

October 27, 2016

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Mr. Robert Boswick, P. Eng.
Environmental Engineer
160-123 Main Street
Box 80
Winnipeg, Manitoba
R3C 1A5

B-246.12

via e-mail

Dear Mr. Boswick,

Re: Rural Municipality of Brokenhead – Decommissioning of Community of Tyndall Wastewater Treatment Lagoon

As discussed previously, the RM of Brokenhead plans to decommission the Community of Tyndall Wastewater Treatment Lagoon as part of the overall lagoon construction works to be completed for the Garson/Tyndall Lagoon expansion in late November of 2016. The following letter describes the proposed works. The works will be completed in accordance with Clause 55 of the Licence #2646 RRR.

1.0 Sludge Assessment

A biosolids survey and soil sampling was completed by Assiniboine Injections Ltd. on April 29, 2016. The secondary cell was surveyed by measuring depth of sludge in a grid pattern from a boat. The total sludge volume has been estimated at 2,000 m³ with an average depth of 150 mm. Sludge and soil samples of the lagoon dyke and outside dyke were analyzed by ALS Environmental. Various parameters were measured including metals, salinity, moisture, available nutrients, total solids, and more through other test methods. Please see the attached sludge survey and laboratory report for more details.

Sludge from the primary cell of the existing Tyndall lagoon was removed by Assiniboine Injections Ltd. under the supervision of JRCC in June of 2009. Stantec completed soil sampling and laboratory testing of the primary cell after sludge was removed to show all sludge was removed from the lagoon. As previously discussed, no additional sludge removal is required from the primary cell of the lagoon. Test results from the primary cell sludge removal are retained on file by JRCC and can be provided, if requested.

2.0 Wastewater and Sludge Removal

The liquid wastewater from the old Tyndall lagoon will be removed via septic truck and hauled to the new Garson/Tyndall lagoon primary cell located on NW and SW 15-13-6 EPM in the Rural Municipality of Brokenhead, Manitoba. After the sludge is dewatered it will be allowed to partially freeze before removing and transporting all sludge to the newly expanded lagoon. The sludge will be evenly spread in a thin lift over the entire cell floor of the new secondary cell No. 4. Based on expected sludge volumes the average sludge thickness will be approximately 2.2 cm. The Contractor has been made aware that sludge must be hauled so that no sludge is lost or spilled during transportation and sludge must be removed and applied at the lagoon so that no sludge is tracked outside of the lined area of either lagoon.

JRCC.ca

3.0 Soil Sampling and Dyke Leveling

Once the Tyndall lagoon secondary cell has been entirely cleared of sludge, soil samples will be taken from each of the four corners of the existing clay liner from depths of 0–0.5 m below cell floor. These samples will be analyzed by a laboratory to measure nutrients, metals, salinity and soil texture. The goal of the lab analyses is to confirm that all sludge was removed from the lagoon and only clay soils remain. The test results will be sent to Manitoba Sustainable Development with a summary of the sludge removal work completed and will request approval to level the dikes of the lagoon. Once approval is received, the lagoon dykes will be leveled and graded to return the area to farmland. The crops to be grown will be restricted to a cereal, forage or oil seed crop for a period of three years in accordance with Clause 56 of Licence # 2646 RRR.

Please provide authorization to proceed with the works.

If you have any questions, please contact the undersigned.

Yours truly,

JR Cousin Consultants Ltd.



Brett McCormac, P.Eng
Environmental Engineer

Att. Sludge Assessment Survey by Assiniboine Injections Ltd.

c.c Sue Sutherland, CAO of the RM of Brokenhead



Assiniboine Injections Ltd.

Box 160 177 Notre Dame Ave Notre Dame de Lourdes, MB ROG-1M0
PH: 204-248-2559 FAX: 204-248-2799 EMAIL: info@lagooncleaning.com

DATE: MAY 13, 2016
TOWN: TYNDAL

ATTENTION: Brett McCormac

As requested, Assiniboine Injections Ltd completed our biosolids survey of secondary cell. Soil sample of dyke and outside dyke. This survey was completed on April 29, 2016.

Methodology

The cells were surveyed using a grid pattern.
Measurements are obtained by going out on a boat and probing the bottom with a measuring pole. The depth is determined by top of sludge blanket to base of lagoon.

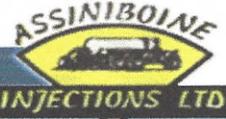
Please find maps of cells, grid locations, indicating depth to sludge and depth to bottom of cell.

