



July 7, 2017

File No. 16-0429-004

Department of Sustainable Development
Environmental Approvals Branch
Government of Manitoba
Box 80, 160-123 Main Street
Winnipeg, Manitoba
R3C 1A5

ATTENTION: Mr. Asit Dey
Environmental Engineer

RE: Town of Melita Land Application of Biosolids - File 108.30

Dear Mr. Dey:

Over the past two weeks KGS Group has been discussing the Melita biosolids project with Sustainable Development and with Jordan Karpinchik at Tone Ag who was responsible for the agronomic assessment for the project and for determining the appropriate rate to apply the biosolids. We have scheduled a meeting at the KGS Group office for next Thursday, but hope that this letter will clear up some of the concerns raised by Sustainable Development.

As the biosolids are now proposed to be spread as a solid rather than a slurry, KGS Group requested that Tone Ag convert the application rates from lbs/1,000 imperial gallons to kg/tonne. We provided the converted application rates in a Notice of Alteration letter to the Environmental Approvals Branch dated June 19, 2017.

Discussions between KGS Group, Tone Ag and Sustainable Development indicate that the application rate, as it relates to phosphorus, has been raised as a concern as well as the amount of time it would take for the receiving field to return to pre-application Olsen-P soil levels. We have provided an updated Table 11 (Attachment 1) which relates to the Land Suitability Assessment originally provided in the EAP submitted on August 11, 2016. At the bottom of new Table 11 we indicate that it will take approximately 12 years for the proposed field to return to pre-application Olsen-P soil levels following application of biosolids from the Primary cell.

During the excavation of the Primary and Secondary cells it was observed that there was a large amount of river silt in the matrix as a result of flooding in 2011 which caused the lagoon to be completely inundated for a period of 30 days. KGS Group recently submitted new composite samples of the excavated biosolids to ALS Labs for analysis and we anticipate that the composite samples will have lower levels of all parameters of concern, including phosphorus, due to the mixing of the river silt. We will provide the analysis to Sustainable Development upon receipt from the lab.

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As stated in the Section 5.8 of Attachment 1, based on the application rate outlined in Table 11, the nitrogen application rates for both Primary and Secondary cells (45 and 42 tons/acre, respectively) are suitable for the receiving land within NW-25-3-27W. The soil test results from ALS Labs from October 2016 for the proposed field (Field #2) are also enclosed (Attachment 2). As the report indicates, the field is low in phosphorus (just over 7 ppm) and would benefit from application of biosolids with minimal agronomic and environmental risk. Assuming 25 lbs of phosphate increases the Olsen-P level in soil by 1 ppm, there will be an increase of 23 ppm and 11 ppm from application of biosolids from the Primary and Secondary cell, respectively. Based on the Nutrient Management Regulation, phosphorus does not appear to be a limiting factor for biosolids application on this field.

We hope that the explanation and the information provided in this email and in previous correspondence sufficiently addresses the concerns that Sustainable Development has raised relating to the biosolids application rate and phosphorus. The delay in approval of the Notice of Alteration is affecting the ability of the Town of Melita to move forward with the necessary upgrades to the lagoon.

Yours truly,

A handwritten signature in blue ink, appearing to read "Gene Senior".

Gene Senior, M.A.
Environmental Scientist

GS/jr
Attachments

cc: Travis Parsons, Manitoba Water Services Board

ATTACHMENT 1

Table 8 – Biosolid Characteristics (Nitrogen and Phosphorus) for Primary and Secondary Cells – Based on June 2016 Sludge Samples

