CANADIAN Kraft Paper
PO Box 1590 • The Pas, Manitoba • R9A 1L4 Telephone (204) 623-7411

February 15, 2023

TM-10048
Code #09-LF-009

James Capotosto
Director
Environmental Approvals Branch
Manitoba Environment, Climate, and Parks
1007 Century Street
Winnipeg, Manitoba
R3H 0W4

Re: Canadian Kraft Paper Biosolids Landspreading - Trial Project on Agricultural Land

Dear Mr. Capotosto:

Canadian Kraft Paper Industries (CKP) is a high performance, unbleached, sack kraft papermill location in The Pas, Manitoba. Since October 2017 CKP, with the approval of Manitoba Environment, Climate and Parks (MECP), has undertaken a Landspreading Pilot Study Project on CKP property. The Pilot Study involved removing biosolids from the effluent treatment system onsite and applying it to industrial lands at the CKP mill site. With the Pilot Study approval ending in 2022, CKP has begun exploring other options with respect to landspreading biosolids. This includes the submission of an Environmental Act License proposal to continue landspreading at the mill site (forthcoming in 2023) and the possibly of landspreading on nearby agricultural lands.

CKP is a member of the University of Toronto Pulp and Paper Research Consortium. As members we have access to various research scientists and students working closely with the pulp and paper sector to address a broad range of operational challenges including finding solutions related to energy efficiency and environmental footprints of mills. Through the consortium and other funding mechanisms, CKP has hired a post doctoral research scientist, Emmanuel Badewa, to work on investigating the feasibility of utilizing biosolids as a soil amendment on agricultural land. The end goal is to have the biosolids produced onsite classified as a fertilizer and utilized by local farmers. Pulp and Paper biosolids are currently being used as fertilizers in other jurisdictions across Canada.

What we have learned from the Pilot Study and the hiring of Emmanuel has led CKP to submit this Notice of Alteration (NOA) in hopes of receiving approval to run a small-scale landspreading trial on agricultural land. With a large farming area located west of The Pas, CKP has reached out to farmers and found that there is interest in the application of biosolids to their farmland. We have also received commitment from one farmer to perform a trial on their land pending approval of the NOA. Performing the trial is another step in which the mill is exploring alternative biosolids management practices apart from the existing landfilling and landspreading on CKP's property.

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TRIAL OVERVIEW

The focus of the trial is to explore the benefit of the biosolids on soil health and crop productivity. It will also determine if biosolids can be effectively used as a fertilizer. If successful, this could help reduce the demand for nitrogen fertilizer and improve soil microbial activity/diversity of the local farmland. Upon a successful trial, CKP would work toward registering the biosolids produced onsite as a fertilizer with the Canadian Food Inspection Agency. This will not only benefit the nearby agricultural community but will also divert biosolids from the onsite landfill extending the landfill life and aligning with MECP's directive to promote a circular economy.

CKP currently has one agricultural location committed to run a trial. It is located on the property of Round the Bend Farms (RTBF) which is owned and operated by Shawn and Edith Sexsmith. The trial will consist of 6 different amendments that range from a control to different ratios of biosolids mixed with nitrogen fertilizer (Table 1).

The biosolids being used for the trial will be sourced from previous landspread sites on CKP property, thus the biosolids used will have been exposed to weathering for a minimum of one year. The primary biosolids source for the trial will be from the North Settling Basin (NSB), dredged in 2022. The secondary biosolids source will be from the Aerated Settling Basin (ASB) which was dredged in 2021. The biosolids will be transported from the CKP property to the trial site on RTBF once approval of the NOA has been received. The biosolids will be transported to the trial site using a semi truck and trailer, biosolids will be stored inside large woven polypropylene bags (previously used to store starch) during transportation.

Table 1: Summary information for agricultural land trial of CKP biosolids.

Site/Size	Location (Lat/Long)	Plants	6 Amendments	Description
Round the Bend Farm (0.25ha)	53°44'12.2"N 101°38'52.9"W	Canola/ Wheat	1) Control	No amendment
			2) Fertilizer (urea)	Urea nitrogen fertilizer
			3) Secondary Biosolids 50% + urea 50%	Biosolids from the ASB that was land applied on CLF1 zone 2 ASB, co -applied with urea
			4) Mixed Biosolids 50% + urea 50%	Primary-secondary biosolids mix (1:1), co-applied with urea
			5) Primary Biosolids 50% + urea 50%	Biosolids from the NSB that was land applied on Site 2A zone 1 and 3, co-applied with urea
			6) Mixed Biosolids 100%	Primary-secondary biosolids mix (1:1)

Note: Based on the land area (0.25ha), biosolids applied will be less than 5 bone dry tonnes (BDT) of biosolids per year.

The trial site is a 50 m x 50 m area at RTBF, located in the Carrot Valley farming area west of The Pas, Manitoba (53°44'12.2"N, 101°38'54.3"W) (Appendix A, A1). The soil in the area was formed from deposited glacial drifts and alluvium parent material, grouped as peaty calcareous gleysol in the Pasquia series (Ehrlich et al., 1960 - Report of Detailed Soil Survey of Pasquia map area in Northern Manitoba). The soil is medium textured silt loam soil at 0-15 cm (<1% Sand, 73.3 Silt, 26.5% Clay) and loam soil at 0-60 cm (<1% Sand, 88.5 Silt, 11.4% Clay). Historically, the trial site was used as a pasture - to grow grass for bison and managed with bison manure. The trial site will be moldboard plowed (20-25 cm depth) and harrowed (10 cm depth) in the spring prior to seeding.

For the experimental design, treatments will be established in a randomized, complete block design, replicated four times, for a total of 48 plots of 27 m^2 (3 m × 9 m) (Appendix A, A2). The trial location will be divided into two adjacent sections for canola and wheat cultivation, each crop section will be divided into 24 plots separate plots. All plots will be separated from each other by a 2-m buffer zone.

The applicate rate considered was calculated for each crop type (Table 2) based on the baseline/preliminary soil and biosolids information (Table 3 and 4). Rates of biosolids were calculated using 0.25 nitrogen efficiency coefficient. This helps to target optimum available nitrogen and phosphorus levels for canola and wheat crops while considering the metal loading limits for agricultural land. This rate calculation was done according to the Tri-Provincial Manure Application and User Guidelines. The biosolids and urea will be spread by hand considering the size of the plot and incorporated within 1 hour with a rototiller (10 cm depth) to minimize ammonia volatilization losses.

Table 2: Description of the Nitrogen (N) application treatments to be applied at RTBF by crop.

Crops	**Treatment**	**Biosolids Application rate (Mg/ha)**	**Total N applied (kg N ha^{-1})**			**Total Carbon (C) applied (kg C ha^{-1})**
			Urea-N	Biosolids-N	Total N	
Canola (Hybrid)	Control (No Nitrogen)	0	0	0	0	0
	Fertilizer (urea)	0	157	0	157	0
	Secondary Biosolids + urea 50%	26.7	78.5	306.4	385	8878
	Mixed Biosolids 50% + urea 50%	35.9	78.5	308.5	387	10232
	Primary Biosolids + urea 50%	55.0	78.5	312.6	391	12385
	Mixed Biosolids 100%	71.8	0	616.9	616.9	20464

Wheat (CWRS)	Control (No Nitrogen)	0	0	0	0	0
	Fertilizer (urea)	0	123	0	123	0
	Secondary Biosolids + urea 50%	20.9	61.5	240.1	302	6955
	Mixed Biosolids 50% + urea 50%	28.1	61.5	241.7	303	8016
	Primary Biosolids + urea 50%	43.1	61.5	244.9	306	9703
	Mixed Biosolids 100%	56.3	0	483.3	483.3	16033

To mitigate any potential environmental effects, the RTBF trial will implement the following:

- The site will be surrounded by grass that will serve as a buffer for any runoff. If issues with runoff arise, a berm will be installed around the site (only if needed). In addition, the site is flat, and fenced to prevent livestock access (Appendix C, C1-C4).
- The trial plot will set back from any ground water wells (>50m), designated residential area (>1000m), property line with a residence (>10m), waterway (>30m), major swamp or wetland (>8m), and not subjected to annual land inundation.

These steps will ensure the trial will have little to no effect on the surrounding environment.

BACKROUND SOIL TESTING

On October 17, 2022, background soil sampling was carried on the RTBF trial site at three different locations, each at depths 0-15 cm and 0-60 cm. The three samples from each depth were then combined and mixed to create one composite sample from each depth. Samples were collected by use of a shovel; depths were verified with a tape measure. The pattern of sub-sampling locations was designed to be as random as possible, while also allowing for the collection of samples representative of the entire site/ zone. The GPS coordinates for each sub-sample pit were collected and recorded using Avenza Maps (Table 3).

Table 3. Coordinates of sampling points on trial site at RTBF

Lat/Long	**Latitude**	**Longitude**
#1	53°44’12.6"N	101°38’53.7"W
#2	53°44'12.2"N	101°38’52.9"W
#3	53°44’11.6"N	101°38’52.5"W

Each composite sample was analyzed for conductivity, metals, percent moisture, particle size/composition, pH, mercury, available phosphate-phosphorus, and numerous forms of nitrogen (Table 4). Analyzing the soils testing results, the available phosphorus and nitrate level in the soil at the proposed site are below the regulated limits (Table 4). Thus, at the proposed site on RTBF (Appendix A, A1), CKP is

requesting to spread a biosolid approximate amount of 10 bone dry tonnes/year for a period of two years to complete the trial (Appendix A, A2). See Table 5 for the chemical characteristics of the biosolids that will be utilized from the landspread locations on CKP property.

Table 4: The preliminary soil characteristics of composite samples, depths 0-15 cm and 0-60 cm at RTBF trial site.

Chemical Properties	**Composite 0-15cm**	**Composite 0-60cm**	**CCME Soil Guideline (Agricultural)***
Sample Date	October 17, 2022	October 17, 2022	-
Soil Texture	Silt loam	Silt	-
pH	7.34	7.69	6 to 8
Total Nitrogen (%)	0.83	0.356	-
Ammonium (mg/kg)	2.6	1.4	-
Nitrate (mg/kg)	1.8	<1	-
Available Phosphate-P	4.4	3.0	-
Phosphorus (mg/kg)	3.3	<2	-
Potassium (mg/kg)	296	184	-
Arsenic (mg/kg)	15.9	11.1	17[a]
Cadmium (mg/kg)	0.591	0.453	1.4
Chromium (mg/kg)	20.5	22.7	64
Copper (mg/kg)	28.2	27.9	63
Lead (mg/kg)	14.2	14.4	60
Mercury (mg/kg)	0.0516	0.0504	0.5
Nickel (mg/kg)	32.3	33.3	32
Zinc (mg/kg)	92.3	92.5	200

Units with < indicates below or at detection limit.

* Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health

[a] CCME soil contact guideline using environmental health guidelines/check values.

To ensure the dryland agricultural capability of the trial site receiving the biosolids meets the nutrient management regulation, a review of the soil survey report for the area was undertaken (Appendix B, B1-B3). The soil survey report reviewed indicated the Pasquia and Le Pas soil series of Northern Manitoba is underlying by Peaty Calcareous Gleysol-Silty clay/loam. According to the Canada Land Inventory Soil Capability Classification, for agriculture and the current management practice at the site, RTBF's land is classified as a Class 4. This categorization results in the adoption of conservation practices such as fences to exclude livestock (Bison) from the site, field-edge filter strips, calculation of the fertilizer and

amendment rate using the soil test results. Also, the information suggested the adopted of the N2 nutrient management zone, as defined in Nutrient Management Regulation, Man Reg 62/2008.

Table 5: The chemical properties of the biosolids proposed for agricultural land application.

Chemical Properties	Primary Biosolids (NSB 2022)[1]	Secondary Biosolids (ASB 2021)	CCME Biosolids Guidelines[2]
Sampled Date	October 17, 2022	October 17, 2022	
Total Solids	29.45	64.7	
Electrical conductivity (dS/m)	1.11	1.26	
pH	7.54	7.05	
Total Carbon (%)	22.5	33.3	
Inorganic Carbon (%)	3.1	3.69	
organic carbon (%)	19.4	29.6	
Total Nitrogen (%)	0.522	1.22	
Ammonium (mg/kg)	8.65	3.5	
Nitrate (mg/kg)	<3.5	90.9	
Available Phosphate-P (mg/kg)	83.85	101	
Phosphorus (mg/kg)	811.5	3360	
Potassium (mg/kg)	196	99	
Magnesium (mg/kg)	188	128	
Arsenic (mg/kg)	0.9	1.96	13
Cadmium (mg/kg)	0.426	6.01	20[a]
Cobalt (mg/kg)	2.53	3.96	34
Chromium (mg/kg)	51.3	43.9	210
Copper (mg/kg)	11.85	84.8	400
Lead (mg/kg)	4.745	12	150
Mercury (mg/kg)	0.0086	0.0635	0.8
Molybdenum (mg/kg)	3.465	4.79	20[a]
Nickel (mg/kg)	31.85	41.9	62
Selenium (mg/kg)	0.35	0.7	2
Zinc (mg/kg)	60.8	879	1850[a]

Units with < indicates below or at detection limit.

[1] using an average of CKP site 2A zone 1 and 3.

[2] Canadian Council of Ministers of the Environment (CCME) guidelines for compost quality- Category A maximum concentration within biosolids product.

[a] Concentrations are the existing standards under the Canadian Food Inspection Agency's Standards for Metals in Fertilizers and Supplements, September 1997 (Trade Memorandum T-4-93).

Post crop harvest, an intensive in-depth analysis of soil and plants on the site will take place at analytical facilities located at the University of Toronto and Lakehead University. Sampling will be carried out on

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each treatment replicate to determine soil health indicators that encompasses physical, chemical, and biological soil properties. The soil indicators will include, bulk density, water stable aggregate stability, soil pH, cation exchange capacity, soil organic carbon, hot water extractable carbon, and microbial community analysis (Appendix A, A3). The trial will also be assessing agronomic rates for the biosolids as soil amendments. Furthermore, the trial will also assess the risk of metal accumulation on soil amended with the biosolids.

The trial is tentatively scheduled to begin in May, at the onset of the spring farming season. As such, CKP is requesting a response regarding the start of the agricultural landspreading trial by March 31, 2023, to ensure that there is no delay in the work planned for spring 2023. If you have any further questions, do not hesitate to contact me at (204) 623-8585 or leigh.johnston@ckpi.com.

Sincerely,

[redacted]

Leigh Johnston
Mill Services Manager

Attach.
cc: Siobhan Burland Ross, Environmental Approvals Branch, Winnipeg
Robert Boswick, Environmental Approvals Branch, Winnipeg
Cristal Huculak, Environmental Compliance and Enforcement, The Pas
Halle Fines, Environmental Compliance and Enforcement, The Pas
Emmanuel Badewa, CKP Research Scientist
Lisa Jones, Environmental Coordinator
Ashely Moore, Environmental Coordinator
Leigh Johnston, CKP Manager of Mill Services
Tamsin Patience, CKP Director of Mill Services
Landspreading File

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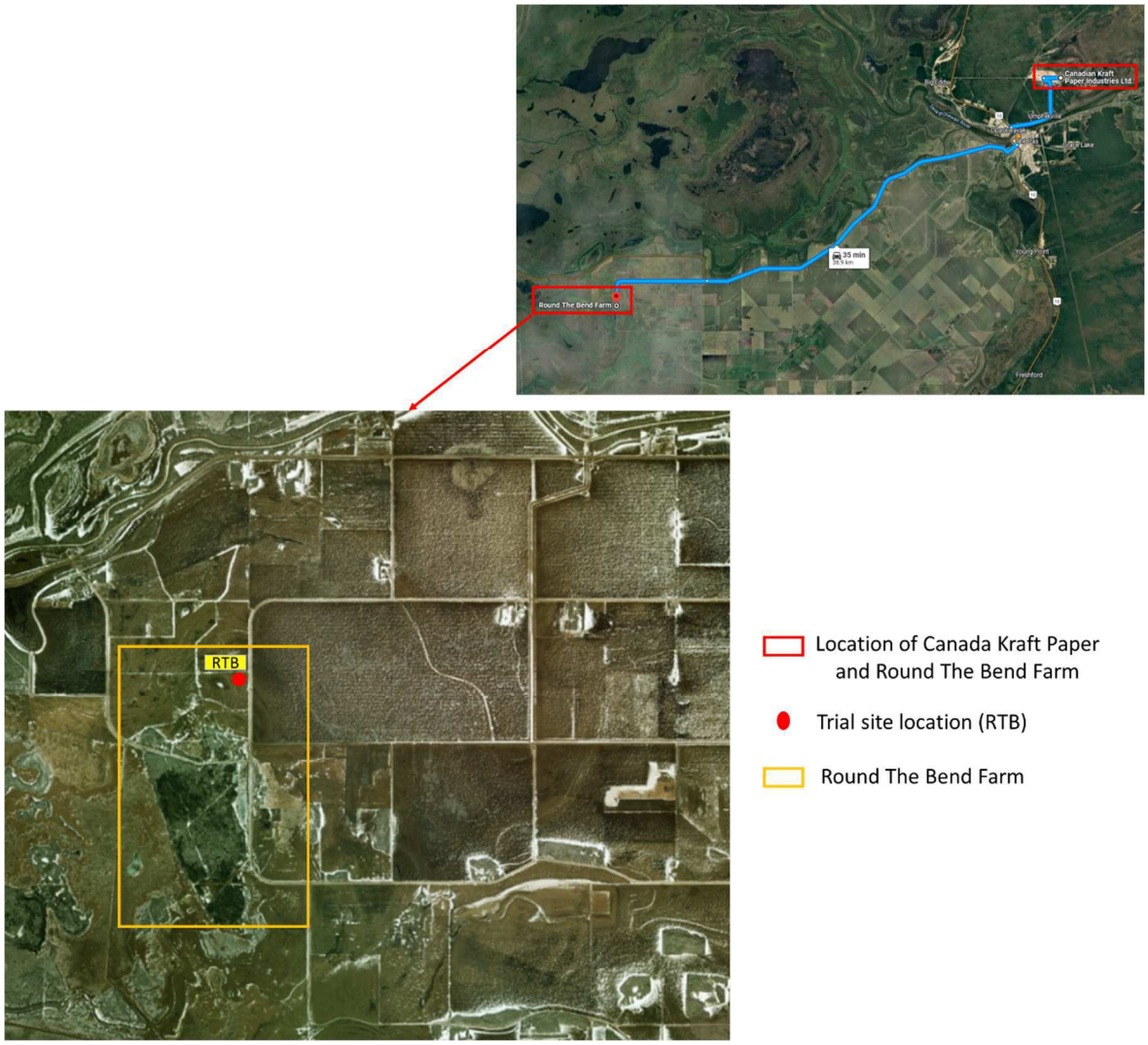
APPENDICES

A: Figures



A1: Location of the trial site on RTBF and the driving distance from the CKP mill site.