Cell Sludge Volume

<u>CELL</u>	<u>SLUDGE VOLUME</u>
Secondary	2000 m3

[Thank you for allowing us to help you with this project. Please let me know if we can be of any more help with your biosolids management requirements. We look forward to working with you in the future.](#)

[Yours Truly,](#)
[Assiniboine Injections Ltd](#)



Assiniboine Injections Ltd.

Box 160
PH: 204-248-2559

177 Notre Dame Ave
FAX: 204-248-2799

Notre Dame de Lourdes, MB
EMAIL: info@lagooncleaning.com

ROG-1M0

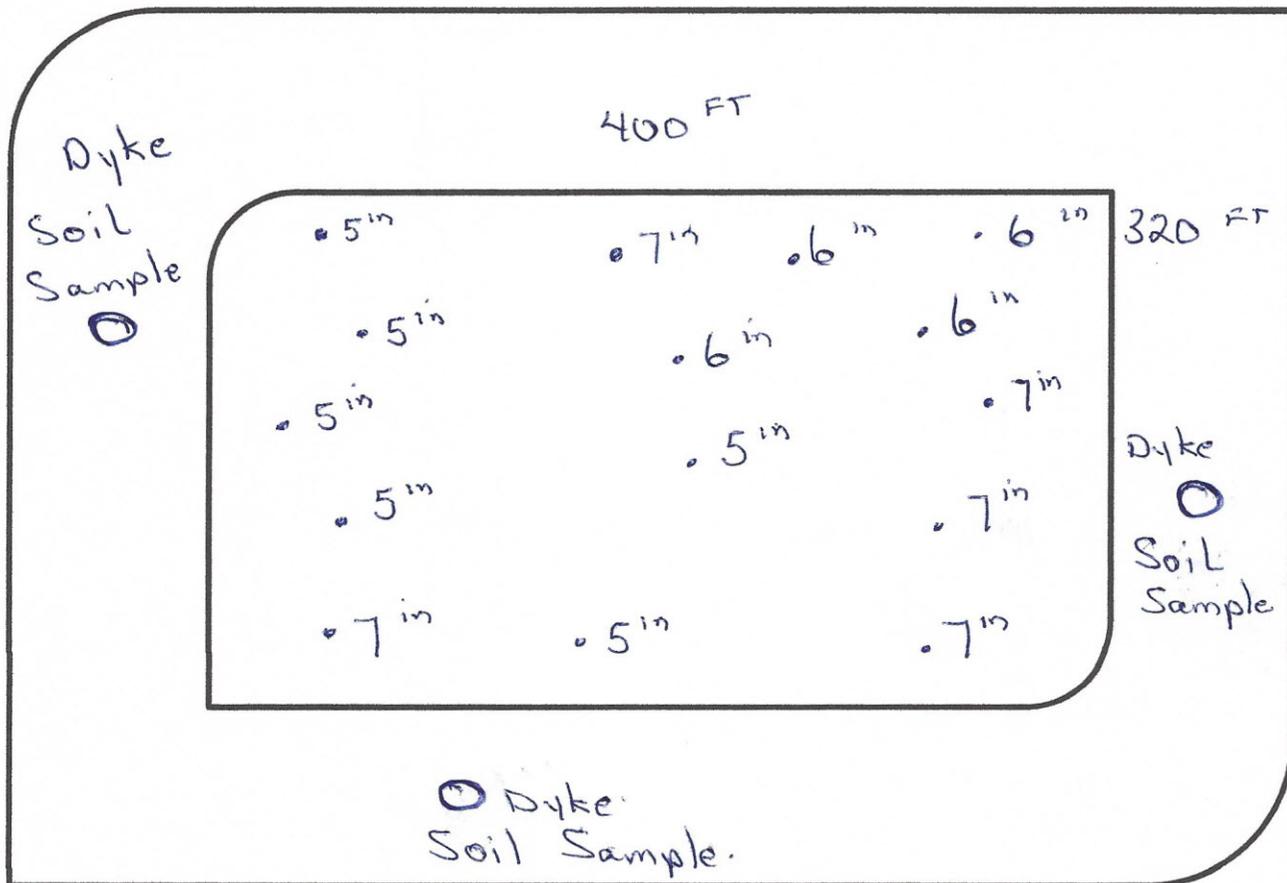
Project No. 1
Client : TYNDAL LAGOON
Avg. Sludge Depth: 6 inches

Survey Date: April 29, 2016
Lagoon Id: Secondary
Samples Taken: Yes

Survey Crew: Jeff
Lagoon Dimensions: 400ft x 320 ft.

