

Certificate of Analysis

Nunatta Environmental Services Inc.

P.O. Box 267
Iqaluit, NU X0A 0H0
Attn: Jim Wilson

Phone: (867) 979-1488
Fax: (867) 979-1478

Client PO:
Project: Land Farm Soil
Custody: 86989

Report Date: 7-Jun-2013
Order Date: 3-Jun-2013

Order #: 1323088

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

Paracel ID	Client ID
1323088-01	Cell #1 582
1323088-02	Cell #1 4015
1323088-03	Cell #4 East
1323088-04	Cell #4 West

Approved By:



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

Certificate of Analysis

Client: **Nunatta Environmental Services Inc.**

Report Date: 07-Jun-2013

Client PO:

Project Description: Land Farm Soil

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Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC, water extraction	6-Jun-13	6-Jun-13
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	6-Jun-13	7-Jun-13
Mercury	EPA 7471A - CVAA, digestion	6-Jun-13	6-Jun-13
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	7-Jun-13	7-Jun-13
Nitrogen as N, total	Calculation	6-Jun-13	7-Jun-13
PCBs, total	SW846 8082A - GC-ECD	5-Jun-13	6-Jun-13
PHC F1	CWS Tier 1 - P&T GC-FID	6-Jun-13	7-Jun-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	4-Jun-13	6-Jun-13
Phosphorus, total	EPA 365.4 - Auto Colour, digestion	6-Jun-13	7-Jun-13
Solids, %	Gravimetric, calculation	6-Jun-13	6-Jun-13
Standard Plate Count	based on SM 9215C	5-Jun-13	5-Jun-13
TKN	based on EPA351.2 - Auto Colour, digestion	6-Jun-13	7-Jun-13

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NIAGARA FALLS
 5415 Morning Glory Crt.
 Niagara Falls, ON L2J 0A3

SARNIA
 123 Christina St. N.
 Sarnia, ON N7T 5T7

Certificate of Analysis

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Order Date: 3-Jun-2013

Client PO:

Project Description: Land Farm Soil

Client ID:	Cell #1 582	Cell #1 4015	Cell #4 East	Cell #4 West
Sample Date:	03-Jun-13	03-Jun-13	03-Jun-13	03-Jun-13
Sample ID:	1323088-01	1323088-02	1323088-03	1323088-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	93.5	90.0	93.5	92.2
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Microbiological Parameters

Standard Plate Count	1000 CFU/g	-	-	6000 [1]	2000 [1]
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General Inorganics

Nitrogen, Total	21 ug/g	-	-	488	446
Phosphorus, total	1.00 ug/g dry	-	-	690	501
Total Kjeldahl Nitrogen	10 ug/g dry	-	-	460	441

Anions

Nitrate as N	1 ug/g dry	-	-	28	5
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Metals

Antimony	1 ug/g dry	-	-	<1	<1
Arsenic	1 ug/g dry	-	-	<1	<1
Barium	1 ug/g dry	-	-	38	28
Beryllium	0.5 ug/g dry	-	-	<0.5	<0.5
Boron	5.0 ug/g dry	-	-	8.6	<5.0
Cadmium	0.5 ug/g dry	-	-	<0.5	<0.5
Chromium	5 ug/g dry	-	-	26	23
Cobalt	1 ug/g dry	-	-	7	6
Copper	5 ug/g dry	-	-	16	13
Iron	200 ug/g dry	-	-	28500	27100
Lead	1 ug/g dry	-	-	14	16
Mercury	0.1 ug/g dry	-	-	<0.1	<0.1
Molybdenum	1 ug/g dry	-	-	<1	1
Nickel	5 ug/g dry	-	-	10	9
Potassium	200 ug/g dry	-	-	1140	752
Selenium	1 ug/g dry	-	-	<1	<1
Silver	0.3 ug/g dry	-	-	<0.3	<0.3
Thallium	1 ug/g dry	-	-	<1	<1
Tin	5 ug/g dry	-	-	<5	<5
Uranium	1 ug/g dry	-	-	<1	<1
Vanadium	10 ug/g dry	-	-	51	49
Zinc	20 ug/g dry	-	-	41	39

Volatiles

Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.09
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Client PO:

