampled	Sample Matrix	No. of Containers	Comments/Contamination/ Site History
1	PR-BW-1	Sept 16, 99	11:00 AM	Soil	1	
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Samples Relinquished to PASC by (Client Signature): [Signature]

Date: 7-27-99 Time: 11:30 AM

Method of Shipment

Samples Received in lab by: [Signature]

Date: 7-27-99 Time: 7:00

Condition of samples upon receipt at lab:

White: Philip Yellow: Mail Pink: Receiver Goldenrod: Client

CQC00799

JUL-26-99 MON 02:56 PM XCG
V1720759 SUN 05:02:24 200 010 1402
SUMMARY FILE TRANSMITTING
FAX NO. 905 891 2554
P. 08/11
09003



Certificate of Analysis

CLIENT INFORMATION

Attention: Basil Wong
Client Name: XCG Consultants Ltd.
Project: 5-997-01
Project Desc:

Address: 1 Port St, East
Suite 201
Mississauga, Ontario
L5G 4N1
Fax Number: 905 891-2554
Phone Number: 905 891-2400

LABORATORY INFORMATION

Contact: Ada Blythe, B.Sc., C.Chem.
Project: AN981300
Date Received: 99/07/13
Date Reported: 99/07/21

Submission No.: 9G0375
Sample No.: 037803-037816

NOTES:

'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available
LOQ can be determined for all analytes by multiplying the appropriate MDL X 3.33
All organic data is blank corrected except for PCDD/F, Hi-Res MS and CLP volatile analytes
Solids data is based on dry weight except for biota analyses.
Organic analytes are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analytes)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Nineteenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

(1) Sample concentration(s) too high to differentiate spike

Certified by: 

Page 1

PHILIP ANALYTICAL SERVICES CORPORATION

5445 North Service Road, Burlington, Ontario, Canada L7R 5H7 Tel: (905) 332-4799 Fax: (905) 332-9169



7/21/99

PASC - Certificate of Analysis

Page 2 of 3

Component	MDL	Units	Method	Blank	% Recovery	RB-SURF1	RB-SURF2	RB-SURF3	RB-SURF4	RB-SURF5	RB-SURF6	
			Blank	Spike		037803 99	037803 99	037803 99	037804 99	037804 99	037804 99	037807 99
Client ID:			037803 99	037803 99	037803 99	037804 99	037804 99	037804 99	037804 99	037805 99	037806 99	
Lab No.:			037803 99	037803 99	037803 99	037804 99	037804 99	037804 99	037804 99	037805 99	037806 99	
Date Sampled:			99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	
						Duplicate	M. Spike	MS % Rec.				
Metals via SW846 Method 6010												
Aluminum	3	mg/kg	<	210	100	6100	6200	7400	610	5600	6200	6400
Barium	0.1	"	<0.2	100	100	170	150	300	140	72	100	160
Beryllium	0.1	"	<	52	100	0.7	0.7	52	100	0.5	0.7	0.8
Cadmium	0.2	"	<	50	100	2.2	2.2	52	100	2.1	5.1	5.7
Calcium	20	"	<	1100	110	89000	88000	91000	270	65000	10000	19000
Chromium	0.4	"	<	110	110	25	25	130	100	30	53	62
Cobalt	1	"	<	110	110	6.0	6.0	110	100	7.0	5.0	7.0
Copper	0.6	"	<	100	100	760	780	890	120	1300	19000	12000
Iron	1	"	2.0	1300	110	25000	25000	26000	72	33000	32000	42000
Lead	2	"	<	110	100	900	930	1000	88	1700	13000	8100
Magnesium	5	"	<	1100	100	17000	17000	12000	130	13000	3000	5100
Manganese	0.5	"	<	100	100	370	360	480	110	410	370	450
Molybdenum	1	"	<	51	100	2.0	3.0	49	92	3.0	4.0	6.0
Nickel	1	"	<	51	100	34	35	83	98	42	75	65
Phosphorus	6	"	7.0	530	110	680	670	1200	110	710	720	800
Potassium	100	"	<	1000	110	980	1000	2100	110	1000	740	820
Silver	1.0	"	<	52	100	<	<	51	100	>	8.1	5.3
Sodium	10	"	<	1000	100	190	190	1200	100	220	190	240
Thallium	6	"	<	100	99	<	<	97	93	9.0	7.0	8.0
Vanadium	0.5	"	<	53	110	23	23	75	100	19	19	23
Zinc	0.5	"	0.6	210	110	850	840	1100	110	1900	4300	4100

Client: XCG Consultants Ltd. Project: 5-997-01

JUL-26-99 MON 02:57 PM XCG
 JUL 21 1999 17:48 FR PHILIP ANALYTICAL 905 332 9169 TO 19059912554
 FAX NO. 905 891 2554

P. 02/05

P. 10/11

7/21/99

PASC - Certificate of Analysis

Page 3 of 3

			RB	RB	RB	RB	RB	RB	RB	RB	
Client ID:	RB-SURF5	RB-SURF6	RB-SURF7	RB-SURF8	RB-SURF9	SURF10	SURF11	SURF12	RB-BW1		
Lab No.:	037808 99	037809 99	037810 99	037811 99	037812 99	037813 99	037814 99	037815 99	037816 99		
Date Sampled:	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12	99/07/12		
Component	MDL	Units									
Metals via SW846 Method 6010											
Aluminum	3	mg/kg	4500	4700	6800	5500	3900	4100	4700	4900	5700
Barium	0.1	"	72	91	76	82	63	60	96	88	81
Beryllium	0.1	"	0.7	0.6	0.8	0.7	0.7	0.6	0.8	0.9	0.8
Cadmium	0.2	"	2.1	2.6	2.8	3.7	1.5	1.3	2.1	1.4	3.8
Calcium	20	"	38000	54000	17000	28000	26000	59000	13000	14000	26000
Chromium	0.4	"	25	40	21	20	21	28	27	23	19
Cobalt	1	"	6.0	8.0	8.0	9.0	5.0	6.0	5.0	7.0	9.0
Copper	0.6	"	1700	1600	6400	5900	700	500	540	330	6300
Iron	1	"	50000	52000	16000	40000	47000	41000	16000	49000	39000
Lead	2	"	2000	2000	6700	8100	890	600	920	380	8700
Magnesium	5	"	4200	4600	2500	3700	2700	4400	980	1300	4100
Manganese	0.5	"	370	430	310	340	320	310	340	350	330
Molybdenum	1	"	4.0	6.0	8.0	6.0	4.0	4.0	4.0	4.0	6.0
Nickel	1	"	49	58	130	110	34	33	29	30	120
Phosphorus	6	"	530	820	1000	810	490	470	680	500	860
Potassium	100	"	650	630	830	800	690	630	980	860	850
Silver	1.0	"	<	<	1.1	1.3	<	<	<	<	1.3
Sodium	10	"	250	290	500	320	200	340	160	150	330
Thallium	6	"	10	12	<	9.0	8.0	6.0	7.0	<	<
Vanadium	0.5	"	19	24	19	19	17	21	21	21	19
Zinc	0.5	"	2500	2700	12000	7000	1100	880	850	470	7400

Client: XCG Consultants Ltd. Project: S-997-01

JUL-26-99 MON 02:57 PM XCG
 JUL 21 1999 17:48 FR PHILIP ANALYTICAL 905 332 9169 TO 19050912554
 FAX NO. 905 891 2554
 P. 03/06 P. 11/11

RECEIVED

JUL 27 1999

NYSDEC - REG. 9
FOIL
REL UNREL