N

○ Soil Sample





Assiniboine Injections Ltd. (Notre Dame De
Lourdes)

ATTN: JEFF JAMAULT

Box 160

126 Notre Dame Ave W.

Notre Dame De Lourdes MB R0G 1M0

Date Received: 29-APR-16

Report Date: 09-MAY-16 12:06 (MT)

Version: FINAL

Client Phone: 204-248-2559

Certificate of Analysis

Lab Work Order #: L1762506

Project P.O. #: NOT SUBMITTED

Job Reference:

C of C Numbers:

Legal Site Desc:

Craig Riddell, B.Sc.Ag
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

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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Environmental 

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1762506-1 SLUDGE #1							
Sampled By: CLIENT on 29-APR-16 @ 15:00							
Matrix:							
Miscellaneous Parameters							
Available Phosphate-P	118		1.0	mg/kg	06-MAY-16	06-MAY-16	R3453036
Mercury (Hg)	0.0632		0.0050	mg/kg	05-MAY-16	05-MAY-16	R3451878
% Moisture	45.0		0.10	%	05-MAY-16	05-MAY-16	R3451423
Total Nitrogen by LECO	0.480		0.020	%	04-MAY-16	04-MAY-16	R3452755
Total Solids and Total Volatile Solids							
Total Solids	57.5		0.10	%	06-MAY-16	06-MAY-16	R3452395
Total Volatile Solids (dry basis)	11.9		0.10	%	06-MAY-16	06-MAY-16	R3452395
pH and EC (1:2 Soil:Water Extraction)							
Conductivity (1:2)	1.57		0.050	dS m-1	05-MAY-16	05-MAY-16	R3451624
pH (1:2 soil:water)	8.60		0.10	pH	05-MAY-16	05-MAY-16	R3451624
Metals in Soil by CRC ICPMS							
Aluminum (Al)	22500		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Antimony (Sb)	0.62		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Arsenic (As)	7.21		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Barium (Ba)	196		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Beryllium (Be)	0.92		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Boron (B)	14.7		5.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Bismuth (Bi)	1.50		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Cadmium (Cd)	0.325		0.020	mg/kg	05-MAY-16	05-MAY-16	R3452501
Calcium (Ca)	35700		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Chromium (Cr)	35.1		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Cobalt (Co)	10.7		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Copper (Cu)	47.8		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Iron (Fe)	23300		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Lead (Pb)	11.7		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Lithium (Li)	21.9		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Magnesium (Mg)	13900		20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Manganese (Mn)	455		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Molybdenum (Mo)	0.99		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Nickel (Ni)	32.0		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Phosphorus (P)	2190		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Potassium (K)	3930		100	mg/kg	05-MAY-16	05-MAY-16	R3452501
Selenium (Se)	0.56		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Silver (Ag)	0.15		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Sodium (Na)	1050		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Strontium (Sr)	84.0		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Thallium (Tl)	0.236		0.050	mg/kg	05-MAY-16	05-MAY-16	R3452501
Tin (Sn)	2.6		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Titanium (Ti)	68.4		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Uranium (U)	2.14		0.050	mg/kg	05-MAY-16	05-MAY-16	R3452501
Vanadium (V)	63.4		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Zinc (Zn)	117		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Zirconium (Zr)	4.3		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Total Organic Nitrogen - Soil							
Available Ammonium-N							
Available Ammonium-N	154	DLHC	24	mg/kg	05-MAY-16	05-MAY-16	R3451877
Note: Done as Rec'd, back calc to dry							
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.496		0.020	%		06-MAY-16	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.51	DLHC	0.10	%	05-MAY-16	06-MAY-16	R3453019
Available N, P and K							