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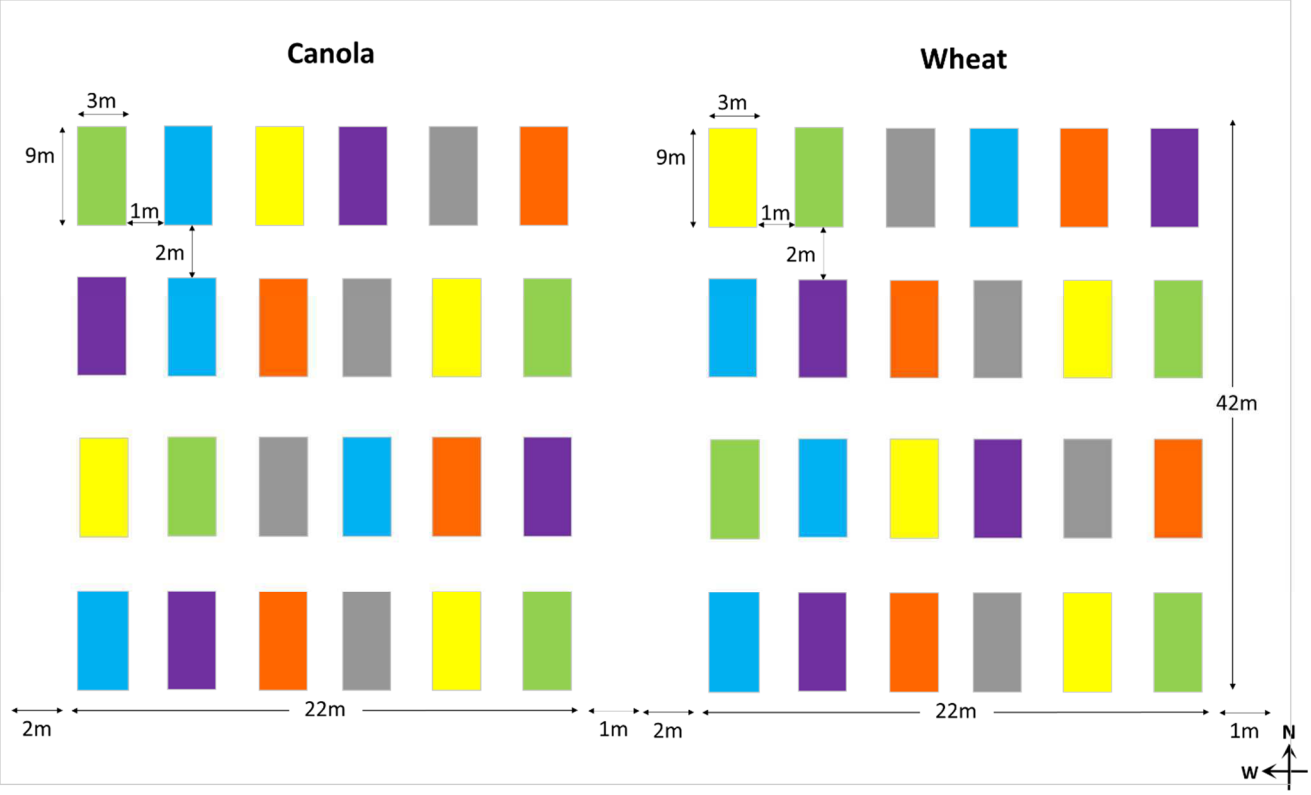

A2: Proposed experimental design showing the treatments and the adjacent sections for the proposed crops, Canola and Wheat.

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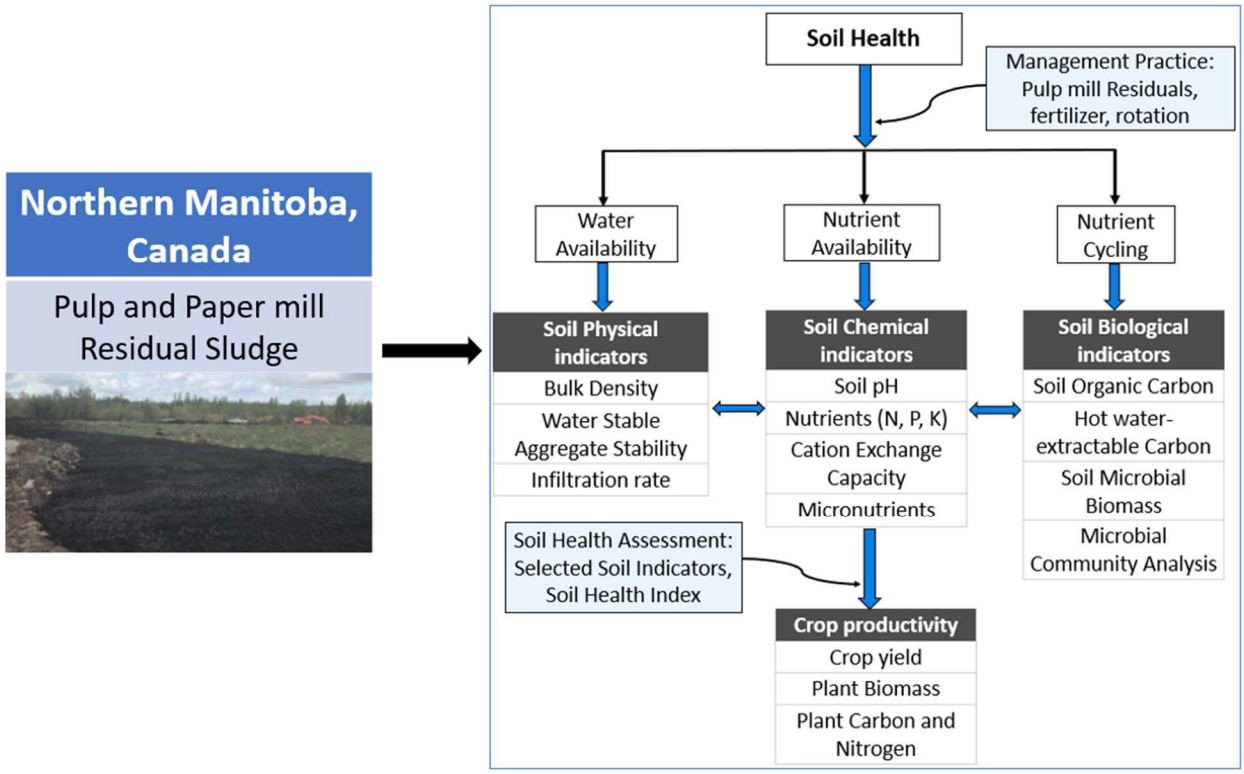

A3: Soil health indicators to be used in this assessment suggested by the Soil Health Institute.

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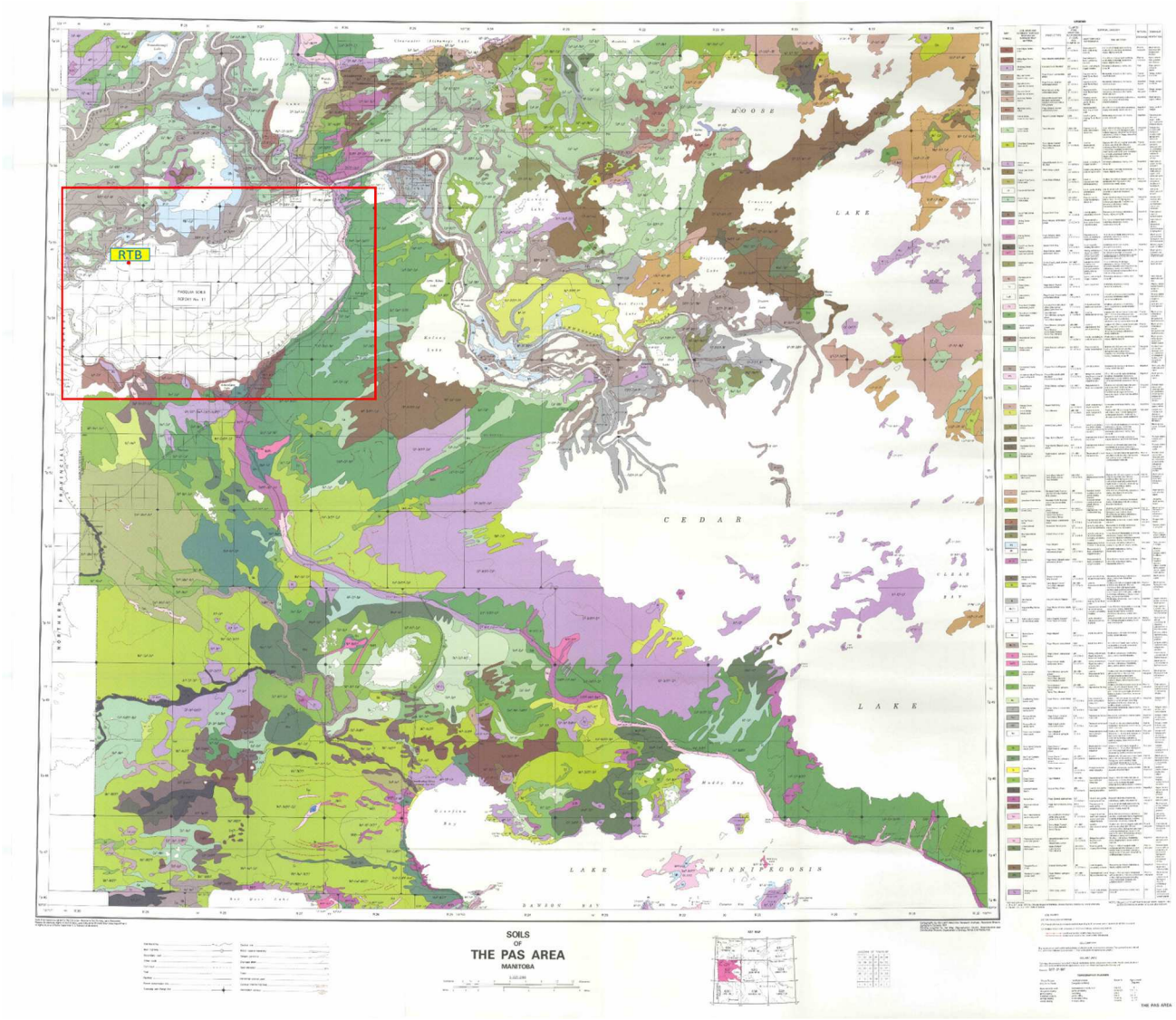
B: Survey maps and trial site information



B1: The location of RTBF trial site on The Pas pedological soil map.

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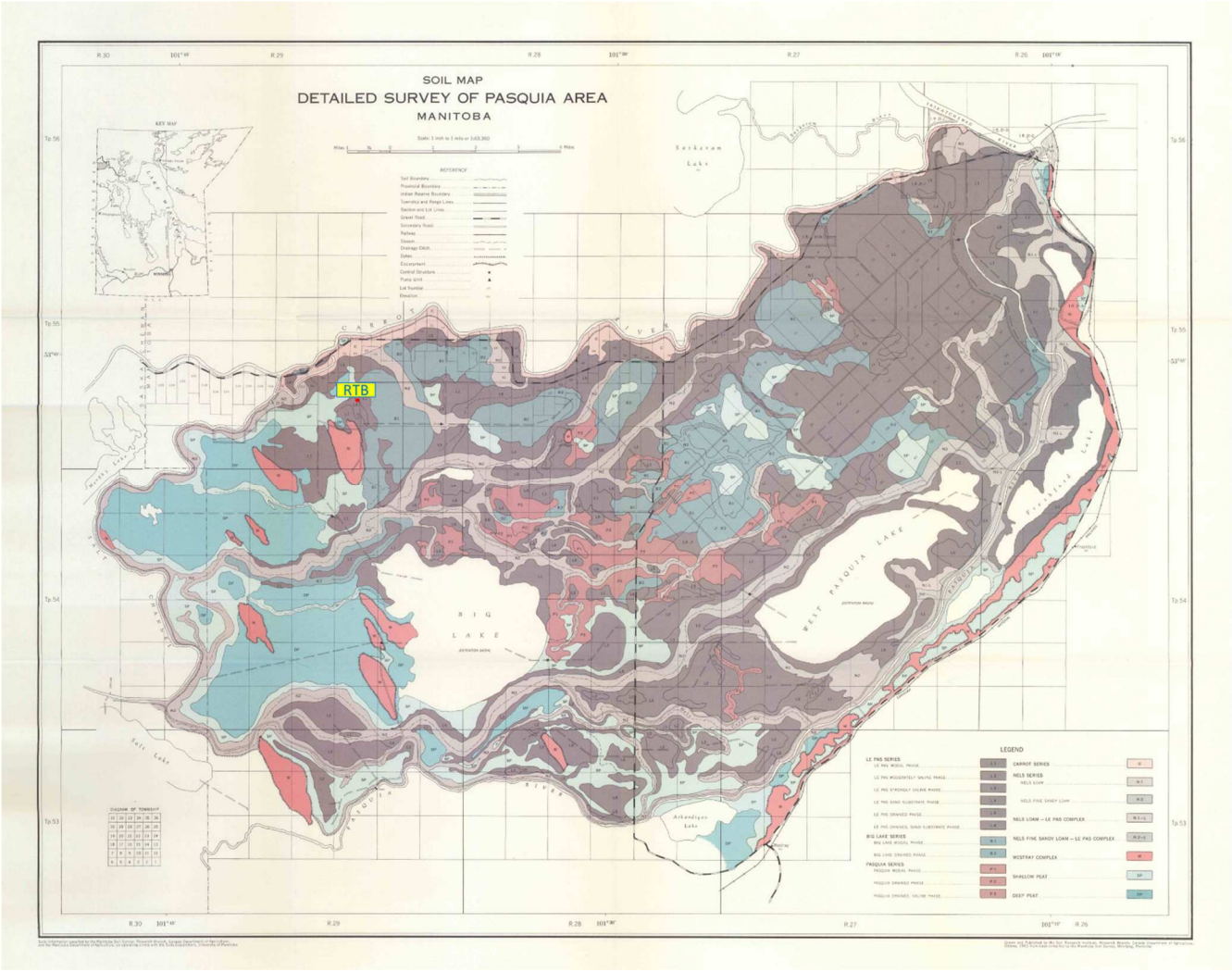

B2: The location of RTBF trial site on detailed soil survey map of old Pasquia area.