Name	Description	Unit	Primary Cell Results	Secondary Cell Results
Volume (Plus 10%)	Field	m ³	20,000	10,000
Specific Gravity	As Received	Kg/L	1.04	1.08
Moisture	As Received	%	92.8	84
Nitrogen Characteristics				
Total Kjeldahl N	% Dried Basis	%	0.53	0.68
Total Kjeldahl N	Dried Basis	mg/kg	5,300	6,800
Total Kjeldahl N	Dried Basis	kg/tonne	5.3	6.8
Ammonium N	Dried Basis	mg/kg	1,030	316
Ammonium N	Dried Basis	kg/tonne	1.03	0.32
Available Nitrate	Dried Basis	mg/kg	0	0
Available Nitrate-N	Dried Basis	mg/kg	0	0
Organic N	Dried Basis	mg/kg	4,270	6,484
Organic N	Dried Basis	kg/tonne	4.27	6.48
Application Method			Braodcast/Incorp	Braodcast/Incorp
Anticipated Weather			Cool/Dry	Cool/Dry
Anticipated Volatilization			35%	35%
Available Organic N	Dried Basis	kg/tonne	1.07	1.62
Available Ammonium N	Dried Basis	kg/tonne	0.67	0.21
Total Available N (Year 1)	Dried Basis	kg/tonne	1.74	1.83
Mineralization N (Year 2)	Dried Basis	kg/tonne	0.7	0.73
Mineralization N (Year 3)	Dried Basis	kg/tonne	0.35	0.37
Phosphorus Characteristics				
Total Phosphorus	Dried Basis	mg/kg	5,440	2,870
Total Phosphorus	Dried Basis	kg/tonne	5.44	2.87
P2O5 (P * 2.3)	Dried Basis	kg/tonne	12.51	6.6
Total Available P2O5 (50% available Year 1)	Dried Basis	kg/tonne	6.25	3.3

Source: Tri-Provincial Manure Application and Use Guidelines, 2004 and MMM Group, 2013.

5.7 Soil Sampling

5.8 Proposed Application Rates

The target biosolids application rates for the primary and secondary cells will be based on the nitrogen requirement of either a cereal or oilseed crop (ie. spring wheat or canola). The target N rate will be 155 lbs/acre in order to grow a 55 bushel canola crop. Table 11 below shows the biosolids application rate based on N requirement and P2O5 crop removal for comparison.

Table 11 – Application Rate Calculation Worksheet (Metric/Imperial Units)

Name	Unit	Primary Cell	Secondary Cell
Nitrogen & Phosphorus Based Application Rates			
Total Kjeldahl N	kg/tonne	0.53	0.68
Ammonium N	kg/tonne	1.03	0.32
Available Nitrate-N	kg/tonne	0	0
Organic N	kg/tonne	4.27	6.48
Application Method		Broadcast/Incorp	Broadcast/Incorp
Anticipated Weather		Cool/Dry	Cool/Dry
Anticipated Volatilization		35%	35%
Available Organic N	kg/tonne	1.07	1.62
Available Ammonium N	kg/tonne	0.67	0.21
Total Available N	kg/tonne	1.74	1.83
Total Available N	lbs/ton	3.48	3.66
N based Rate	tons/acre	45	42
Total N Applied	lbs/acre	155	155
2X P2O5 Removal based Application Rate	tons/acre	7.5	14
Total P2O5	kg/tonne	12.51	6.6
Total Available P2O5 (50% in Year 1)	kg/tonne	6.25	3.3
Amount of Total P2O5 applied (N based rate)	lbs/acre	1125.9	554.4
Amount of Available P2O5 applied (50% in Year 1 – N based)	lbs/acre	563	277.2
Crop Removal Rate	lbs/acre	47	47
Years to pre-application Olsen-P soil levels (N-based rate)		12	6

Based on the application rate outlined in Table 11, the nitrogen application rates for both primary and secondary cells (45 and 42 tons/acre, respectively) are suitable for the receiving land within the PPA (NW 25-3-27W1) as soil test phosphorus is below 60 ppm (7 ppm). Assuming 25 lbs of phosphate increases the Olsen P level in soil by 1 ppm, there will be an increase of 23 ppm and 11 ppm from the primary and secondary cell application of biosolids, respectively. According to

the Nutrient Management Regulations, phosphorus is not a limiting factor for biosolids application on all fields within the PPA. These soils are rated very low to low in phosphorus and would benefit greatly from an N based application rate of biosolids with minimal agronomic and environmental risk.