* 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
L1762506-1 SLUDGE #1 Sampled By: CLIENT on 29-APR-16 @ 15:00 Matrix:							
Available Nitrate-N	<4.0	DLR	4.0	mg/kg	05-MAY-16	05-MAY-16	R3452885
Available Nitrate-N							
Plant Available Phosphorus and Potassium							
Available Potassium	800	DLHC	100	mg/kg	07-MAY-16	07-MAY-16	R3453301
L1762506-2 DYKE Sampled By: CLIENT on 29-APR-16 @ 15:00 Matrix:							
Miscellaneous Parameters							
Available Nitrate-N	<4.0	DLR	4.0	mg/kg	05-MAY-16	05-MAY-16	R3452885
Available Phosphate-P	21.6		1.0	mg/kg	06-MAY-16	06-MAY-16	R3453036
Available Potassium	361		20	mg/kg	07-MAY-16	07-MAY-16	R3453301
Mercury (Hg)	0.0341		0.0050	mg/kg	05-MAY-16	05-MAY-16	R3451878
% Moisture	26.7		0.10	%	03-MAY-16	03-MAY-16	R3450501
Total Nitrogen by LECO	0.171		0.020	%	04-MAY-16	04-MAY-16	R3452755
Total Solids and Total Volatile Solids							
Total Solids	72.9		0.10	%	06-MAY-16	06-MAY-16	R3452395
Total Volatile Solids (dry basis)	11.4		0.10	%	06-MAY-16	06-MAY-16	R3452395
pH and EC (1:2 Soil:Water Extraction)							
Conductivity (1:2)	0.550		0.050	dS m-1	05-MAY-16	05-MAY-16	R3451624
pH (1:2 soil:water)	8.56		0.10	pH	05-MAY-16	05-MAY-16	R3451624
Metals in Soil by CRC ICPMS							
Aluminum (Al)	26900		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Antimony (Sb)	0.40		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Arsenic (As)	7.87		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Barium (Ba)	187		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Beryllium (Be)	1.08		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Boron (B)	14.9		5.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Bismuth (Bi)	0.28		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Cadmium (Cd)	0.213		0.020	mg/kg	05-MAY-16	05-MAY-16	R3452501
Calcium (Ca)	31600		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Chromium (Cr)	51.8		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Cobalt (Co)	12.3		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Copper (Cu)	28.0		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Iron (Fe)	28100		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Lead (Pb)	13.0		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Lithium (Li)	23.9		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Magnesium (Mg)	15000		20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Manganese (Mn)	475		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Molybdenum (Mo)	0.68		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Nickel (Ni)	39.7		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Phosphorus (P)	559		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Potassium (K)	4240		100	mg/kg	05-MAY-16	05-MAY-16	R3452501
Selenium (Se)	0.31		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Silver (Ag)	0.11		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Sodium (Na)	670		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Strontium (Sr)	63.3		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Thallium (Tl)	0.288		0.050	mg/kg	05-MAY-16	05-MAY-16	R3452501
Tin (Sn)	<2.0		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Titanium (Ti)	103		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Uranium (U)	0.984		0.050	mg/kg	05-MAY-16	05-MAY-16	R3452501
Vanadium (V)	75.3		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Zinc (Zn)	80.7		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501