Project Description: Land Farm Soil

	Client ID:	Cell #1 582	Cell #1 4015	Cell #4 East	Cell #4 West
	Sample Date:	03-Jun-13	03-Jun-13	03-Jun-13	03-Jun-13
	Sample ID:	1323088-01	1323088-02	1323088-03	1323088-04
	MDL/Units	Soil	Soil	Soil	Soil
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	0.14
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	1.61
m,p-Xylenes	0.05 ug/g dry	<0.05	0.07	<0.05	0.16
o-Xylene	0.05 ug/g dry	<0.05	0.08	<0.05	0.11
Xylenes, total	0.05 ug/g dry	<0.05	0.15	<0.05	0.26
Toluene-d8	Surrogate	93.8%	85.4%	92.7%	94.3%

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	56	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	73	920	<4	161
F3 PHCs (C16-C34)	8 ug/g dry	39	156	23	218
F4 PHCs (C34-C50)	6 ug/g dry	<6	18	<6	23

PCBs

PCBs, total	0.05 ug/g dry	-	-	<0.05	<0.05
Decachlorobiphenyl	Surrogate	-	-	133%	123%

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Report Date: 07-Jun-2013

Client PO:

Project Description: Land Farm Soil

Order Date: 3-Jun-2013

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	1	ug/g						
General Inorganics									
Phosphorus, total	ND	1.00	ug/g						
Total Kjeldahl Nitrogen	ND	10	ug/g						
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						
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Iron	ND	200	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Potassium	ND	200	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Tin	ND	5	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						
Microbiological Parameters									
Standard Plate Count	1000	1000	CFU/g						
PCBs									
PCBs, total	ND	0.05	ug/g						
Surrogate: Decachlorobiphenyl	0.108		ug/g		108	60-140			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	7.77		ug/g		97.1	50-140			

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Report Date: 07-Jun-2013

Client PO:

Project Description: Land Farm Soil

Order Date: 3-Jun-2013

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	1	ug/g dry	ND				20	
General Inorganics									
Phosphorus, total	544	10.0	ug/g dry	690			23.6	10	QR-04
Total Kjeldahl Nitrogen	391	20	ug/g dry	460			16.2	10	QR-04
Hydrocarbons									
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Metals									
Antimony	19.6	1	ug/g dry	ND			0.0	30	
Arsenic	ND	1	ug/g dry	ND			0.0	30	
Barium	30.6	1	ug/g dry	37.8			21.2	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron	6.4	5.0	ug/g dry	8.6			30.0	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	25.6	5	ug/g dry	25.7			0.3	30	
Cobalt	5.6	1	ug/g dry	6.6			15.2	30	
Copper	13.0	5	ug/g dry	16.2			21.8	30	
Iron	28300	200	ug/g dry	28500			0.6	30	
Lead	19.0	1	ug/g dry	14.3			28.1	30	
Mercury	ND	0.1	ug/g dry	ND			0.0	35	
Molybdenum	2.8	1	ug/g dry	ND			0.0	30	
Nickel	9.5	5	ug/g dry	10.4			8.3	30	
Potassium	870	200	ug/g dry	1140			26.7	30	
Selenium	1.5	1	ug/g dry	ND			0.0	30	
Silver	0.60	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1	ug/g dry	ND			0.0	30	
Tin	6.9	5	ug/g dry	ND			0.0	30	
Uranium	ND	1	ug/g dry	ND			0.0	30	
Vanadium	53.7	10	ug/g dry	51.1			4.9	30	
Zinc	36.6	20	ug/g dry	40.9			10.9	30	
Microbiological Parameters									
Standard Plate Count	3000	1000	CFU/g	6000			0.0	200	BAC02
PCBs									
PCBs, total	ND	0.05	ug/g dry	ND				40	
Surrogate: Decachlorobiphenyl	0.135		ug/g dry	ND	124	60-140			
Physical Characteristics									
% Solids	82.1	0.1	% by Wt.	78.9			3.9	25	

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Report Date: 07-Jun-2013

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Project Description: Land Farm Soil