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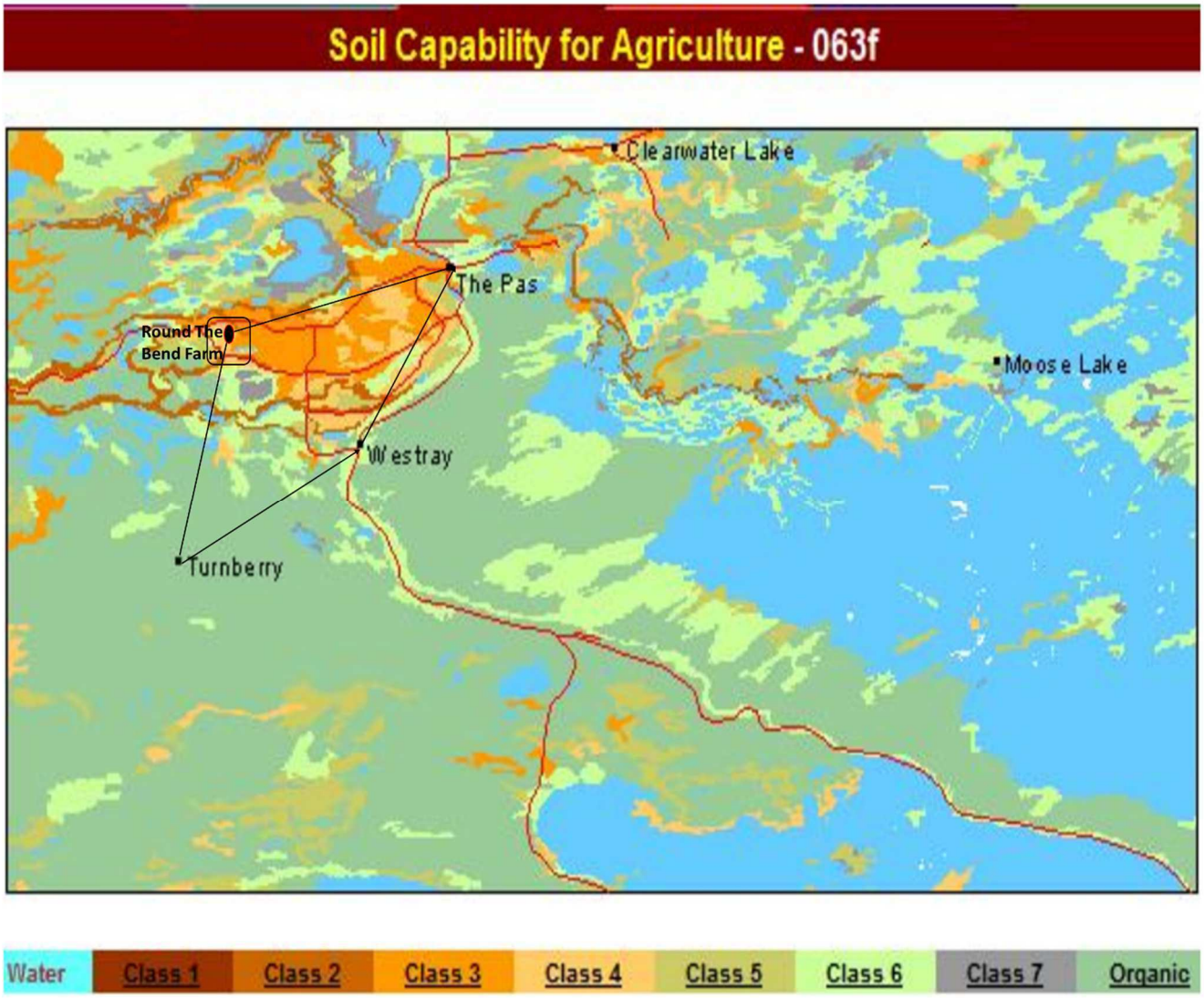

B3: The approximate location of the RTBF trial site on soil capability for Agriculture in Northern Manitoba.

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C: Photos of Trial Site

C1: Photo of RTBF trail site, October 17, 2022, during soil sample collection.

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C2: Photo of RTBF sample site soil profile, October 17, 2022, depth of 15 cm.

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C3: Photo of RTBF sample site soil profile, October 17, 2022, depth of 60 cm.

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C4: Photo of RTBF trail site, October 26, 2022, fencing around site installed.

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D: Biosolids Certificate of Analysis

D1: Primary Biosolids from Zone 1 (NSB)

ALS

Canadian Kraft Paper Industries Limited
ATTN: ERNIE BALLANTYNE
PO Box 1590
The Pas MB R9A 1L4

Date Received: 13-OCT-22
Report Date: 18-NOV-22 10:02 (MT)
Version: FINAL REV. 2

Client Phone: 204-623-8636

Certificate of Analysis

Lab Work Order #: L2736640
Project P.O. #: SV-31293
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments:
18-NOV-2022 Revised report - Full metals reporting.

[redacted]
Hua Wo
Chemistry Laboratory Manager

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-3 SITE 2A ZONE 1, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 14:30							
Matrix: COMPOSITE SOIL							
Total Carbon, TOC and TIC in soil							
Inorganic Carbon as CaCO3 Equivalent							
Inorganic Carbon (as CaCO3 Equivalent)	22.7		0.40	%		21-OCT-22	
Total Carbon by combustion method							
Total Carbon by Combustion	18.5		0.05	%	20-OCT-22	20-OCT-22	R5878623
Total Inorganic Carbon in Soil							
Inorganic Carbon	2.73		0.050	%		21-OCT-22	R5879037
Total Organic Carbon Calculation							
Total Organic Carbon	15.8		0.050	%		22-OCT-22	
Miscellaneous Parameters							
Moisture	65.5		0.10	%		19-OCT-22	R5877597
Available Phosphate-P	30.4		1.0	mg/kg	20-OCT-22	20-OCT-22	R5878090
Specific Gravity	1210		10	kg/m3	22-OCT-22	22-OCT-22	R5879470
Conductivity (1:2)	1.21		0.050	dS m-1	19-OCT-22	19-OCT-22	R5877502
Mercury (Hg)	0.0084		0.0050	mg/kg	19-OCT-22	19-OCT-22	R5877496
Nitrate (as N)	<1.0		1.0	mg/L		16-OCT-22	R5879136
pH (1:2 CaCl2)	7.50		0.10	pH	19-OCT-22	19-OCT-22	R5877478
Particle size - Pipette removal OM & CO3							
% Sand (2.0mm - 0.05mm)	55.7	PSAL	1.0	%	28-OCT-22	29-OCT-22	R5883681
% Silt (0.05mm - 2um)	37.7	PSAL	1.0	%	28-OCT-22	29-OCT-22	R5883681
% Clay (<2um)	6.6	PSAL	1.0	%	28-OCT-22	29-OCT-22	R5883681
Texture	Sandy loam	PSAL			28-OCT-22	29-OCT-22	R5883681
Available Micronutrients (Cu,Fe,Zn,Mn)							
Copper (Cu)	1.98		0.60	mg/kg	27-OCT-22	27-OCT-22	R5882816
Iron (Fe)	197		6.0	mg/kg	27-OCT-22	27-OCT-22	R5882816
Manganese (Mn)	21.7		0.15	mg/kg	27-OCT-22	27-OCT-22	R5882816
Zinc (Zn)	6.95		0.60	mg/kg	27-OCT-22	27-OCT-22	R5882816
Total Available N & NO3-N, NO2-N & NH4							
Available Ammonium-N							
Available Ammonium-N	6.2		2.0	mg/kg	19-OCT-22	19-OCT-22	R5878240
Available Ammonium-N - Calculation							
Total Available Nitrogen	6.2		4.5	mg/kg		20-OCT-22	
Nitrate, Nitrite & Nitrate+Nitrite-N(KCL							
Nitrite-N	<2.0		2.0	mg/kg	19-OCT-22	19-OCT-22	R5878168
Nitrate+Nitrite-N	<4.0		4.0	mg/kg	19-OCT-22	19-OCT-22	R5878168
Nitrate-N	<4.0		4.0	mg/kg	19-OCT-22	19-OCT-22	R5878168
Total Organic Nitrogen - Soil							
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.284		0.020	%		22-OCT-22	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.285		0.040	%	19-OCT-22	21-OCT-22	R5879057
Available N, P and K							
Available Nitrate-N							
Available Nitrate-N	<2.0	DLM	2.0	mg/kg	19-OCT-22	19-OCT-22	R5878163
Plant Available Phosphorus and Potassium							
Available Phosphate-P	92		10	mg/kg	20-OCT-22	20-OCT-22	R5879059
Available Potassium	166		20	mg/kg	20-OCT-22	20-OCT-22	R5879059
Total N, P, K, S							
Metals in Soil by CRC ICPMS							
Aluminum (Al)	4300		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Antimony (Sb)	0.21		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Arsenic (As)	0.94		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Barium (Ba)	50.5		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-3 SITE 2A ZONE 1, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 14:30							
Matrix: COMPOSITE SOIL							
Metals in Soil by CRC ICPMS							
Beryllium (Be)	0.16		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Boron (B)	10.8		5.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Bismuth (Bi)	<0.20		0.20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Cadmium (Cd)	0.310		0.020	mg/kg	19-OCT-22	19-OCT-22	R5877677
Calcium (Ca)	103000		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Chromium (Cr)	75.3		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Cobalt (Co)	2.78		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Copper (Cu)	11.2		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Iron (Fe)	5460		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Lead (Pb)	4.64		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Lithium (Li)	5.9		2.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Magnesium (Mg)	49600		20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Manganese (Mn)	167		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Molybdenum (Mo)	4.42		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Nickel (Ni)	43.1		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Phosphorus (P)	758		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Potassium (K)	720		100	mg/kg	19-OCT-22	19-OCT-22	R5877677
Selenium (Se)	0.32		0.20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Silver (Ag)	0.10		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Sodium (Na)	470		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Strontium (Sr)	39.4		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Sulfur (S)	2100		1000	mg/kg	19-OCT-22	19-OCT-22	R5877677
Thallium (Tl)	0.055		0.050	mg/kg	19-OCT-22	19-OCT-22	R5877677
Tin (Sn)	<1.0		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Titanium (Ti)	135		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Tungsten (W)	<0.50		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Uranium (U)	0.463		0.050	mg/kg	19-OCT-22	19-OCT-22	R5877677
Vanadium (V)	12.5		0.20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Zinc (Zn)	47.8		2.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Zirconium (Zr)	<1.0		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Total Nitrogen by combustion method							
Total Nitrogen by LECO	0.393		0.020	%	20-OCT-22	20-OCT-22	R5878623
Total Sulphur by combustion method							
Sulfur (S)-Total	2600		500	mg/kg	20-OCT-22	20-OCT-22	R5878623
Detailed Salinity							
Chloride (Cl) (Saturated Paste)							
Chloride (Cl)	109		20	mg/L	21-OCT-22	21-OCT-22	R5879196
Detail Salinity in mg/kg							
Chloride (Cl)	131		24	mg/kg		27-OCT-22	
Calcium (Ca)	620		30	mg/kg		27-OCT-22	
Magnesium (Mg)	125		30	mg/kg		27-OCT-22	
Potassium (K)	50		30	mg/kg		27-OCT-22	
Sodium (Na)	230		30	mg/kg		27-OCT-22	
Sulfur (as SO4)	473		30	mg/kg		27-OCT-22	
Nitrate-N	<1.2		1.2	mg/kg		27-OCT-22	
SAR, Cations and SO4 in saturated soil							
Calcium (Ca)	519	DLDS	25	mg/L	21-OCT-22	21-OCT-22	R5879657
Potassium (K)	42	DLDS	25	mg/L	21-OCT-22	21-OCT-22	R5879657
Magnesium (Mg)	104	DLDS	25	mg/L	21-OCT-22	21-OCT-22	R5879657
Sodium (Na)	193	DLDS	25	mg/L	21-OCT-22	21-OCT-22	R5879657
SAR	2.02		0.10	SAR	21-OCT-22	21-OCT-22	R5879657
Sulfur (as SO4)	396	DLDS	25	mg/L	21-OCT-22	21-OCT-22	R5879657

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-3 SITE 2A ZONE 1, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 14:30							
Matrix: COMPOSITE SOIL							
Theoretical Gypsum Requirement							
TGR(brine)	<0.10		0.10	t/ha		27-OCT-22	
TGR(sodic)	<0.10		0.10	t/ha		27-OCT-22	
pH and EC (Saturated Paste)							
% Saturation	119		1.0	%	20-OCT-22	21-OCT-22	R5878938
pH in Saturated Paste	7.06		0.10	pH	20-OCT-22	21-OCT-22	R5878938
Conductivity Sat. Paste	3.06		0.10	dS m-1	20-OCT-22	21-OCT-22	R5878938
VOC routine							
VOC plus F1 by GCMS							
Acetone	4.7	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
Benzene	<0.010	DLHM	0.010	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromobenzene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromochloromethane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromodichloromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromoform	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromomethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
n-Butylbenzene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
sec-Butylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
tert-Butylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Carbon disulfide	<0.50	DLHM	0.50	mg/kg	11-OCT-22	29-OCT-22	R5887957
Carbon Tetrachloride	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chloroform	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chloromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
2-Chlorotoluene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
4-Chlorotoluene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dibromochloromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dibromo-3-chloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dibromoethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dibromomethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,3-Dichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,4-Dichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dichlorodifluoromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1-dichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1-dichloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
cis-1,2-Dichloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
trans-1,2-Dichloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dichloromethane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dichloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,3-Dichloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
2,2-Dichloropropane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1-Dichloropropene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
cis-1,3-Dichloropropene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
trans-1,3-Dichloropropene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Ethylbenzene	<0.030	DLHM	0.030	mg/kg	11-OCT-22	29-OCT-22	R5887957
Hexachlorobutadiene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Hexane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
2-Hexanone (Methyl butyl ketone)	<1.0	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
Isopropylbenzene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-3 SITE 2A ZONE 1, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 14:30							
Matrix: COMPOSITE SOIL							
VOC plus F1 by GCMS							
4-Isopropyltoluene	109	DLHC	0.50	mg/kg	11-OCT-22	29-OCT-22	R5887957
MEK	<1.5	DLHM	1.5	mg/kg	11-OCT-22	29-OCT-22	R5887957
MIBK	<1.0	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
MTBE	<0.40	DLHM	0.40	mg/kg	11-OCT-22	29-OCT-22	R5887957
Styrene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,1,2-Tetrachloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,2,2-Tetrachloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Tetrachloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Toluene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,3-Trichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,4-Trichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,1-Trichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,2-Trichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Trichloroethene	<0.020	DLHM	0.020	mg/kg	11-OCT-22	29-OCT-22	R5887957
Trichlorofluoromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,3-Trichloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,4-Trimethylbenzene	0.21	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,3,5-Trimethylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Vinyl Chloride	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
M+P-Xylenes	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
o-Xylene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Surrogate: 1,4-Difluorobenzene (SS)	114.9		70-130	%	11-OCT-22	29-OCT-22	R5887957
Surrogate: 4-Bromofluorobenzene (SS)	160.4	SHMI	70-130	%	11-OCT-22	29-OCT-22	R5887957