* 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
L1762506-2 DYKE Sampled By: CLIENT on 29-APR-16 @ 15:00 Matrix:							
Metals in Soil by CRC ICPMS							
Zirconium (Zr)	10.0		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Total Organic Nitrogen - Soil							
Available Ammonium-N							
Available Ammonium-N	13.0		1.0	mg/kg	05-MAY-16	05-MAY-16	R3451876
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.167		0.020	%		06-MAY-16	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.168		0.020	%	05-MAY-16	06-MAY-16	R3453019
L1762506-3 OUTSIDE DYKE Sampled By: CLIENT on 29-APR-16 @ 15:00 Matrix:							
Miscellaneous Parameters							
Available Nitrate-N	<4.0	DLR	4.0	mg/kg	05-MAY-16	05-MAY-16	R3452885
Available Phosphate-P	2.2		1.0	mg/kg	06-MAY-16	06-MAY-16	R3453036
Available Potassium	259		20	mg/kg	07-MAY-16	07-MAY-16	R3453301
Mercury (Hg)	0.0331		0.0050	mg/kg	05-MAY-16	05-MAY-16	R3451878
% Moisture	20.0		0.10	%	03-MAY-16	03-MAY-16	R3450501
Total Nitrogen by LECO	0.155		0.020	%	04-MAY-16	04-MAY-16	R3452755
Total Solids and Total Volatile Solids							
Total Solids	79.8		0.10	%	06-MAY-16	06-MAY-16	R3452395
Total Volatile Solids (dry basis)	8.25		0.10	%	06-MAY-16	06-MAY-16	R3452395
pH and EC (1:2 Soil:Water Extraction)							
Conductivity (1:2)	0.210		0.050	dS m ⁻¹	05-MAY-16	05-MAY-16	R3451624
pH (1:2 soil:water)	8.33		0.10	pH	05-MAY-16	05-MAY-16	R3451624
Metals in Soil by CRC ICPMS							
Aluminum (Al)	25600		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Antimony (Sb)	0.34		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Arsenic (As)	7.72		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Barium (Ba)	190		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Beryllium (Be)	1.06		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Boron (B)	11.9		5.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Bismuth (Bi)	0.25		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Cadmium (Cd)	0.226		0.020	mg/kg	05-MAY-16	05-MAY-16	R3452501
Calcium (Ca)	34200		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Chromium (Cr)	41.4		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Cobalt (Co)	12.8		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Copper (Cu)	27.4		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Iron (Fe)	27000		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Lead (Pb)	12.4		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Lithium (Li)	24.0		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Magnesium (Mg)	14700		20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Manganese (Mn)	504		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Molybdenum (Mo)	0.45		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Nickel (Ni)	36.1		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Phosphorus (P)	441		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Potassium (K)	3920		100	mg/kg	05-MAY-16	05-MAY-16	R3452501
Selenium (Se)	0.29		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Silver (Ag)	0.11		0.10	mg/kg	05-MAY-16	05-MAY-16	R3452501
Sodium (Na)	217		50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Strontium (Sr)	65.3		0.50	mg/kg	05-MAY-16	05-MAY-16	R3452501
Thallium (Tl)	0.279		0.050	mg/kg	05-MAY-16	05-MAY-16	R3452501

* 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
L1762506-3 OUTSIDE DYKE							
Sampled By: CLIENT on 29-APR-16 @ 15:00							
Matrix:							
Metals in Soil by CRC ICPMS							
Tin (Sn)	<2.0		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Titanium (Ti)	83.9		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Uranium (U)	1.03		0.050	mg/kg	05-MAY-16	05-MAY-16	R3452501
Vanadium (V)	72.2		0.20	mg/kg	05-MAY-16	05-MAY-16	R3452501
Zinc (Zn)	77.8		2.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Zirconium (Zr)	9.8		1.0	mg/kg	05-MAY-16	05-MAY-16	R3452501
Total Organic Nitrogen - Soil							
Available Ammonium-N							
Available Ammonium-N	5.5		1.0	mg/kg	05-MAY-16	05-MAY-16	R3451876
Nitrogen, Total Organic - calculation							
Total Organic Nitrogen	0.148		0.020	%		06-MAY-16	
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.148		0.020	%	05-MAY-16	06-MAY-16	R3453019

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLR	Detection Limit Raised due to required dilution, limited sample amount, and/or high moisture content (soil samples)

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ETL-N-TOTORG-CALC-SK	Soil	Nitrogen, Total Organic - calculation	APHA 4500 Norg-Calculated as TKN - NH3-N
HG-200.2-CVAF-SK	Soil	Mercury in Soil by CVAFS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.			
K-AVAIL-SK	Soil	Available Potassium	Comm. Soil Sci. Plant, 25 (5&6)
Plant available potassium is extracted from the soil using Modified Kelowna solution. Potassium in the soil extract is determined by flame emission at 770 nm.			
MET-200.2-CCMS-SK	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.			
Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction. depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.			
MOIST-SK	Soil	Moisture Content	ASTM D2216-80
The weighed portion of soil is placed in a 105°C oven overnight. The dried soil is allowed to cooled to room temperature, weighed and the % moisture is calculated.			
Reference: ASTM D2216-80			
N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974
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
The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colorimetrically at 660 nm.			
NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS(1993) 4.2/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	Method = Alberta Ag (1988)
Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrite is quantitatively reduced to nitrite by passage 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.			
Reference: Recommended Methods of Soil Analysis for Canadian Prairie Agricultural Soils. Alberta Agriculture (1988) p. 19 and 28			
PH,EC-1:2-SK	Soil	pH and EC (1:2 Soil:Water Extraction)	CSSC 3.13/CSSS 18.3.1
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, pH of the slurry is measured using a pH meter. Conductivity of the filtered extract is measured by a conductivity meter.			
PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1
Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.			
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 using Modified Kelowna solution. Phosphorous in the soil extract is determined colorimetrically at 880 nm, while potassium is determined by flame emission at 770 nm.			
SOLIDS-TOT/TOTVOL-SK	Manure	Total Solids and Total Volatile Solids	APHA 2540G
A well-mixed sample is evaporated in a weighed dish and dried to constant weight in an oven at 103-105°C. The increase in weight over that of the empty dish represents the Total Solids. The crucible is then ignited at 550°-10°C for 1 hour. The remaining solids represent the Total Fixed Solids,			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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while the weight lost on ignition represents the Total Volatile Solids.