ATTACHMENT 2



Tone Ag Consulting (St. Pierre-Jolys)
ATTN: Shannon Wiebe
31022 Rat River Rd
St. Pierre-Jolys Manitoba ROA 1V0

Date Received: 29-SEP-16
Report Date: 11-OCT-16 09:38 (MT)
Version: FINAL REV. 2

Client Phone: 204-433-7189

Certificate of Analysis

Lab Work Order #: L1836271
Project P.O. #: NOT SUBMITTED
Job Reference: PT 1/2-36-3-27W
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
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1836271-1 1437293 - FIELD #1 Sampled By: CLIENT on 27-SEP-16 Matrix: SOIL							
Miscellaneous Parameters							
Mercury (Hg)	0.0214		0.0050	mg/kg	03-OCT-16	04-OCT-16	R3563579
Metals in Soil by CRC ICPMS							
Aluminum (Al)	12100		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Antimony (Sb)	0.20		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Arsenic (As)	4.10		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Barium (Ba)	147		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Beryllium (Be)	0.48		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Boron (B)	12.3		5.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Bismuth (Bi)	<0.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cadmium (Cd)	0.275		0.020	mg/kg	03-OCT-16	03-OCT-16	R3562810
Calcium (Ca)	26600		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Chromium (Cr)	21.5		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cobalt (Co)	5.86		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Copper (Cu)	11.5		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Iron (Fe)	15500		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lead (Pb)	6.14		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lithium (Li)	9.9		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Magnesium (Mg)	9980		20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Manganese (Mn)	578		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Molybdenum (Mo)	0.19		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Nickel (Ni)	17.2		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Phosphorus (P)	412		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Potassium (K)	1940		100	mg/kg	03-OCT-16	03-OCT-16	R3562810
Selenium (Se)	<0.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Silver (Ag)	<0.10		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Sodium (Na)	192		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Strontium (Sr)	50.2		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Thallium (Tl)	0.204		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Tin (Sn)	<1.0		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Titanium (Ti)	137		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Uranium (U)	0.784		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Vanadium (V)	40.3		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zinc (Zn)	48.5		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zirconium (Zr)	3.0		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Available N,P,K & S plus pH, EC(AG) & B							
Available Boron, Hot Water							
Boron (B), Hot Water Ext.	1.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3563273
Available Nitrate-N							
Available Nitrate-N	2.7		1.0	mg/kg	04-OCT-16	04-OCT-16	R3563810
Available Phosphate-P by Olsen							
Available Phosphate-P	20.3		1.0	mg/kg	04-OCT-16	04-OCT-16	R3564786
Available Potassium							
Available Potassium	268		20	mg/kg	04-OCT-16	04-OCT-16	R3564737
Available Sulfate-S							
Available Sulfate-S	22.7		4.0	mg/kg	04-OCT-16	04-OCT-16	R3564368
pH & EC 1:2 soil to water (Ag. Method)							
pH (1:2 soil:water)	7.68		0.10	pH	03-OCT-16	03-OCT-16	R3562690
Conductivity (1:2)	0.353		0.050	dS m-1	03-OCT-16	03-OCT-16	R3562690
L1836271-2 1437294 - FIELD #2 Sampled By: CLIENT on 27-SEP-16 Matrix: SOIL							