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D2: Primary biosolids- Zone 3 (NSB)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-5 SITE 2A ZONE 3, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 13:30							
Matrix: COMPOSITE SOIL							
Total Carbon, TOC and TIC in soil							
Inorganic Carbon as CaCO3 Equivalent							
Inorganic Carbon (as CaCO3 Equivalent)	28.9		0.40	%		21-OCT-22	
Total Carbon by combustion method							
Total Carbon by Combustion	26.5		0.05	%	20-OCT-22	20-OCT-22	R5878623
Total Inorganic Carbon in Soil							
Inorganic Carbon	3.47		0.050	%		21-OCT-22	R5879037
Total Organic Carbon Calculation							
Total Organic Carbon	23.0		0.050	%		22-OCT-22	
Miscellaneous Parameters							
Moisture	75.6		0.10	%		19-OCT-22	R5877597
Available Phosphate-P	28.1		1.0	mg/kg	20-OCT-22	20-OCT-22	R5878090
Specific Gravity	1070		10	kg/m3	22-OCT-22	22-OCT-22	R5879470
Conductivity (1:2)	1.11	FR5	0.050	dS m-1	19-OCT-22	19-OCT-22	R5877502
Mercury (Hg)	0.0088		0.0050	mg/kg	19-OCT-22	19-OCT-22	R5877496
Nitrate (as N)	<1.0		1.0	mg/L		16-OCT-22	R5879136
pH (1:2 CaCl2)	7.54	FR5	0.10	pH	19-OCT-22	19-OCT-22	R5877478
Particle size - Pipette removal OM & CO3							
% Sand (2.0mm - 0.05mm)	38.9	PSAL	1.0	%	28-OCT-22	29-OCT-22	R5883681
% Silt (0.05mm - 2um)	50.2	PSAL	1.0	%	28-OCT-22	29-OCT-22	R5883681
% Clay (<2um)	10.9	PSAL	1.0	%	28-OCT-22	29-OCT-22	R5883681
Texture	Silt loam	PSAL			28-OCT-22	29-OCT-22	R5883681
Available Micronutrients (Cu,Fe,Zn,Mn)							
Copper (Cu)	2.65		0.60	mg/kg	27-OCT-22	27-OCT-22	R5882816
Iron (Fe)	277		6.0	mg/kg	27-OCT-22	27-OCT-22	R5882816
Manganese (Mn)	37.5		0.15	mg/kg	27-OCT-22	27-OCT-22	R5882816
Zinc (Zn)	11.5		0.60	mg/kg	27-OCT-22	27-OCT-22	R5882816
Total Available N & NO3-N, NO2-N & NH4							
Available Ammonium-N							
Available Ammonium-N	11.1		5.0	mg/kg	19-OCT-22	19-OCT-22	R5878240
Available Ammonium-N - Calculation							
Total Available Nitrogen	11		11	mg/kg		20-OCT-22	
Nitrate, Nitrite & Nitrate+Nitrite-N(KCL							
Nitrite-N	<5.0		5.0	mg/kg	19-OCT-22	19-OCT-22	R5878168
Nitrate+Nitrite-N	<10		10	mg/kg	19-OCT-22	19-OCT-22	R5878168
Nitrate-N	<10		10	mg/kg	19-OCT-22	19-OCT-22	R5878168
Total Organic Nitrogen - Soil							
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.850		0.020	%		22-OCT-22	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.85		0.10	%	19-OCT-22	21-OCT-22	R5879057
Available N, P and K							
Available Nitrate-N							
Available Nitrate-N	<5.0	DLM	5.0	mg/kg	19-OCT-22	19-OCT-22	R5878163
Plant Available Phosphorus and Potassium							
Available Phosphate-P	75.7		4.0	mg/kg	20-OCT-22	20-OCT-22	R5879059
Available Potassium	226		20	mg/kg	20-OCT-22	20-OCT-22	R5879059
Total N, P, K, S							
Metals in Soil by CRC ICPMS							
Aluminum (Al)	4970		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Antimony (Sb)	0.79		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Arsenic (As)	0.86		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Barium (Ba)	72.1		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-5 SITE 2A ZONE 3, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 13:30							
Matrix: COMPOSITE SOIL							
Metals in Soil by CRC ICPMS							
Beryllium (Be)	0.14		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Boron (B)	7.4		5.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Bismuth (Bi)	<0.20		0.20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Cadmium (Cd)	0.542		0.020	mg/kg	19-OCT-22	19-OCT-22	R5877677
Calcium (Ca)	65400		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Chromium (Cr)	27.3		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Cobalt (Co)	2.28		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Copper (Cu)	12.5		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Iron (Fe)	4440		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Lead (Pb)	4.85		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Lithium (Li)	4.5		2.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Magnesium (Mg)	16500		20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Manganese (Mn)	181		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Molybdenum (Mo)	2.51		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Nickel (Ni)	20.6		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Phosphorus (P)	865		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Potassium (K)	850		100	mg/kg	19-OCT-22	19-OCT-22	R5877677
Selenium (Se)	0.38		0.20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Silver (Ag)	0.17		0.10	mg/kg	19-OCT-22	19-OCT-22	R5877677
Sodium (Na)	951		50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Strontium (Sr)	39.6		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Sulfur (S)	2900		1000	mg/kg	19-OCT-22	19-OCT-22	R5877677
Thallium (Tl)	0.066		0.050	mg/kg	19-OCT-22	19-OCT-22	R5877677
Tin (Sn)	2.3		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Titanium (Ti)	108		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Tungsten (W)	<0.50		0.50	mg/kg	19-OCT-22	19-OCT-22	R5877677
Uranium (U)	0.479		0.050	mg/kg	19-OCT-22	19-OCT-22	R5877677
Vanadium (V)	12.0		0.20	mg/kg	19-OCT-22	19-OCT-22	R5877677
Zinc (Zn)	73.8		2.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Zirconium (Zr)	1.8		1.0	mg/kg	19-OCT-22	19-OCT-22	R5877677
Total Nitrogen by combustion method							
Total Nitrogen by LECO	0.651		0.020	%	20-OCT-22	20-OCT-22	R5878623
Total Sulphur by combustion method							
Sulfur (S)-Total	3200		500	mg/kg	20-OCT-22	20-OCT-22	R5878623
Detailed Salinity							
Chloride (Cl) (Saturated Paste)							
Chloride (Cl)	13		10	mg/L	21-OCT-22	21-OCT-22	R5879196
Detail Salinity in mg/kg							
Chloride (Cl)	100		77	mg/kg		27-OCT-22	
Calcium (Ca)	1910		38	mg/kg		27-OCT-22	
Magnesium (Mg)	250		38	mg/kg		27-OCT-22	
Potassium (K)	81		38	mg/kg		27-OCT-22	
Sodium (Na)	544		38	mg/kg		27-OCT-22	
Sulfur (as SO4)	373		38	mg/kg		27-OCT-22	
Nitrate-N	<7.7		7.7	mg/kg		27-OCT-22	
SAR, Cations and SO4 in saturated soil							
Calcium (Ca)	249		5.0	mg/L	21-OCT-22	21-OCT-22	R5879657
Potassium (K)	10.6		5.0	mg/L	21-OCT-22	21-OCT-22	R5879657
Magnesium (Mg)	32.6		5.0	mg/L	21-OCT-22	21-OCT-22	R5879657
Sodium (Na)	70.8		5.0	mg/L	21-OCT-22	21-OCT-22	R5879657
SAR	1.12		0.10	SAR	21-OCT-22	21-OCT-22	R5879657
Sulfur (as SO4)	48.5		5.0	mg/L	21-OCT-22	21-OCT-22	R5879657

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-5 SITE 2A ZONE 3, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 13:30							
Matrix: COMPOSITE SOIL							
Theoretical Gypsum Requirement							
TGR(brine)	<0.10		0.10	t/ha		27-OCT-22	
TGR(sodic)	<0.10		0.10	t/ha		27-OCT-22	
pH and EC (Saturated Paste)							
% Saturation	769		1.0	%	20-OCT-22	21-OCT-22	R5878938
pH in Saturated Paste	6.63		0.10	pH	20-OCT-22	21-OCT-22	R5878938
Conductivity Sat. Paste	1.39		0.10	dS m-1	20-OCT-22	21-OCT-22	R5878938
VOC routine							
VOC plus F1 by GCMS							
Acetone	3.6	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
Benzene	<0.020	DLHM	0.020	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromobenzene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromochloromethane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromodichloromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromoform	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Bromomethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
n-Butylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
sec-Butylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
tert-Butylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Carbon disulfide	<0.50	DLHM	0.50	mg/kg	11-OCT-22	29-OCT-22	R5887957
Carbon Tetrachloride	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chloroform	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Chloromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
2-Chlorotoluene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
4-Chlorotoluene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dibromochloromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dibromo-3-chloropropane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dibromoethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dibromomethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,3-Dichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,4-Dichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dichlorodifluoromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1-dichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1-dichloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
cis-1,2-Dichloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
trans-1,2-Dichloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Dichloromethane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2-Dichloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,3-Dichloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
2,2-Dichloropropane	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1-Dichloropropene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
cis-1,3-Dichloropropene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
trans-1,3-Dichloropropene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Ethylbenzene	<0.030	DLHM	0.030	mg/kg	11-OCT-22	29-OCT-22	R5887957
Hexachlorobutadiene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Hexane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
2-Hexanone (Methyl butyl ketone)	<1.0	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
Isopropylbenzene	<0.20	DLHM	0.20	mg/kg	11-OCT-22	29-OCT-22	R5887957

* Refer to Referenced Information for Qualifiers (if any) and Methodology

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2736640-5 SITE 2A ZONE 3, 0-15 CM							
Sampled By: CLIENT on 11-OCT-22 @ 13:30							
Matrix: COMPOSITE SOIL							
VOC plus F1 by GCMS							
4-Isopropyltoluene	132	DLHC	0.50	mg/kg	11-OCT-22	29-OCT-22	R5887957
MEK	<1.0	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
MIBK	<1.0	DLHM	1.0	mg/kg	11-OCT-22	29-OCT-22	R5887957
MTBE	<0.40	DLHM	0.40	mg/kg	11-OCT-22	29-OCT-22	R5887957
Styrene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,1,2-Tetrachloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,2,2-Tetrachloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Tetrachloroethene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Toluene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,3-Trichlorobenzene	<0.50	DLHM	0.50	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,4-Trichlorobenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,1-Trichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,1,2-Trichloroethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Trichloroethene	<0.050	DLHM	0.050	mg/kg	11-OCT-22	29-OCT-22	R5887957
Trichlorofluoromethane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,3-Trichloropropane	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,2,4-Trimethylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
1,3,5-Trimethylbenzene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Vinyl Chloride	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
M+P-Xylenes	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
o-Xylene	<0.10	DLHM	0.10	mg/kg	11-OCT-22	29-OCT-22	R5887957
Surrogate: 1,4-Difluorobenzene (SS)	106.8		70-130	%	11-OCT-22	29-OCT-22	R5887957
Surrogate: 4-Bromofluorobenzene (SS)	106.1		70-130	%	11-OCT-22	29-OCT-22	R5887957

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D3: Secondary Biosolids- Capped Landfill 1, ZONE 2 (ASB)

Canadian Kraft Paper Industries Limited
ATTN: ERNIE BALLANTYNE
PO Box 1590
The Pas MB R9A 1L4

Date Received: 19-OCT-22
Report Date: 18-NOV-22 10:02 (MT)
Version: FINAL REV. 2

Client Phone: 204-623-8636

Certificate of Analysis

Lab Work Order #: L2737358
Project P.O. #: SV-32018
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments:
18-NOV-2022 Revised report - Full metals reporting.

[redacted]
Hua Wo
Chemistry Laboratory Manager

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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L2737358-2	CLF1 ZONE 2 ASB, 0-30 CM						
Sampled By:	CLIENT on 17-OCT-22 @ 15:00						
Matrix:	COMPOSITE SOIL						
Total Carbon, TOC and TIC in soil							
Inorganic Carbon as CaCO3 Equivalent							
Inorganic Carbon (as CaCO3 Equivalent)	30.7		0.40	%		26-OCT-22	
Total Carbon by combustion method							
Total Carbon by Combustion	33.3		0.05	%	26-OCT-22	26-OCT-22	R5882125
Total Inorganic Carbon in Soil							
Inorganic Carbon	3.69		0.050	%		26-OCT-22	R5881740
Total Organic Carbon Calculation							
Total Organic Carbon	29.6		0.050	%		27-OCT-22	
Miscellaneous Parameters							
Moisture	35.3		0.10	%		27-OCT-22	R5882518
% Saturation	231		1.0	%		24-OCT-22	R5879996
Available Phosphate-P	195		10	mg/kg	26-OCT-22	26-OCT-22	R5881778
Specific Gravity	1220		10	kg/m3	26-OCT-22	26-OCT-22	R5882117
Conductivity (1:2)	1.26	FRS	0.050	dS m-1	26-OCT-22	26-OCT-22	R5882122
Mercury (Hg)	0.0635		0.0050	mg/kg	25-OCT-22	26-OCT-22	R5881816
Nitrate (as N)	41		20	mg/L		24-OCT-22	R5882750
pH (1:2 CaCl2)	7.05		0.10	pH	26-OCT-22	26-OCT-22	R5882120
Particle size - Pipette removal OM & CO3							
% Sand (2.0mm - 0.05mm)	8.2	UMI	1.0	%	28-OCT-22	29-OCT-22	R5883677
% Silt (0.05mm - 2um)	81.9	UMI	1.0	%	28-OCT-22	29-OCT-22	R5883677
% Clay (<2um)	10.0	UMI	1.0	%	28-OCT-22	29-OCT-22	R5883677
Texture	Silt	UMI			28-OCT-22	29-OCT-22	R5883677
Note: PSA Results Unreliable. Insufficient soil for analysis.							
Available Micronutrients (Cu,Fe,Zn,Mn)							
Copper (Cu)	20.5		0.60	mg/kg	26-OCT-22	26-OCT-22	R5882436
Iron (Fe)	128		6.0	mg/kg	26-OCT-22	26-OCT-22	R5882436
Manganese (Mn)	770		0.15	mg/kg	26-OCT-22	26-OCT-22	R5882436
Zinc (Zn)	302		0.60	mg/kg	26-OCT-22	26-OCT-22	R5882436
Metals in Soil by CRC ICPMS							
Aluminum (Al)	9270		50	mg/kg	25-OCT-22	26-OCT-22	R5881797

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737358-2 CLF1 ZONE 2 ASB, 0-30 CM							
Sampled By: CLIENT on 17-OCT-22 @ 15:00							
Matrix: COMPOSITE SOIL							
Metals in Soil by CRC ICPMS							
Antimony (Sb)	0.50		0.10	mg/kg	25-OCT-22	26-OCT-22	R5881797
Arsenic (As)	1.96		0.10	mg/kg	25-OCT-22	26-OCT-22	R5881797
Barium (Ba)	345		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Beryllium (Be)	0.29		0.10	mg/kg	25-OCT-22	26-OCT-22	R5881797
Boron (B)	5.9		5.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Bismuth (Bi)	<0.20		0.20	mg/kg	25-OCT-22	26-OCT-22	R5881797
Cadmium (Cd)	6.01		0.020	mg/kg	25-OCT-22	26-OCT-22	R5881797
Calcium (Ca)	118000		50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Chromium (Cr)	43.9		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Cobalt (Co)	3.96		0.10	mg/kg	25-OCT-22	26-OCT-22	R5881797
Copper (Cu)	84.8		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Iron (Fe)	5190		50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Lead (Pb)	12.0		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Lithium (Li)	5.2		2.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Magnesium (Mg)	11100		20	mg/kg	25-OCT-22	26-OCT-22	R5881797
Manganese (Mn)	2860		1.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Molybdenum (Mo)	4.79		0.10	mg/kg	25-OCT-22	26-OCT-22	R5881797
Nickel (Ni)	41.9		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Phosphorus (P)	3360		50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Potassium (K)	660		100	mg/kg	25-OCT-22	26-OCT-22	R5881797
Selenium (Se)	0.70		0.20	mg/kg	25-OCT-22	26-OCT-22	R5881797
Silver (Ag)	4.98		0.10	mg/kg	25-OCT-22	26-OCT-22	R5881797
Sodium (Na)	1310		50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Strontium (Sr)	223		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Sulfur (S)	11200		1000	mg/kg	25-OCT-22	26-OCT-22	R5881797
Thallium (Tl)	0.270		0.050	mg/kg	25-OCT-22	26-OCT-22	R5881797
Tin (Sn)	1.2		1.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Titanium (Ti)	104		1.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Tungsten (W)	0.79		0.50	mg/kg	25-OCT-22	26-OCT-22	R5881797
Uranium (U)	1.81		0.050	mg/kg	25-OCT-22	26-OCT-22	R5881797
Vanadium (V)	18.7		0.20	mg/kg	25-OCT-22	26-OCT-22	R5881797
Zinc (Zn)	879		2.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Zirconium (Zr)	1.7		1.0	mg/kg	25-OCT-22	26-OCT-22	R5881797
Total Available N & NO3-N, NO2-N & NH4							
Available Ammonium-N							
Available Ammonium-N	3.5		2.0	mg/kg	25-OCT-22	25-OCT-22	R5881179
Available Ammonium-N - Calculation							
Total Available Nitrogen	94.4		4.5	mg/kg		26-OCT-22	
Nitrate, Nitrite & Nitrate+Nitrite-N(KCL							
Nitrite-N	<2.0	DLM	2.0	mg/kg	25-OCT-22	25-OCT-22	R5880796
Nitrate+Nitrite-N	90.9		4.0	mg/kg	25-OCT-22	25-OCT-22	R5880796
Nitrate-N	90.9		4.0	mg/kg	25-OCT-22	25-OCT-22	R5880796
Total Organic Nitrogen - Soil							
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	1.14		0.020	%		02-NOV-22	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	1.14		0.16	%	27-OCT-22	01-NOV-22	R5885857
Available N, P and K							
Available Nitrate-N							
Available Nitrate-N	94.4		2.0	mg/kg	26-OCT-22	26-OCT-22	R5881737
Plant Available Phosphorus and Potassium							
Available Phosphate-P	101		10	mg/kg	26-OCT-22	26-OCT-22	R5881817