** 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

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.

Environmental Division



L1762506-COFC

WORK ORDER NO: _____

FOR LABORATORY USE ONLY:

Sample Condition Upon Receipt: Accidentally Damaged 14
 Frozen Cold Ambient Broken Leakage Incorrect Sample Container

LAB NO.: 16:30
 DATE RECEIVED: _____
 TIME RECEIVED: 29-4-16
 BY: BN

Date Sampled: 29/04/2016 Time: 3:00 A.M. P.M.

Date Required: _____

Location: Wynndall Manitoba
(Town, Community, City)

Submitter's Name Printed: _____

Sample Submitted By: _____

Community Code Number: _____

Rural Municipality/LGC/UVD: _____

SAMPLE TYPE

DRINKING WATER

- Untreated Well
- Treated Well
- Treated Municipal
- Non-Treated Municipal
- Water-Surface-Raw
- Water-Surface-Treated

PLEASE PRINT & PRESS FIRMLY

NON-DRINKING WATER

- Sewage/Waste Water
- Lake/River
- Swimming Pool
- Whirl Pool
- Other

NOTES & CONDITIONS

1. Quote number must be provided to insure proper pricing.
2. Failure to properly complete all portions of this form may delay analysis.
3. ALS's liability limited to cost of analysis.

SERVICE REQUESTED

- REGULAR PRIORITY EMERGENCY
- (50% SURCHARGE) (100% SURCHARGE)

PURPOSE OF TEST
 Private Real Estate Water Main

LAB NUMBER	SAMPLE IDENTIFICATION	ALS CUSTOMER #:	QUOTE #:
	- Sludge # 1	REPORT TO BE SENT TO	
	- Dyke	NAME: <u>Jeff Samavit</u>	
	- outside Dyke	COMPANY: <u>Assiniboine Injections</u>	
		ADDRESS: <u>Box 160</u>	
		CITY/TOWN: <u>Norre Dame</u> / PROV.: <u>MB</u>	
		POSTAL CODE: <u>R0G 1M0</u>	
		PHONE: <u>(204) 248-2559</u>	
		BY: MAIL <input type="checkbox"/> FAX <input type="checkbox"/>	(FAX NUMBER)
		PICKUP <input type="checkbox"/> E-MAIL <input checked="" type="checkbox"/> <u>info@lagooncleaning.com</u>	(EMAIL ADDRESS)
		CC	
	- metals in soil by ccc	NAME: _____	
	lc pms	ADDRESS: _____	
	- Phosphorus	CITY/TOWN: _____ / PROV.: _____	
	- Available potassium	POSTAL CODE: _____	
	- conductivity	PHONE: _____	
	- mercury	BY: MAIL <input type="checkbox"/> FAX <input type="checkbox"/>	(FAX NUMBER)
	- % moisture	PICKUP <input type="checkbox"/> E-MAIL <input type="checkbox"/>	(EMAIL ADDRESS)
	- total solids, total volatile solids		

Analyses required Available Nitrate - N
Available Nitrite - N, total nitrogen by leco,
total organic nitrogen - soil, Available Ammonium - N
total organic nitrogen, total Kjeldahl Nitrogen,
Soil ph, Available phosphate - P, Sodium Bicarbonate
Extractable.

BILLING ADDRESS SAME AS REPORT TO

NAME: _____
 COMPANY: _____
 ADDRESS: _____
 CITY/TOWN: _____ / PROV.: _____
 POSTAL CODE: _____

PAYMENT PARTICULARS

INVOICE NEEDED / CLIENT'S P.O. NO. _____
 INTERAC
 CASH Subtotal \$ _____
 CHEQUE G.S.T. \$ _____
 VISA / MASTERCARD Total \$ _____

* OUR POLICY IS NOT TO ACCEPT SAMPLES FROM THE PRIVATE CITIZEN WITHOUT PREPAYMENT

SAMPLING INSTRUCTIONS ON REVERSE SIDE

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