Order Date: 3-Jun-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.06		mg/L	0.08	97.8	83-109			
General Inorganics									
Phosphorus, total	58.6	1.00	ug/g	ND	93.8	57-139			
Total Kjeldahl Nitrogen	217	10	ug/g	ND	86.8	79-130			
Hydrocarbons									
F1 PHCs (C6-C10)	192	7	ug/g	ND	96.1	80-120			
F2 PHCs (C10-C16)	64	4	ug/g	ND	65.0	60-140			
F3 PHCs (C16-C34)	146	8	ug/g	ND	71.4	60-140			
F4 PHCs (C34-C50)	88	6	ug/g	ND	64.9	60-140			
Metals									
Antimony	45.0		ug/L	ND	90.1	70-130			
Arsenic	42.8		ug/L	ND	85.7	70-130			
Barium	73.2		ug/L	15.1	116	70-130			
Beryllium	55.6		ug/L	0.12	111	70-130			
Boron	60.1		ug/L	3.5	113	70-130			
Cadmium	45.1		ug/L	ND	90.2	70-130			
Chromium	67.6		ug/L	10.3	115	70-130			
Cobalt	61.2		ug/L	2.6	117	70-130			
Copper	62.0		ug/L	6.5	111	70-130			
Iron	12400		ug/L	11400	97.9	70-130			
Lead	60.8		ug/L	5.7	110	70-130			
Mercury	1.15	0.1	ug/g	ND	76.4	72-128			
Molybdenum	45.1		ug/L	ND	90.2	70-130			
Nickel	59.7		ug/L	4.1	111	70-130			
Potassium	1690		ug/L	455	123	70-130			
Selenium	43.9		ug/L	ND	87.7	70-130			
Silver	46.8		ug/L	ND	93.6	70-130			
Thallium	52.0		ug/L	ND	104	70-130			
Tin	46.9		ug/L	1.4	91.0	70-130			
Uranium	52.3		ug/L	0.2	104	70-130			
Vanadium	78.0		ug/L	20.5	115	70-130			
Zinc	60.6		ug/L	16.3	88.6	70-130			
PCBs									
PCBs, total	0.464	0.05	ug/g	ND	106	60-140			
Surrogate: Decachlorobiphenyl	0.112		ug/g		103	60-140			
Volatiles									
Benzene	3.76	0.02	ug/g	ND	93.9	60-130			
Ethylbenzene	3.50	0.05	ug/g	ND	87.5	60-130			
Toluene	3.58	0.05	ug/g	ND	89.5	60-130			
m,p-Xylenes	7.19	0.05	ug/g	ND	89.8	60-130			
o-Xylene	3.31	0.05	ug/g	ND	82.6	60-130			

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Qualifier Notes:***Sample Qualifiers :***

1 : Possible laboratory contamination may have resulted in a QC blank failure. Data may be subject to bias.

QC Qualifiers :

BAC02 : Possible laboratory contamination may have resulted in a QC blank failure. Data may be subject to bias.

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

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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Client Name: <u>Munetta Environmental</u>	Project Reference: <u>Land Farm Soil</u>	TAT: ☒ Regular ☐ 2 Day ☐ 1 Day ☐ Same Day Date Required: _____
Contact Name: <u>Jim Wilson</u>	Quote # _____	
Address: <u>Box 267</u> <u>Malott</u>	PO # _____	
Telephone: <u>867-979-1488 cell 222-4111</u>	Email Address: <u>Munetta@northwestel</u>	
Samples Submitted Under: ☐ O. Reg. 153/04 Table _____ ☐ O. Reg 511/09 Table _____ ☐ PWQO ☐ CCME ☐ Sewer Use (Storm) ☐ Sewer Use (Sanitary) ☐ Other: _____		

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)							Required Analyses										
Parcel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		F1 F4	B T	Total Organics	NPK	PAH	Metals	Pb	Mercury	PCB		
Sample ID/Location Name					Date	Time											
1	Cell #1 582	S	0	1	June 3	11:00	x	x									-120 ml
2	Cell #1 3415 4015	S	0	1	↓	↓	x	x									
3	Cell #4 East	S	0	4	↓	↓	x	x	x	x	x	x	x	x	x		
4	Cell #4 West	S	0	4	↓	↓	x	x	x	x	x	x	x	x	x		
5																	
6																	
7																	
8																	
9																	
10																	

Comments:	Method of Delivery: <u>Pick Up</u>
Relinquished By (Print & Sign): <u>Jim Wilson</u> <u>James Hurler</u>	Received by Driver/Depot: <u>DEPOSE</u>
Date/Time: <u>June 3 11:30</u>	Received at Lab: <u>SUNDEPORN</u>
Temperature: _____ °C	Date/Time: <u>JUN 04 2013 12:40</u>
	Temperature: <u>13.0</u> °C
	Verified By: <u>MC</u>
	Date/Time: <u>June 4/13 2:07</u>
	pH Verified By: <u>N/A</u>