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737358-2 CLF1 ZONE 2 ASB, 0-30 CM							
Sampled By: CLIENT on 17-OCT-22 @ 15:00							
Matrix: COMPOSITE SOIL							
Plant Available Phosphorus and Potassium							
Available Potassium	99		20	mg/kg	26-OCT-22	26-OCT-22	R5881817
Total N, P, K, S							
Total Nitrogen by combustion method							
Total Nitrogen by LECO	1.22		0.020	%	26-OCT-22	26-OCT-22	R5882125
Total Sulphur by combustion method							
Sulfur (S)-Total	10400		500	mg/kg	26-OCT-22	26-OCT-22	R5882125
Detailed Salinity							
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	522		5.0	mg/L		25-OCT-22	R5886097
Magnesium (Mg)	128		5.0	mg/L		25-OCT-22	R5886097
Potassium (K)	8.0		5.0	mg/L		25-OCT-22	R5886097
Sodium (Na)	88.2		5.0	mg/L		25-OCT-22	R5886097
Chloride in Soil (Paste) by Colorimetry							
Chloride (Cl)	<20		20	mg/L		10-NOV-22	R5890098
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	2.79		0.010	dS/m		30-OCT-22	R5883767
Sodium Adsorption Ratio (Sat. Paste)							
SAR	0.90		0.10	SAR		02-NOV-22	
Sulphate (SO4)							
Sulfur (as SO4)	1590		6.0	mg/L		25-OCT-22	R5886097
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	7.15		0.10	pH		03-NOV-22	R5886860
VOC routine							
VOC plus F1 by GCMS							
Acetone	0.60		0.50	mg/kg	17-OCT-22	22-OCT-22	R5886677
Benzene	<0.0050		0.0050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Bromobenzene	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
Bromochloromethane	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
Bromodichloromethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Bromoform	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Bromomethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
n-Butylbenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
sec-Butylbenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
tert-Butylbenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Carbon disulfide	<0.25		0.25	mg/kg	17-OCT-22	22-OCT-22	R5886677
Carbon Tetrachloride	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Chlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Chloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Chloroform	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Chloromethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
2-Chlorotoluene	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
4-Chlorotoluene	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
Dibromochloromethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2-Dibromo-3-chloropropane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2-Dibromoethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Dibromomethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2-Dichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,3-Dichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,4-Dichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Dichlorodifluoromethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,1-dichloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2-Dichloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737358-2 CLF1 ZONE 2 ASB, 0-30 CM							
Sampled By: CLIENT on 17-OCT-22 @ 15:00							
Matrix: COMPOSITE SOIL							
VOC plus F1 by GCMS							
1,1-dichloroethene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
cis-1,2-Dichloroethene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
trans-1,2-Dichloroethene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Dichloromethane	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2-Dichloropropane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,3-Dichloropropane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
2,2-Dichloropropane	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,1-Dichloropropene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
cis-1,3-Dichloropropene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
trans-1,3-Dichloropropene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Ethylbenzene	<0.015		0.015	mg/kg	17-OCT-22	22-OCT-22	R5886677
Hexachlorobutadiene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Hexane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
2-Hexanone (Methyl butyl ketone)	<0.50		0.50	mg/kg	17-OCT-22	22-OCT-22	R5886677
Isopropylbenzene	<0.10		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
4-Isopropyltoluene	0.21		0.10	mg/kg	17-OCT-22	22-OCT-22	R5886677
MEK	<0.50		0.50	mg/kg	17-OCT-22	22-OCT-22	R5886677
MIBK	<0.50		0.50	mg/kg	17-OCT-22	22-OCT-22	R5886677
MTBE	<0.20		0.20	mg/kg	17-OCT-22	22-OCT-22	R5886677
Styrene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,1,1,2-Tetrachloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,1,2,2-Tetrachloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Tetrachloroethene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Toluene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2,3-Trichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2,4-Trichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,1,1-Trichloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,1,2-Trichloroethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Trichloroethene	<0.010		0.010	mg/kg	17-OCT-22	22-OCT-22	R5886677
Trichlorofluoromethane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2,3-Trichloropropane	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,2,4-Trimethylbenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
1,3,5-Trimethylbenzene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Vinyl Chloride	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
M+P-Xylenes	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
o-Xylene	<0.050		0.050	mg/kg	17-OCT-22	22-OCT-22	R5886677
Surrogate: 1,4-Difluorobenzene (SS)	110.6		70-130	%	17-OCT-22	22-OCT-22	R5886677
Surrogate: 4-Bromofluorobenzene (SS)	111.6		70-130	%	17-OCT-22	22-OCT-22	R5886677

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E: Round the Bend Farm Soil – COA (attached)

Canadian Kraft Paper Industries Limited
ATTN: ERNIE BALLANTYNE
PO Box 1590
The Pas MB R9A 1L4

Date Received: 25- OCT- 22
Report Date: 18- NOV- 22 10:03 (MT)
Version: FINAL REV. 2

Client Phone: 204- 623- 8636

Certificate of Analysis

Lab Work Order #: L2737850

Project P.O. #: SV- 32008
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments:

18- NOV- 2022 Revised report - Full metals reporting.

[redacted]

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-1 ROUNDTHEBEND (RTB) 0-15 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
Total Carbon, TOC and TIC in soil							
Inorganic Carbon as CaCO3 Equivalent							
Inorganic Carbon (as CaCO3 Equivalent)	4.53		0.40	%		29-OCT-22	
Total Carbon by combustion method							
Total Carbon by Combustion	8.98		0.05	%	28-OCT-22	28-OCT-22	R5883678
Total Inorganic Carbon in Soil							
Inorganic Carbon	0.544		0.050	%		29-OCT-22	R5883664
Total Organic Carbon Calculation							
Total Organic Carbon	8.44		0.050	%		29-OCT-22	
Miscellaneous Parameters							
Moisture	25.7		0.10	%		01-NOV-22	R5885342
% Saturation	124		1.0	%	03-NOV-22	03-NOV-22	R5886880
Available Phosphate-P	4.4		1.0	mg/kg	29-OCT-22	29-OCT-22	R5883675
Specific Gravity	1610		10	kg/m3	02-NOV-22	02-NOV-22	R5886037
Conductivity (1:2)	0.359		0.050	dS m-1	02-NOV-22	02-NOV-22	R5886202
Mercury (Hg)	0.0516		0.0050	mg/kg	28-OCT-22	28-OCT-22	R5883357
Nitrate (as N)	1.1		1.0	mg/L		03-NOV-22	R5886956
pH (1:2 CaCl2)	7.34		0.10	pH	02-NOV-22	02-NOV-22	R5886201
Particle size - Pipette removal OM & CO3							
% Sand (2.0mm - 0.05mm)	<1.0	UMI	1.0	%	31-OCT-22	01-NOV-22	R5885456
% Silt (0.05mm - 2um)	73.3	UMI	1.0	%	31-OCT-22	01-NOV-22	R5885456
% Clay (<2um)	26.5	UMI	1.0	%	31-OCT-22	01-NOV-22	R5885456
Texture	Silt loam	UMI			31-OCT-22	01-NOV-22	R5885456
Available Micronutrients (Cu,Fe,Zn,Mn)							
Copper (Cu)	2.15		0.20	mg/kg	02-NOV-22	02-NOV-22	R5886116
Iron (Fe)	109		2.0	mg/kg	02-NOV-22	02-NOV-22	R5886116
Manganese (Mn)	3.31		0.050	mg/kg	02-NOV-22	02-NOV-22	R5886116
Zinc (Zn)	3.29		0.20	mg/kg	02-NOV-22	02-NOV-22	R5886116
Metals in Soil by CRC ICPMS							
Aluminum (Al)	13200		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Antimony (Sb)	0.63		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Arsenic (As)	15.9		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Barium (Ba)	300		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Beryllium (Be)	0.88		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Boron (B)	9.9		5.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Bismuth (Bi)	0.25		0.20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Cadmium (Cd)	0.591		0.020	mg/kg	28-OCT-22	28-OCT-22	R5883398
Calcium (Ca)	19900		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Chromium (Cr)	20.5		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Cobalt (Co)	11.7		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Copper (Cu)	28.2		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Iron (Fe)	20400		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Lead (Pb)	14.2		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Lithium (Li)	14.0		2.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Magnesium (Mg)	8800		20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Manganese (Mn)	393		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Molybdenum (Mo)	1.21		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Nickel (Ni)	32.3		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Phosphorus (P)	1010		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Potassium (K)	1820		100	mg/kg	28-OCT-22	28-OCT-22	R5883398
Selenium (Se)	0.85		0.20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Silver (Ag)	0.15		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-1 ROUNDTHEBEND (RTB) 0-15 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
Metals in Soil by CRC ICPMS							
Sodium (Na)	165		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Strontium (Sr)	81.5		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Sulfur (S)	1400		1000	mg/kg	28-OCT-22	28-OCT-22	R5883398
Thallium (Tl)	0.225		0.050	mg/kg	28-OCT-22	28-OCT-22	R5883398
Tin (Sn)	<1.0		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Titanium (Ti)	31.9		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Tungsten (W)	<0.50		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Uranium (U)	1.73		0.050	mg/kg	28-OCT-22	28-OCT-22	R5883398
Vanadium (V)	34.8		0.20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Zinc (Zn)	92.3		2.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Zirconium (Zr)	9.0		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Total Available N & NO3-N, NO2-N & NH4							
Available Ammonium-N							
Available Ammonium-N	2.6		1.0	mg/kg	31-OCT-22	31-OCT-22	R5884656
Available Ammonium-N - Calculation							
Total Available Nitrogen	2.6		2.2	mg/kg		01-NOV-22	
Nitrate, Nitrite & Nitrate+Nitrite-N(KCL							
Nitrite-N	<1.0		1.0	mg/kg	02-NOV-22	02-NOV-22	R5886076
Nitrate+Nitrite-N	<2.0		2.0	mg/kg	02-NOV-22	02-NOV-22	R5886076
Nitrate-N	<2.0		2.0	mg/kg	02-NOV-22	02-NOV-22	R5886076
Total Organic Nitrogen - Soil							
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.672		0.020	%		04-NOV-22	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.672		0.080	%	01-NOV-22	03-NOV-22	R5887137
Available N, P and K							
Available Nitrate-N							
Available Nitrate-N	1.8		1.0	mg/kg	01-NOV-22	01-NOV-22	R5885459
Plant Available Phosphorus and Potassium							
Available Phosphate-P	3.3		2.0	mg/kg	29-OCT-22	29-OCT-22	R5886199
Available Potassium	296		20	mg/kg	29-OCT-22	29-OCT-22	R5886199
Total N, P, K, S							
Total Nitrogen by combustion method							
Total Nitrogen by LECO	0.830		0.020	%	28-OCT-22	28-OCT-22	R5883678
Total Sulphur by combustion method							
Sulfur (S)-Total	1800		500	mg/kg	28-OCT-22	28-OCT-22	R5883678
Detailed Salinity							
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	40.5		5.0	mg/L		04-NOV-22	R5889496
Magnesium (Mg)	12.9		5.0	mg/L		04-NOV-22	R5889496
Potassium (K)	15.0		5.0	mg/L		04-NOV-22	R5889496
Sodium (Na)	7.2		5.0	mg/L		04-NOV-22	R5889496
Chloride in Soil (Paste) by Colorimetry							
Chloride (Cl)	48		20	mg/L		03-NOV-22	R5887316
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.396		0.010	dS/m		03-NOV-22	R5886876
Sodium Adsorption Ratio (Sat. Paste)							
SAR	0.25		0.10	SAR		09-NOV-22	
Sulphate (SO4)							
Sulfur (as SO4)	18.7		6.0	mg/L		04-NOV-22	R5889496
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	7.41		0.10	pH		03-NOV-22	R5886860

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-1 ROUNDTHEBEND (RTB) 0-15 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
VOC routine							
VOC plus F1 by GCMS							
Acetone	<1.0	DLIS	1.0	mg/kg	17-OCT-22	26-OCT-22	R5882057
Benzene	<0.010	DLIS	0.010	mg/kg	17-OCT-22	26-OCT-22	R5882057
Bromobenzene	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
Bromochloromethane	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
Bromodichloromethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Bromoform	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Bromomethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
n-Butylbenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
sec-Butylbenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
tert-Butylbenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Carbon disulfide	<0.50	DLIS	0.50	mg/kg	17-OCT-22	26-OCT-22	R5882057
Carbon Tetrachloride	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Chlorobenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Chloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Chloroform	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Chloromethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
2-Chlorotoluene	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
4-Chlorotoluene	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
Dibromochloromethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2-Dibromo-3-chloropropane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2-Dibromoethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Dibromomethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2-Dichlorobenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,3-Dichlorobenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,4-Dichlorobenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Dichlorodifluoromethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1-dichloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2-Dichloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1-dichloroethene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
cis-1,2-Dichloroethene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
trans-1,2-Dichloroethene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Dichloromethane	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2-Dichloropropane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,3-Dichloropropane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
2,2-Dichloropropane	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1-Dichloropropene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
cis-1,3-Dichloropropene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
trans-1,3-Dichloropropene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Ethylbenzene	<0.030	DLIS	0.030	mg/kg	17-OCT-22	26-OCT-22	R5882057
Hexachlorobutadiene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Hexane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
2-Hexanone (Methyl butyl ketone)	<1.0	DLIS	1.0	mg/kg	17-OCT-22	26-OCT-22	R5882057
Isopropylbenzene	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
4-Isopropyltoluene	<0.20	DLIS	0.20	mg/kg	17-OCT-22	26-OCT-22	R5882057
MEK	<1.0	DLIS	1.0	mg/kg	17-OCT-22	26-OCT-22	R5882057
MIBK	<1.0	DLIS	1.0	mg/kg	17-OCT-22	26-OCT-22	R5882057
MTBE	<0.40	DLIS	0.40	mg/kg	17-OCT-22	26-OCT-22	R5882057
Styrene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1,1,2-Tetrachloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1,2,2-Tetrachloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-1 ROUNDTHEBEND (RTB) 0-15 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
VOC plus F1 by GCMS							
Tetrachloroethene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Toluene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2,3-Trichlorobenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2,4-Trichlorobenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1,1-Trichloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,1,2-Trichloroethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Trichloroethene	<0.020	DLIS	0.020	mg/kg	17-OCT-22	26-OCT-22	R5882057
Trichlorofluoromethane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2,3-Trichloropropane	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,2,4-Trimethylbenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
1,3,5-Trimethylbenzene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Vinyl Chloride	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
M+P-Xylenes	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
o-Xylene	<0.10	DLIS	0.10	mg/kg	17-OCT-22	26-OCT-22	R5882057
Surrogate: 1,4-Difluorobenzene (SS)	121.4		70-130	%	17-OCT-22	26-OCT-22	R5882057
Surrogate: 4-Bromofluorobenzene (SS)	113.8		70-130	%	17-OCT-22	26-OCT-22	R5882057
L2737850-2 ROUNDTHEBEND (RTB) 0-60 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
Total Carbon, TOC and TIC in soil							
Inorganic Carbon as CaCO3 Equivalent							
Inorganic Carbon (as CaCO3 Equivalent)	8.32		0.40	%		29-OCT-22	
Total Carbon by combustion method							
Total Carbon by Combustion	4.56		0.05	%	28-OCT-22	28-OCT-22	R5883678
Total Inorganic Carbon in Soil							
Inorganic Carbon	0.999		0.050	%		29-OCT-22	R5883664
Total Organic Carbon Calculation							
Total Organic Carbon	3.56		0.050	%		29-OCT-22	
Miscellaneous Parameters							
Moisture	20.2		0.10	%		01-NOV-22	R5885342
% Saturation	76.0		1.0	%	03-NOV-22	03-NOV-22	R5886880
Available Phosphate-P	3.0		1.0	mg/kg	29-OCT-22	29-OCT-22	R5883675
Specific Gravity	1710		10	kg/m3	02-NOV-22	02-NOV-22	R5886037
Conductivity (1:2)	0.499		0.050	dS m-1	02-NOV-22	02-NOV-22	R5886202
Mercury (Hg)	0.0504		0.0050	mg/kg	28-OCT-22	28-OCT-22	R5883357
Nitrate (as N)	<1.0		1.0	mg/L		03-NOV-22	R5886956
pH (1:2 CaCl2)	7.69		0.10	pH	02-NOV-22	02-NOV-22	R5886201
Particle size - Pipette removal OM & CO3							
% Sand (2.0mm - 0.05mm)	<1.0		1.0	%	31-OCT-22	01-NOV-22	R5885456
% Silt (0.05mm - 2um)	88.5		1.0	%	31-OCT-22	01-NOV-22	R5885456
% Clay (<2um)	11.4		1.0	%	31-OCT-22	01-NOV-22	R5885456
Texture	Silt				31-OCT-22	01-NOV-22	R5885456
Available Micronutrients (Cu,Fe,Zn,Mn)							
Copper (Cu)	2.93		0.20	mg/kg	02-NOV-22	02-NOV-22	R5886116
Iron (Fe)	64.4		2.0	mg/kg	02-NOV-22	02-NOV-22	R5886116
Manganese (Mn)	3.67		0.050	mg/kg	02-NOV-22	02-NOV-22	R5886116
Zinc (Zn)	1.91		0.20	mg/kg	02-NOV-22	02-NOV-22	R5886116
Metals in Soil by CRC ICPMS							
Aluminum (Al)	14800		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Antimony (Sb)	0.62		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Arsenic (As)	11.1		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-2 ROUNDTHEBEND (RTB) 0-60 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
Metals in Soil by CRC ICPMS							
Barium (Ba)	333		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Beryllium (Be)	0.89		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Boron (B)	7.5		5.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Bismuth (Bi)	0.25		0.20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Cadmium (Cd)	0.453		0.020	mg/kg	28-OCT-22	28-OCT-22	R5883398
Calcium (Ca)	29900		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Chromium (Cr)	22.7		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Cobalt (Co)	12.3		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Copper (Cu)	27.9		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Iron (Fe)	23600		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Lead (Pb)	14.4		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Lithium (Li)	16.0		2.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Magnesium (Mg)	10700		20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Manganese (Mn)	607		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Molybdenum (Mo)	1.15		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Nickel (Ni)	33.3		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Phosphorus (P)	753		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Potassium (K)	1910		100	mg/kg	28-OCT-22	28-OCT-22	R5883398
Selenium (Se)	0.65		0.20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Silver (Ag)	0.15		0.10	mg/kg	28-OCT-22	28-OCT-22	R5883398
Sodium (Na)	322		50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Strontium (Sr)	82.2		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Sulfur (S)	<1000		1000	mg/kg	28-OCT-22	28-OCT-22	R5883398
Thallium (Tl)	0.261		0.050	mg/kg	28-OCT-22	28-OCT-22	R5883398
Tin (Sn)	<1.0		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Titanium (Ti)	38.9		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Tungsten (W)	<0.50		0.50	mg/kg	28-OCT-22	28-OCT-22	R5883398
Uranium (U)	1.39		0.050	mg/kg	28-OCT-22	28-OCT-22	R5883398
Vanadium (V)	37.7		0.20	mg/kg	28-OCT-22	28-OCT-22	R5883398
Zinc (Zn)	92.5		2.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Zirconium (Zr)	9.0		1.0	mg/kg	28-OCT-22	28-OCT-22	R5883398
Total Available N & NO3-N, NO2-N & NH4							
Available Ammonium-N							
Available Ammonium-N	1.4		1.0	mg/kg	31-OCT-22	31-OCT-22	R5884656
Available Ammonium-N - Calculation							
Total Available Nitrogen	<2.2		2.2	mg/kg		01-NOV-22	
Nitrate, Nitrite & Nitrate+Nitrite-N(KCL							
Nitrite-N	<1.0		1.0	mg/kg	02-NOV-22	02-NOV-22	R5886076
Nitrate+Nitrite-N	<2.0		2.0	mg/kg	02-NOV-22	02-NOV-22	R5886076
Nitrate-N	<2.0		2.0	mg/kg	02-NOV-22	02-NOV-22	R5886076
Total Organic Nitrogen - Soil							
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.327		0.020	%		04-NOV-22	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.327		0.040	%	01-NOV-22	03-NOV-22	R5887137
Available N, P and K							
Available Nitrate-N							
Available Nitrate-N	<1.0		1.0	mg/kg	01-NOV-22	01-NOV-22	R5885459
Plant Available Phosphorus and Potassium							
Available Phosphate-P	<2.0		2.0	mg/kg	29-OCT-22	29-OCT-22	R5886199
Available Potassium	184		20	mg/kg	29-OCT-22	29-OCT-22	R5886199
Total N, P, K, S							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-2 ROUNDTHEBEND (RTB) 0-60 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
Total Nitrogen by combustion method							
Total Nitrogen by LECO	0.356		0.020	%	28-OCT-22	28-OCT-22	R5883678
Total Sulphur by combustion method							
Sulfur (S)-Total	1000		500	mg/kg	28-OCT-22	28-OCT-22	R5883678
Detailed Salinity							
Ca,K,Mg,Na in Soil (Paste) by ICPOES							
Calcium (Ca)	47.0		5.0	mg/L		04-NOV-22	R5889496
Magnesium (Mg)	17.6		5.0	mg/L		04-NOV-22	R5889496
Potassium (K)	<5.0		5.0	mg/L		04-NOV-22	R5889496
Sodium (Na)	26.2		5.0	mg/L		04-NOV-22	R5889496
Chloride in Soil (Paste) by Colorimetry							
Chloride (Cl)	61		20	mg/L		03-NOV-22	R5887316
Conductivity in Soil (Paste) by Meter							
Conductivity Sat. Paste	0.490		0.010	dS/m		03-NOV-22	R5886876
Sodium Adsorption Ratio (Sat. Paste)							
SAR	0.83		0.10	SAR		09-NOV-22	
Sulphate (SO4)							
Sulfur (as SO4)	49.2		6.0	mg/L		04-NOV-22	R5889496
pH (1:2 CaCl2)							
pH (1:2 CaCl2)	7.63		0.10	pH		03-NOV-22	R5886860
VOC routine							
VOC plus F1 by GCMS							
Acetone	<0.50		0.50	mg/kg	17-OCT-22	27-OCT-22	R5882057
Benzene	<0.0050		0.0050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Bromobenzene	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
Bromochloromethane	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
Bromodichloromethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Bromoform	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Bromomethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
n-Butylbenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
sec-Butylbenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
tert-Butylbenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Carbon disulfide	<0.25		0.25	mg/kg	17-OCT-22	27-OCT-22	R5882057
Carbon Tetrachloride	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Chlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Chloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Chloroform	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Chloromethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
2-Chlorotoluene	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
4-Chlorotoluene	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
Dibromochloromethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2-Dibromo-3-chloropropane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2-Dibromoethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Dibromomethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2-Dichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,3-Dichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,4-Dichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Dichlorodifluoromethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1-dichloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2-Dichloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1-dichloroethene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
cis-1,2-Dichloroethene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
trans-1,2-Dichloroethene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2737850-2 ROUNDTHEBEND (RTB) 0-60 CM							
Sampled By: CLIENT on 17-OCT-22 @ 11:30							
Matrix: SOIL COMPOSITE							
VOC plus F1 by GCMS							
Dichloromethane	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2-Dichloropropane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,3-Dichloropropane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
2,2-Dichloropropane	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1-Dichloropropene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
cis-1,3-Dichloropropene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
trans-1,3-Dichloropropene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Ethylbenzene	<0.015		0.015	mg/kg	17-OCT-22	27-OCT-22	R5882057
Hexachlorobutadiene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Hexane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
2-Hexanone (Methyl butyl ketone)	<0.50		0.50	mg/kg	17-OCT-22	27-OCT-22	R5882057
Isopropylbenzene	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
4-Isopropyltoluene	<0.10		0.10	mg/kg	17-OCT-22	27-OCT-22	R5882057
MEK	<0.50		0.50	mg/kg	17-OCT-22	27-OCT-22	R5882057
MIBK	<0.50		0.50	mg/kg	17-OCT-22	27-OCT-22	R5882057
MTBE	<0.20		0.20	mg/kg	17-OCT-22	27-OCT-22	R5882057
Styrene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1,1,2-Tetrachloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1,2,2-Tetrachloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Tetrachloroethene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Toluene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2,3-Trichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2,4-Trichlorobenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1,1-Trichloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,1,2-Trichloroethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Trichloroethene	<0.010		0.010	mg/kg	17-OCT-22	27-OCT-22	R5882057
Trichlorofluoromethane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2,3-Trichloropropane	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,2,4-Trimethylbenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
1,3,5-Trimethylbenzene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Vinyl Chloride	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
M+P-Xylenes	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
o-Xylene	<0.050		0.050	mg/kg	17-OCT-22	27-OCT-22	R5882057
Surrogate: 1,4-Difluorobenzene (SS)	120.8		70-130	%	17-OCT-22	27-OCT-22	R5882057
Surrogate: 4-Bromofluorobenzene (SS)	115.5		70-130	%	17-OCT-22	27-OCT-22	R5882057

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLIS	Detection Limit Adjusted: Insufficient Sample
RRQC	Refer to report remarks for information regarding this QC result.
UMI	Unreliable: Matrix interference.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217
A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.			
C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2
Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)			
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
CL-PASTE-COL-CL	Soil	Chloride in Soil (Paste) by Colorimetry	CSSS, APHA 4500-Cl E
A soil extract produced by the saturated paste extraction procedure is analyzed for Chloride by Colourimetry.			
DENSITY-REC-SK	Misc.	Density by Calibrated Cup Method	APHA 2710 F
A mud sample is placed into a 75 mL plexi-glass container, then weighed. Density is calculated as sample weight per container volume and expressed in units of kg/m3.			
EC-1:2-SK	Soil	EC (1:2 Soil:Water Extraction)	AB Ag (1988) p.7
1 part dry soil and 2 parts de-ionized water (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. After equilibration, the conductivity of the filtered extract is measured by a conductivity meter.			
EC-PASTE-CL	Soil	Conductivity in Soil (Paste) by Meter	CSSS ch.15
This analysis is adapted from the methods outlined in "Soil Sampling and Methods of Analysis" by M. Carter. In summary, 200 to 500 grams of sample is extracted for a minimum of 4 hours with an amount of deionized water as required to create a saturated paste. The sample is then filtered or centrifuged and decanted to produce an extract that is ready for analysis. Conductivity is determined using a conductivity electrode.			
ETL-N-TOT-AVAIL-SK	Soil	Available Ammonium-N - Calculation	Soil Methods of Analysis (1993) CSSS
ETL-N-TOTORG-CALC-SK	Soil	Nitrogen, Total Organic - calculation	APHA 4500 Norg-Calculated as TKN - NH3-N
HG-200.2-CVAA-SK	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.			
IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
MET-200.2-CCMS-SK	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS. Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.			
MET-PASTE-ICP-CL	Soil	Ca,K,Mg,Na in Soil (Paste) by ICPOES	CSSS CH15/EPA 6010D
A soil extract produced by the saturated paste extraction procedure is analyzed for Calcium, Magnesium, Potassium, Sodium by ICPOES.			
METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)
Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.			
MOISTURE-WP	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
Moisture content in solid matrices is determined gravimetrically after drying to constant weight at 105°C.			
N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	CSSS (2008) 22.4
The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.			
N-TOTKJ-COL-SK	Soil	Total Kjeldahl Nitrogen	CSSS (2008) 22.2.3

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colrimetrically at 660 nm.			
N2/N3-AVAIL-KCL-SK	Soil	Nitrate, Nitrite & Nitrate+Nitrite-N(KCL	CSSS (2008) 6.2-6.3
Plant available nitrate and nitrite are extracted from the sample with 2N KCl. Nitrate and Nitrite in the filtered extract are determined colorimetrically by Technicon auto-analyzer or flow injection analyzer at 520 nm.			
NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS Carter 6.2 / Comm Soil Sci 19(6)
Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.			
NO3-AVAIL-SK	Soil	Available Nitrate-N	Alberta Ag / APHA 4500 NO3F
Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrate is quantitatively reduced to nitrite by passing of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.			
NO3-PASTE-IC-CL	Soil	Nitrate (N) in Soil (Paste) by IC	CSSS CH15/EPA 300.1
A soil extract produced by the saturated paste extraction procedure is analyzed for nitrate (as N) by Ion Chromatography with conductivity or UV detection.			
PH-1:2 CACL2-CL	Soil	pH (1:2 CaCl2)	CSSS 16.3 - 1:2 Extraction w/0.01M CaCl2
Soil and 0.01M CaCl2 solution (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSS 2008 16.3
1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.			
PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (2008) 8
Plant available phosphorus is extracted from air dried soil using a fixed ratio bicarbonate extraction. Phosphorus is determined by colorimetry.			
PO4/K-AVAIL-SK	Soil	Plant Available Phosphorus and Potassium	Comm. Soil Sci. Plant Anal, 25 (5&6)
Plant available phosphorus and potassium are extracted from the soil usng Modified Kelowna solution. Phosphorous in the soil extract is determined colorimetrically at 880 nm, while potassiumis determined by flame emission at 770 nm.			
PSA-3-SK	Soil	Particle size - Pipette removal OM & CO3	SSIR-51 Method 3.2.1
Dry, < 2 mm soil is treated hydrochloric acid top remove carbonates, then hydrogen peroxide to remove organic matter. The soil is then treated with sodium hexametaphosphate to ensure complete dispersion of primary soil particles. After treatment, sub-samples of the homogenized soil suspension are taken at specific times and sampling depths as determined by Stoke's Law. The dry weight of soil found in each sub-sample is used determine the silt and clay content. The sand fraction is determined by difference.			
The soil texture is determined according to the CSSC soil texture triangle.			
S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000
The air-dried sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.			
SALINITY-INTCHECK-CL	Soil		CSSS 18.4-Calculation
SAR-PASTE-CALC-CL	Soil	Sodium Adsorption Ratio (Sat. Paste)	CSSS 15.4.4-Calculation
Sodium Adsorption Ratio (SAR) is calculated as per "Soil Sampling and Methods of Analysis" by M. Carter.			
SAT-PCNT-N-CL	Soil	% Saturation	CSSS Ch. 15
Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.			
SO4-PASTE-ICP-CL	Soil	Sulphate (SO4)	CSSS CH15/EPA 6010D
A soil extract produced by the saturated extraction procedure is analyzed for sulfate by ICPOES.			
VOC+F1-HSMS-WP	Soil	VOC plus F1 by GCMS	EPA 8260C
The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Canadian Kraft Paper Industries Limited
PO Box 1590
The Pas MB R9A 1L4
Contact: ERNIE BALLANTYNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DENSITY-REC-SK	**Misc.**							
Batch R5886037								
WG3770091-1 DUP		**L2737850-2**						
Specific Gravity		1710	1670		kg/m3	2.2	20	02-NOV-22
WG3770091-2 DUP		**L2737850-1**						
Specific Gravity		1610	1560		kg/m3	3.0	20	02-NOV-22
WG3770091-3 IRM		**DENSITY_RM**						
Specific Gravity			100.1		%		98-102	02-NOV-22
C-TIC-PCT-SK	**Soil**							
Batch R5883664								
WG3770386-4 IRM		**08-109_SOIL**						
Inorganic Carbon			98.3		%		80-120	29-OCT-22
WG3770386-2 LCS		**0.5**						
Inorganic Carbon			95.7		%		90-110	29-OCT-22
WG3770386-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-OCT-22
C-TOT-LECO-SK	**Soil**							
Batch R5883678								
WG3770380-1 DUP		**L2737850-1**						
Total Carbon by Combustion		8.98	9.01		%	0.3	20	28-OCT-22
WG3770380-2 IRM		**08-109 SOIL**						
Total Carbon by Combustion			104.0		%		80-120	28-OCT-22
WG3770380-5 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			101.7		%		90-110	28-OCT-22
WG3770380-4 MB								
Total Carbon by Combustion			<0.05		%		0.05	28-OCT-22
CL-PASTE-COL-CL	**Soil**							
Batch R5887316								
WG3771344-8 DUP		**L2737850-1**						
Chloride (Cl)		48	47		mg/L	0.0	30	03-NOV-22
WG3771344-7 LCS								
Chloride (Cl)			98.6		%		70-130	03-NOV-22
WG3771344-5 MB								
Chloride (Cl)			<20		mg/L		20	03-NOV-22
EC-1:2-SK	**Soil**							
Batch R5886202								
WG3770973-1 DUP		**L2737850-1**						
Conductivity (1:2)		0.359	0.362		dS m-1	0.8	20	02-NOV-22
WG3770973-3 IRM		**13-120 SOIL**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-1:2-SK	**Soil**							
Batch R5886202								
WG3770973-3 IRM		**13-120_SOIL**						
Conductivity (1:2)			92.3		%		80-120	02-NOV-22
WG3770973-4 LCS								
Conductivity (1:2)			96.4		%		80-120	02-NOV-22
WG3770973-2 MB								
Conductivity (1:2)			<0.050		dS m-1		0.05	02-NOV-22
EC-PASTE-CL	**Soil**							
Batch R5886876								
WG3771344-8 DUP		**L2737850-1**						
Conductivity Sat. Paste		0.396	0.395		dS/m	0.3	20	03-NOV-22
WG3771344-7 LCS								
Conductivity Sat. Paste			96.0		%		80-120	03-NOV-22
WG3771344-5 MB								
Conductivity Sat. Paste			<0.010		dS/m		0.01	03-NOV-22
HG-200.2-CVAA-SK	**Soil**							
Batch R5883357								
WG3770342-5 CRM		**SCP_SS-2_SOIL**						
Mercury (Hg)			105.9		%		70-130	28-OCT-22
WG3770342-4 DUP		**L2737850-1**						
Mercury (Hg)		0.0516	0.0517		mg/kg	0.3	40	28-OCT-22
WG3770342-3 LCS								
Mercury (Hg)			102.7		%		80-120	28-OCT-22
WG3770342-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	28-OCT-22
MET-200.2-CCMS-SK	**Soil**							
Batch R5883398								
WG3770342-5 CRM		**SCP SS-2 SOIL**						
Aluminum (Al)			95.0		%		70-130	28-OCT-22
Antimony (Sb)			93.1		%		70-130	28-OCT-22
Arsenic (As)			99.5		%		70-130	28-OCT-22
Barium (Ba)			103.2		%		70-130	28-OCT-22
Beryllium (Be)			94.6		%		70-130	28-OCT-22
Boron (B)			8.4		mg/kg		3.5-13.5	28-OCT-22
Bismuth (Bi)			0.14		mg/kg		0-0.34	28-OCT-22
Cadmium (Cd)			94.5		%		70-130	28-OCT-22
Calcium (Ca)			94.3		%		70-130	28-OCT-22
Chromium (Cr)			91.3		%		70-130	28-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-SK	**Soil**							
Batch R5883398								
WG3770342-5 CRM		**SCP_SS-2_SOIL**						
Cobalt (Co)			98.3		%		70-130	28-OCT-22
Copper (Cu)			102.3		%		70-130	28-OCT-22
Iron (Fe)			98.8		%		70-130	28-OCT-22
Lead (Pb)			103.0		%		70-130	28-OCT-22
Lithium (Li)			94.2		%		70-130	28-OCT-22
Magnesium (Mg)			93.8		%		70-130	28-OCT-22
Manganese (Mn)			96.0		%		70-130	28-OCT-22
Molybdenum (Mo)			111.9		%		70-130	28-OCT-22
Nickel (Ni)			104.9		%		70-130	28-OCT-22
Phosphorus (P)			100.5		%		70-130	28-OCT-22
Potassium (K)			102.0		%		70-130	28-OCT-22
Selenium (Se)			0.13		mg/kg		0-0.34	28-OCT-22
Silver (Ag)			91.1		%		70-130	28-OCT-22
Sodium (Na)			112.7		%		70-130	28-OCT-22
Strontium (Sr)			95.1		%		70-130	28-OCT-22
Thallium (Tl)			0.075		mg/kg		0.029-0.129	28-OCT-22
Tin (Sn)			103.6		%		70-130	28-OCT-22
Titanium (Ti)			87.3		%		70-130	28-OCT-22
Uranium (U)			101.7		%		70-130	28-OCT-22
Vanadium (V)			94.0		%		70-130	28-OCT-22
Zinc (Zn)			96.0		%		70-130	28-OCT-22
Zirconium (Zr)			108.6		%		70-130	28-OCT-22
WG3770342-4 DUP		**L2737850-1**						
Aluminum (Al)		13200	13700		mg/kg	3.4	40	28-OCT-22
Antimony (Sb)		0.63	0.65		mg/kg	2.0	30	28-OCT-22
Arsenic (As)		15.9	16.2		mg/kg	1.8	30	28-OCT-22
Barium (Ba)		300	301		mg/kg	0.1	40	28-OCT-22
Beryllium (Be)		0.88	0.88		mg/kg	0.3	30	28-OCT-22
Boron (B)		9.9	10.2		mg/kg	3.2	30	28-OCT-22
Bismuth (Bi)		0.25	0.25		mg/kg	0.3	30	28-OCT-22
Cadmium (Cd)		0.591	0.571		mg/kg	3.4	30	28-OCT-22
Calcium (Ca)		19900	19100		mg/kg	3.9	30	28-OCT-22
Chromium (Cr)		20.5	21.1		mg/kg	3.1	30	28-OCT-22
Cobalt (Co)		11.7	12.0		mg/kg	2.8	30	28-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-SK	**Soil**							
Batch R5883398								
WG3770342-4 DUP		**L2737850-1**						
Copper (Cu)		28.2	28.4		mg/kg	1.0	30	28-OCT-22
Iron (Fe)		20400	20900		mg/kg	2.4	30	28-OCT-22
Lead (Pb)		14.2	14.3		mg/kg	1.0	40	28-OCT-22
Lithium (Li)		14.0	13.6		mg/kg	2.9	30	28-OCT-22
Magnesium (Mg)		8800	8870		mg/kg	0.9	30	28-OCT-22
Manganese (Mn)		393	386		mg/kg	1.8	30	28-OCT-22
Molybdenum (Mo)		1.21	1.28		mg/kg	5.9	40	28-OCT-22
Nickel (Ni)		32.3	32.9		mg/kg	1.8	30	28-OCT-22
Phosphorus (P)		1010	1060		mg/kg	5.1	30	28-OCT-22
Potassium (K)		1820	1860		mg/kg	1.7	40	28-OCT-22
Selenium (Se)		0.85	0.84		mg/kg	0.8	30	28-OCT-22
Silver (Ag)		0.15	0.15		mg/kg	0.5	40	28-OCT-22
Sodium (Na)		165	171		mg/kg	4.1	40	28-OCT-22
Strontium (Sr)		81.5	82.1		mg/kg	0.8	40	28-OCT-22
Sulfur (S)		1400	1500		mg/kg	8.2	30	28-OCT-22
Thallium (Tl)		0.225	0.224		mg/kg	0.7	30	28-OCT-22
Tin (Sn)		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	28-OCT-22
Titanium (Ti)		31.9	37.4		mg/kg	16	40	28-OCT-22
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	28-OCT-22
Uranium (U)		1.73	1.73		mg/kg	0.0	30	28-OCT-22
Vanadium (V)		34.8	35.6		mg/kg	2.3	30	28-OCT-22
Zinc (Zn)		92.3	93.0		mg/kg	0.7	30	28-OCT-22
Zirconium (Zr)		9.0	9.0		mg/kg	0.4	30	28-OCT-22
WG3770342-3 LCS								
Aluminum (Al)			99.8		%		80-120	28-OCT-22
Antimony (Sb)			98.4		%		80-120	28-OCT-22
Arsenic (As)			99.8		%		80-120	28-OCT-22
Barium (Ba)			100.0		%		80-120	28-OCT-22
Beryllium (Be)			96.6		%		80-120	28-OCT-22
Boron (B)			93.1		%		80-120	28-OCT-22
Bismuth (Bi)			100.0		%		80-120	28-OCT-22
Cadmium (Cd)			96.4		%		80-120	28-OCT-22
Calcium (Ca)			99.4		%		80-120	28-OCT-22
Chromium (Cr)			97.3		%		80-120	28-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-SK	**Soil**							
Batch R5883398								
WG3770342-3 LCS								
Cobalt (Co)			98.2		%		80-120	28-OCT-22
Copper (Cu)			98.5		%		80-120	28-OCT-22
Iron (Fe)			103.5		%		80-120	28-OCT-22
Lead (Pb)			100.1		%		80-120	28-OCT-22
Lithium (Li)			95.2		%		80-120	28-OCT-22
Magnesium (Mg)			98.2		%		80-120	28-OCT-22
Manganese (Mn)			102.0		%		80-120	28-OCT-22
Molybdenum (Mo)			98.2		%		80-120	28-OCT-22
Nickel (Ni)			97.6		%		80-120	28-OCT-22
Phosphorus (P)			109.3		%		80-120	28-OCT-22
Potassium (K)			101.0		%		80-120	28-OCT-22
Selenium (Se)			96.8		%		80-120	28-OCT-22
Silver (Ag)			92.8		%		80-120	28-OCT-22
Sodium (Na)			99.98		%		80-120	28-OCT-22
Strontium (Sr)			96.2		%		80-120	28-OCT-22
Sulfur (S)			93.9		%		80-120	28-OCT-22
Thallium (Tl)			98.0		%		80-120	28-OCT-22
Tin (Sn)			95.4		%		80-120	28-OCT-22
Titanium (Ti)			94.5		%		80-120	28-OCT-22
Tungsten (W)			99.4		%		80-120	28-OCT-22
Uranium (U)			100.2		%		80-120	28-OCT-22
Vanadium (V)			99.8		%		80-120	28-OCT-22
Zinc (Zn)			98.5		%		80-120	28-OCT-22
Zirconium (Zr)			96.1		%		80-120	28-OCT-22
WG3770342-1 MB								
Aluminum (Al)			<50		mg/kg		50	28-OCT-22
Antimony (Sb)			<0.10		mg/kg		0.1	28-OCT-22
Arsenic (As)			<0.10		mg/kg		0.1	28-OCT-22
Barium (Ba)			<0.50		mg/kg		0.5	28-OCT-22
Beryllium (Be)			<0.10		mg/kg		0.1	28-OCT-22
Boron (B)			<5.0		mg/kg		5	28-OCT-22
Bismuth (Bi)			<0.20		mg/kg		0.2	28-OCT-22
Cadmium (Cd)			<0.020		mg/kg		0.02	28-OCT-22
Calcium (Ca)			<50		mg/kg		50	28-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-SK	**Soil**							
Batch R5883398								
WG3770342-1 MB								
Chromium (Cr)			<0.50		mg/kg		0.5	28-OCT-22
Cobalt (Co)			<0.10		mg/kg		0.1	28-OCT-22
Copper (Cu)			<0.50		mg/kg		0.5	28-OCT-22
Iron (Fe)			<50		mg/kg		50	28-OCT-22
Lead (Pb)			<0.50		mg/kg		0.5	28-OCT-22
Lithium (Li)			<2.0		mg/kg		2	28-OCT-22
Magnesium (Mg)			<20		mg/kg		20	28-OCT-22
Manganese (Mn)			<1.0		mg/kg		1	28-OCT-22
Molybdenum (Mo)			<0.10		mg/kg		0.1	28-OCT-22
Nickel (Ni)			<0.50		mg/kg		0.5	28-OCT-22
Phosphorus (P)			<50		mg/kg		50	28-OCT-22
Potassium (K)			<100		mg/kg		100	28-OCT-22
Selenium (Se)			<0.20		mg/kg		0.2	28-OCT-22
Silver (Ag)			<0.10		mg/kg		0.1	28-OCT-22
Sodium (Na)			<50		mg/kg		50	28-OCT-22
Strontium (Sr)			<0.50		mg/kg		0.5	28-OCT-22
Sulfur (S)			<1000		mg/kg		1000	28-OCT-22
Thallium (Tl)			<0.050		mg/kg		0.05	28-OCT-22
Tin (Sn)			<1.0		mg/kg		1	28-OCT-22
Titanium (Ti)			<1.0		mg/kg		1	28-OCT-22
Tungsten (W)			<0.50		mg/kg		0.5	28-OCT-22
Uranium (U)			<0.050		mg/kg		0.05	28-OCT-22
Vanadium (V)			<0.20		mg/kg		0.2	28-OCT-22
Zinc (Zn)			<2.0		mg/kg		2	28-OCT-22
Zirconium (Zr)			<1.0		mg/kg		1	28-OCT-22
MET-PASTE-ICP-CL	**Soil**							
Batch R5889496								
WG3771344-8 DUP		**L2737850-1**						
Calcium (Ca)		40.5	42.4		mg/L	4.6	30	04-NOV-22
Magnesium (Mg)		12.9	13.4		mg/L	3.8	30	04-NOV-22
Potassium (K)		15.0	15.6		mg/L	3.4	30	04-NOV-22
Sodium (Na)		7.2	7.3		mg/L	0.2	30	04-NOV-22
METAL-DTPA-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
METAL-DTPA-SK	**Soil**							
Batch R5886116								
WG3770970-1 DUP		**L2737850-2**						
Copper (Cu)		2.93	2.88		mg/kg	1.7	30	02-NOV-22
Iron (Fe)		64.4	66.4		mg/kg	3.2	30	02-NOV-22
Manganese (Mn)		3.67	3.83		mg/kg	4.1	30	02-NOV-22
Zinc (Zn)		1.91	1.95		mg/kg	1.9	30	02-NOV-22
WG3770970-3 IRM		**2013-107**						
Copper (Cu)			106.2		%		70-130	02-NOV-22
Iron (Fe)			104.3		%		70-130	02-NOV-22
Manganese (Mn)			111.2		%		70-130	02-NOV-22
Zinc (Zn)			112.9		%		70-130	02-NOV-22
WG3770970-5 LCS								
Copper (Cu)			96.6		%		80-120	02-NOV-22
Iron (Fe)			98.0		%		80-120	02-NOV-22
Manganese (Mn)			97.9		%		80-120	02-NOV-22
Zinc (Zn)			100.1		%		80-120	02-NOV-22
WG3770970-2 MB								
Copper (Cu)			<0.20		mg/kg		0.2	02-NOV-22
Iron (Fe)			<2.0		mg/kg		2	02-NOV-22
Manganese (Mn)			<0.050		mg/kg		0.05	02-NOV-22
Zinc (Zn)			<0.20		mg/kg		0.2	02-NOV-22
MOISTURE-WP	**Soil**							
Batch R5885342								
WG3770861-5 LCS								
Moisture			100.3		%		90-110	01-NOV-22
WG3770861-4 MB								
Moisture			<0.10		%		0.1	01-NOV-22
N-TOT-LECO-SK	**Soil**							
Batch R5883678								
WG3770380-1 DUP		**L2737850-1**						
Total Nitrogen by LECO		0.830	0.849		%	2.3	20	28-OCT-22
WG3770380-2 IRM		**08-109 SOIL**						
Total Nitrogen by LECO			110.0		%		80-120	28-OCT-22
WG3770380-5 LCS		**SULFADIAZINE**						
Total Nitrogen by LECO			100.5		%		90-110	28-OCT-22
WG3770380-4 MB								
Total Nitrogen by LECO			<0.020		%		0.02	28-OCT-22
N-TOTKJ-COL-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N-TOTKJ-COL-SK	**Soil**							
Batch R5887137								
WG3770880-1 DUP		**L2737850-1**						
Total Kjeldahl Nitrogen		0.672	0.667		%	0.7	20	03-NOV-22
WG3770880-2 IRM		**08-109_SOIL**						
Total Kjeldahl Nitrogen			81.9		%		80-120	03-NOV-22
WG3770880-3 LCS								
Total Kjeldahl Nitrogen			81.6		%		80-120	03-NOV-22
WG3770880-4 MB								
Total Kjeldahl Nitrogen			<0.020		%		0.02	03-NOV-22
N2/N3-AVAIL-KCL-SK	**Soil**							
Batch R5886076								
WG3770969-1 DUP		**L2737850-1**						
Nitrite-N		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	02-NOV-22
Nitrate+Nitrite-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	02-NOV-22
WG3770969-3 IRM		**ALS SAL 2019**						
Nitrite-N			0.3		mg/kg		0-2.3	02-NOV-22
Nitrate+Nitrite-N			91.2		%		70-130	02-NOV-22
WG3770969-4 LCS								
Nitrite-N			101.9		%		70-130	02-NOV-22
Nitrate+Nitrite-N			101.5		%		70-130	02-NOV-22
WG3770969-2 MB								
Nitrite-N			<1.0		mg/kg		1	02-NOV-22
Nitrate+Nitrite-N			<2.0		mg/kg		2	02-NOV-22
NH4-AVAIL-SK	**Soil**							
Batch R5884656								
WG3770638-3 IRM		**ALS SAL 2019**						
Available Ammonium-N			88.5		%		80-120	31-OCT-22
WG3770638-4 LCS								
Available Ammonium-N			91.7		%		80-120	31-OCT-22
WG3770638-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	31-OCT-22
NO3-AVAIL-SK	**Soil**							
Batch R5885459								
WG3770634-3 IRM		**ALS SAL 2019**						
Available Nitrate-N			93.7		%		70-130	01-NOV-22
WG3770634-4 LCS								
Available Nitrate-N			101.7		%		70-130	01-NOV-22
WG3770634-2 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-AVAIL-SK	**Soil**							
Batch R5885459								
WG3770634-2 MB								
Available Nitrate-N			<1.0		mg/kg		1	01-NOV-22
NO3-PASTE-IC-CL	**Soil**							
Batch R5886956								
WG3771365-3 DUP		**L2737850-1**						
Nitrate (as N)		1.1	1.1		mg/L	1.3	30	03-NOV-22
WG3771365-2 LCS								
Nitrate (as N)			98.0		%		70-130	03-NOV-22
Nitrate (as N)			2.45		mg/L		70-130	03-NOV-22
WG3771365-1 MB								
Nitrate (as N)			<1.0		mg/L		1	03-NOV-22
PH-1:2 CACL2-CL	**Soil**							
Batch R5886860								
WG3771371-1 LCS								
pH (1:2 CaCl2)			7.04		pH		6.8-7.2	03-NOV-22
PH-1:2CACL2-SK	**Soil**							
Batch R5886201								
WG3770975-1 DUP		**L2737850-2**						
pH (1:2 CaCl2)		7.69	7.67	J	pH	0.02	0.3	02-NOV-22
WG3770975-3 IRM		**13-120_SOIL**						
pH (1:2 CaCl2)			7.70		pH		7.24-7.84	02-NOV-22
WG3770975-4 LCS								
pH (1:2 CaCl2)			7.03		pH		6.8-7.2	02-NOV-22
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R5883675								
WG3770329-3 IRM		**FARM2005**						
Available Phosphate-P			91.9		%		80-120	29-OCT-22
WG3770329-4 LCS								
Available Phosphate-P			101.4		%		80-120	29-OCT-22
WG3770329-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	29-OCT-22
PO4/K-AVAIL-SK	**Soil**							

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4/K-AVAIL-SK	**Soil**							
Batch R5886199								
WG3770292-3 IRM		**FARM2005**						
Available Phosphate-P			118.9		%		80-120	29-OCT-22
Available Potassium			73.5		%		70-130	29-OCT-22
WG3770292-4 LCS								
Available Phosphate-P			101.5		%		80-120	29-OCT-22
Available Potassium			93.6		%		80-120	29-OCT-22
WG3770292-2 MB								
Available Phosphate-P			<2.0		mg/kg		2	29-OCT-22
Available Potassium			<20		mg/kg		20	29-OCT-22
PSA-3-SK	**Soil**							
Batch R5885456								
WG3770753-1 DUP		**L2737850-1**						
% Sand (2.0mm - 0.05mm)		<1.0	<1.0	RPD-NA	%	N/A	10	01-NOV-22
% Silt (0.05mm - 2um)		73.3	77.5	J	%	4.2	10	01-NOV-22
% Clay (<2um)		26.5	22.4	J	%	4.1	10	01-NOV-22
WG3770753-2 IRM		**2020-PSA SOIL**						
% Sand (2.0mm - 0.05mm)			48.6		%		42.5-62.5	01-NOV-22
% Silt (0.05mm - 2um)			31.7		%		22.5-42.5	01-NOV-22
% Clay (<2um)			19.6		%		5-25	01-NOV-22
S-TOT-LECO-SK	**Soil**							
Batch R5883678								
WG3770380-1 DUP		**L2737850-1**						
Sulfur (S)-Total		1800	2000		mg/kg	9.9	20	28-OCT-22
WG3770380-3 IRM		**1646A_SOIL**						
Sulfur (S)-Total			83.2		%		70-130	28-OCT-22
WG3770380-5 LCS		**SULFADIAZINE**						
Sulfur (S)-Total			95.1		%		90-110	28-OCT-22
WG3770380-4 MB								
Sulfur (S)-Total			<500		mg/kg		500	28-OCT-22
SAT-PCNT-N-CL	**Soil**							
Batch R5886880								
WG3771339-4 DUP		**L2737850-1**						
% Saturation		124	119		%	3.6	20	03-NOV-22
WG3771339-3 IRM		**SAL-STD11**						
% Saturation			101.1		%		70-130	03-NOV-22
WG3771339-2 LCS								
% Saturation			99.3		%		80-120	03-NOV-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAT-PCNT-N-CL	**Soil**							
Batch R5886880								
WG3771339-1 MB								
% Saturation			<1.0		%		1	03-NOV-22
SO4-PASTE-ICP-CL	**Soil**							
Batch R5889496								
WG3771344-8 DUP		**L2737850-1**						
Sulfur (as SO4)		18.7	19.9		mg/L	6.6	30	04-NOV-22
VOC+F1-HSMS-WP	**Soil**							
Batch R5882057								
WG3769891-2 LCS								
Acetone			109.7		%		70-130	26-OCT-22
Benzene			96.6		%		70-130	26-OCT-22
Bromobenzene			97.5		%		70-130	26-OCT-22
Bromochloromethane			116.7		%		70-130	26-OCT-22
Bromodichloromethane			113.1		%		70-130	26-OCT-22
Bromoform			109.4		%		70-130	26-OCT-22
Bromomethane			99.1		%		60-140	26-OCT-22
n-Butylbenzene			82.5		%		70-130	26-OCT-22
sec-Butylbenzene			105.4		%		70-130	26-OCT-22
tert-Butylbenzene			95.1		%		70-130	26-OCT-22
Carbon disulfide			88.5		%		70-130	26-OCT-22
Carbon Tetrachloride			111.9		%		70-130	26-OCT-22
Chlorobenzene			93.8		%		70-130	26-OCT-22
Chloroethane			82.0		%		60-140	26-OCT-22
Chloroform			110.5		%		70-130	26-OCT-22
Chloromethane			77.4		%		60-140	26-OCT-22
2-Chlorotoluene			89.2		%		70-130	26-OCT-22
4-Chlorotoluene			101.6		%		70-130	26-OCT-22
Dibromochloromethane			89.9		%		70-130	26-OCT-22
1,2-Dibromo-3-chloropropane			92.7		%		70-130	26-OCT-22
1,2-Dibromoethane			86.5		%		70-130	26-OCT-22
Dibromomethane			121.7		%		70-130	26-OCT-22
1,2-Dichlorobenzene			89.7		%		70-130	26-OCT-22
1,3-Dichlorobenzene			86.0		%		70-130	26-OCT-22
1,4-Dichlorobenzene			83.8		%		70-130	26-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5882057								
WG3769891-2 LCS								
Dichlorodifluoromethane			45.3	RRQC	%		60-140	26-OCT-22
1,1-dichloroethane			101.7		%		70-130	26-OCT-22
1,2-Dichloroethane			108.0		%		70-130	26-OCT-22
1,1-dichloroethene			96.1		%		70-130	26-OCT-22
cis-1,2-Dichloroethene			107.8		%		70-130	26-OCT-22
trans-1,2-Dichloroethene			95.6		%		70-130	26-OCT-22
Dichloromethane			108.0		%		60-140	26-OCT-22
1,2-Dichloropropane			90.3		%		70-130	26-OCT-22
1,3-Dichloropropane			90.0		%		70-130	26-OCT-22
2,2-Dichloropropane			86.9		%		70-130	26-OCT-22
1,1-Dichloropropene			96.9		%		70-130	26-OCT-22
cis-1,3-Dichloropropene			106.9		%		70-130	26-OCT-22
trans-1,3-Dichloropropene			95.2		%		70-130	26-OCT-22
Ethylbenzene			84.9		%		70-130	26-OCT-22
Hexachlorobutadiene			86.8		%		70-130	26-OCT-22
Hexane			81.2		%		70-130	26-OCT-22
2-Hexanone (Methyl butyl ketone)			96.4		%		70-130	26-OCT-22
Isopropylbenzene			95.6		%		70-130	26-OCT-22
4-Isopropyltoluene			89.4		%		70-130	26-OCT-22
MEK			95.4		%		70-130	26-OCT-22
MIBK			122.9		%		70-130	26-OCT-22
MTBE			92.6		%		70-130	26-OCT-22
Styrene			89.4		%		70-130	26-OCT-22
1,1,1,2-Tetrachloroethane			100.1		%		70-130	26-OCT-22
1,1,2,2-Tetrachloroethane			100.7		%		70-130	26-OCT-22
Tetrachloroethene			93.0		%		70-130	26-OCT-22
Toluene			82.2		%		70-130	26-OCT-22
1,2,3-Trichlorobenzene			86.2		%		70-130	26-OCT-22
1,2,4-Trichlorobenzene			85.3		%		70-130	26-OCT-22
1,1,1-Trichloroethane			112.4		%		70-130	26-OCT-22
1,1,2-Trichloroethane			90.9		%		70-130	26-OCT-22
Trichloroethene			105.7		%		70-130	26-OCT-22
Trichlorofluoromethane			96.0		%		60-140	26-OCT-22
1,2,3-Trichloropropane			103.8		%		70-130	26-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5882057								
WG3769891-2 LCS								
1,2,4-Trimethylbenzene			93.8		%		70-130	26-OCT-22
1,3,5-Trimethylbenzene			93.1		%		70-130	26-OCT-22
Vinyl Chloride			72.7		%		60-140	26-OCT-22
M+P-Xylenes			101.8		%		70-130	26-OCT-22
o-Xylene			89.0		%		70-130	26-OCT-22
COMMENTS: Dichlorofluoromethane low response possible du to spiking standard. Sample results are not affected.								
WG3769891-1 MB								
Acetone			<0.50		mg/kg		0.5	26-OCT-22
Benzene			<0.0050		mg/kg		0.005	26-OCT-22
Bromobenzene			<0.10		mg/kg		0.1	26-OCT-22
Bromochloromethane			<0.10		mg/kg		0.1	26-OCT-22
Bromodichloromethane			<0.050		mg/kg		0.05	26-OCT-22
Bromoform			<0.050		mg/kg		0.05	26-OCT-22
Bromomethane			<0.050		mg/kg		0.05	26-OCT-22
n-Butylbenzene			<0.050		mg/kg		0.05	26-OCT-22
sec-Butylbenzene			<0.050		mg/kg		0.05	26-OCT-22
tert-Butylbenzene			<0.050		mg/kg		0.05	26-OCT-22
Carbon disulfide			<0.25		mg/kg		0.25	26-OCT-22
Carbon Tetrachloride			<0.050		mg/kg		0.05	26-OCT-22
Chlorobenzene			<0.050		mg/kg		0.05	26-OCT-22
Chloroethane			<0.050		mg/kg		0.05	26-OCT-22
Chloroform			<0.050		mg/kg		0.05	26-OCT-22
Chloromethane			<0.050		mg/kg		0.05	26-OCT-22
2-Chlorotoluene			<0.10		mg/kg		0.1	26-OCT-22
4-Chlorotoluene			<0.10		mg/kg		0.1	26-OCT-22
Dibromochloromethane			<0.050		mg/kg		0.05	26-OCT-22
1,2-Dibromo-3-chloropropane			<0.050		mg/kg		0.05	26-OCT-22
1,2-Dibromoethane			<0.050		mg/kg		0.05	26-OCT-22
Dibromomethane			<0.050		mg/kg		0.05	26-OCT-22
1,2-Dichlorobenzene			<0.050		mg/kg		0.05	26-OCT-22
1,3-Dichlorobenzene			<0.050		mg/kg		0.05	26-OCT-22
1,4-Dichlorobenzene			<0.050		mg/kg		0.05	26-OCT-22
Dichlorodifluoromethane			<0.050		mg/kg		0.05	26-OCT-22
1,1-dichloroethane			<0.050		mg/kg		0.05	26-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5882057								
WG3769891-1 MB								
1,2-Dichloroethane			<0.050		mg/kg		0.05	26-OCT-22
1,1-dichloroethene			<0.050		mg/kg		0.05	26-OCT-22
cis-1,2-Dichloroethene			<0.050		mg/kg		0.05	26-OCT-22
trans-1,2-Dichloroethene			<0.050		mg/kg		0.05	26-OCT-22
Dichloromethane			<0.10		mg/kg		0.1	26-OCT-22
1,2-Dichloropropane			<0.050		mg/kg		0.05	26-OCT-22
1,3-Dichloropropane			<0.050		mg/kg		0.05	26-OCT-22
2,2-Dichloropropane			<0.10		mg/kg		0.1	26-OCT-22
1,1-Dichloropropene			<0.050		mg/kg		0.05	26-OCT-22
cis-1,3-Dichloropropene			<0.050		mg/kg		0.05	26-OCT-22
trans-1,3-Dichloropropene			<0.050		mg/kg		0.05	26-OCT-22
Ethylbenzene			<0.015		mg/kg		0.015	26-OCT-22
Hexachlorobutadiene			<0.050		mg/kg		0.05	26-OCT-22
Hexane			<0.050		mg/kg		0.05	26-OCT-22
2-Hexanone (Methyl butyl ketone)			<0.50		mg/kg		0.5	26-OCT-22
Isopropylbenzene			<0.10		mg/kg		0.1	26-OCT-22
4-Isopropyltoluene			<0.10		mg/kg		0.1	26-OCT-22
MEK			<0.50		mg/kg		0.5	26-OCT-22
MIBK			<0.50		mg/kg		0.5	26-OCT-22
MTBE			<0.20		mg/kg		0.2	26-OCT-22
Styrene			<0.050		mg/kg		0.05	26-OCT-22
1,1,1,2-Tetrachloroethane			<0.050		mg/kg		0.05	26-OCT-22
1,1,2,2-Tetrachloroethane			<0.050		mg/kg		0.05	26-OCT-22
Tetrachloroethene			<0.050		mg/kg		0.05	26-OCT-22
Toluene			<0.050		mg/kg		0.05	26-OCT-22
1,2,3-Trichlorobenzene			<0.050		mg/kg		0.05	26-OCT-22
1,2,4-Trichlorobenzene			<0.050		mg/kg		0.05	26-OCT-22
1,1,1-Trichloroethane			<0.050		mg/kg		0.05	26-OCT-22
1,1,2-Trichloroethane			<0.050		mg/kg		0.05	26-OCT-22
Trichloroethene			<0.010		mg/kg		0.01	26-OCT-22
Trichlorofluoromethane			<0.050		mg/kg		0.05	26-OCT-22
1,2,3-Trichloropropane			<0.050		mg/kg		0.05	26-OCT-22
1,2,4-Trimethylbenzene			<0.050		mg/kg		0.05	26-OCT-22
1,3,5-Trimethylbenzene			<0.050		mg/kg		0.05	26-OCT-22

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5882057								
WG3769891-1 MB								
Vinyl Chloride			<0.050		mg/kg		0.05	26-OCT-22
M+P-Xylenes			<0.050		mg/kg		0.05	26-OCT-22
o-Xylene			<0.050		mg/kg		0.05	26-OCT-22
Surrogate: 1,4-Difluorobenzene (SS)			114.8		%		70-130	26-OCT-22
Surrogate: 4-Bromofluorobenzene (SS)			113.4		%		70-130	26-OCT-22

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Plant Available Nutrients							
Available Nitrate-N							
	1	17-OCT-22 11:30	26-OCT-22 14:00	3	9	days	EHTR
	2	17-OCT-22 11:30	26-OCT-22 14:00	3	9	days	EHTR
Nitrate, Nitrite & Nitrate+Nitrite-N(KCL							
	1	17-OCT-22 11:30	26-OCT-22 14:00	3	9	days	EHTR
	2	17-OCT-22 11:30	26-OCT-22 14:00	3	9	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2737850 were received on 25-OCT-22 12:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2737850-COFC

C Number:

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply
Company:	Canadian Kraft Paper	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Leigh Johnston/Lisa Jones	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☐
Phone:	204 623 8585	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	PO Box 1590	Email 1 or Fax: lisa.jones@ckpi.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	The Pas, MB	Email 2: leigh.johnston@ckpi.com	
Postal Code:	R9A 1L4	Email 3: emmanuel.badewa@ckpi.com	

Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax: lisa.jones@ckpi.com
Contact:		Email 2: ernie.ballantyne@ckpi.com

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q89546	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	SV- 32008	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Judy Dalmaijer Sampler: Emmanuel

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC-1:2-SK	METAL-DTPA-SK	N-TOT-ORG-SK	PSA-3-SK	SAL-DETAIL-SK	SAT-PCNT-SK	SAMPLE-DISPOSAL-WP							Number of Containers
					P	P	P	P	P	P	P	P	P	P	P	P	P	
	Roundthebend (RTB), 0-15cm Composite Ground Sample	17-Oct-22	10:30 - 11:30	soil	R	R	R	R	R	R	R							2
	Roundthebend (RTB), 0-60cm Composite Ground Sample	17-Oct-22	10:30 - 11:30	soil	R	R	R	R	R	R	R							2
																		2
																		2
																		2
																		2
																		2
																		2
																		2
																		2

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human drinking water use? ☐ YES ☐ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			4.1		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date: Oct 25 22	Time: 1200	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.