* 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
L1836271-2 1437294 - FIELD #2 Sampled By: CLIENT on 27-SEP-16 Matrix: SOIL							
Miscellaneous Parameters							
Mercury (Hg)	0.0357		0.0050	mg/kg	03-OCT-16	04-OCT-16	R3563579
Metals in Soil by CRC ICPMS							
Aluminum (Al)	17600		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Antimony (Sb)	0.26		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Arsenic (As)	6.70		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Barium (Ba)	216		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Beryllium (Be)	0.74		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Boron (B)	14.1		5.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Bismuth (Bi)	<0.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cadmium (Cd)	0.411		0.020	mg/kg	03-OCT-16	03-OCT-16	R3562810
Calcium (Ca)	16000		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Chromium (Cr)	32.1		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cobalt (Co)	9.93		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Copper (Cu)	20.2		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Iron (Fe)	24600		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lead (Pb)	9.71		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lithium (Li)	13.8		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Magnesium (Mg)	11200		20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Manganese (Mn)	807		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Molybdenum (Mo)	0.28		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Nickel (Ni)	27.5		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Phosphorus (P)	609		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Potassium (K)	2860		100	mg/kg	03-OCT-16	03-OCT-16	R3562810
Selenium (Se)	0.24		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Silver (Ag)	<0.10		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Sodium (Na)	269		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Strontium (Sr)	35.7		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Thallium (Tl)	0.295		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Tin (Sn)	<1.0		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Titanium (Ti)	91.3		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Uranium (U)	0.906		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Vanadium (V)	58.9		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zinc (Zn)	82.0		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zirconium (Zr)	4.6		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Available N,P,K & S plus pH, EC(AG) & B							
Available Boron, Hot Water							
Boron (B), Hot Water Ext.	1.31		0.20	mg/kg	03-OCT-16	03-OCT-16	R3563273
Available Nitrate-N							
Available Nitrate-N	2.7		1.0	mg/kg	04-OCT-16	04-OCT-16	R3563810
Available Phosphate-P by Olsen							
Available Phosphate-P	7.3		1.0	mg/kg	04-OCT-16	04-OCT-16	R3564786
Available Potassium							
Available Potassium	328		20	mg/kg	04-OCT-16	04-OCT-16	R3564737
Available Sulfate-S							
Available Sulfate-S	23.9		4.0	mg/kg	04-OCT-16	04-OCT-16	R3564368
pH & EC 1:2 soil to water (Ag. Method)							
pH (1:2 soil:water)	8.04		0.10	pH	03-OCT-16	03-OCT-16	R3562690
Conductivity (1:2)	0.323		0.050	dS m-1	03-OCT-16	03-OCT-16	R3562690
L1836271-3 1437295 - FIELD #3 Sampled By: CLIENT on 27-SEP-16 Matrix: SOIL							

* 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
L1836271-3 1437295 - FIELD #3 Sampled By: CLIENT on 27-SEP-16 Matrix: SOIL							
Miscellaneous Parameters							
Mercury (Hg)	0.0312		0.0050	mg/kg	03-OCT-16	04-OCT-16	R3563579
Metals in Soil by CRC ICPMS							
Aluminum (Al)	9990		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Antimony (Sb)	0.31		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Arsenic (As)	6.19		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Barium (Ba)	114		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Beryllium (Be)	0.44		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Boron (B)	11.0		5.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Bismuth (Bi)	<0.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cadmium (Cd)	0.289		0.020	mg/kg	03-OCT-16	03-OCT-16	R3562810
Calcium (Ca)	40900		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Chromium (Cr)	24.0		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cobalt (Co)	5.97		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Copper (Cu)	11.1		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Iron (Fe)	13800		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lead (Pb)	5.70		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lithium (Li)	9.8		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Magnesium (Mg)	11400		20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Manganese (Mn)	633		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Molybdenum (Mo)	0.65		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Nickel (Ni)	20.6		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Phosphorus (P)	397		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Potassium (K)	1790		100	mg/kg	03-OCT-16	03-OCT-16	R3562810
Selenium (Se)	0.21		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Silver (Ag)	<0.10		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Sodium (Na)	201		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Strontium (Sr)	44.7		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Thallium (Tl)	0.232		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Tin (Sn)	<1.0		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Titanium (Ti)	168		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Uranium (U)	0.882		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Vanadium (V)	40.9		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zinc (Zn)	41.0		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zirconium (Zr)	2.8		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Available N,P,K & S plus pH, EC(AG) & B							
Available Boron, Hot Water							
Boron (B), Hot Water Ext.	1.24		0.20	mg/kg	03-OCT-16	03-OCT-16	R3563273
Available Nitrate-N							
Available Nitrate-N	2.7		1.0	mg/kg	04-OCT-16	04-OCT-16	R3563810
Available Phosphate-P by Olsen							
Available Phosphate-P	5.1		1.0	mg/kg	04-OCT-16	04-OCT-16	R3564786
Available Potassium							
Available Potassium	293		20	mg/kg	04-OCT-16	04-OCT-16	R3564737
Available Sulfate-S							
Available Sulfate-S	57.9		4.0	mg/kg	04-OCT-16	04-OCT-16	R3564368
pH & EC 1:2 soil to water (Ag. Method)							
pH (1:2 soil:water)	7.88		0.10	pH	03-OCT-16	03-OCT-16	R3562690
Conductivity (1:2)	0.290		0.050	dS m-1	03-OCT-16	03-OCT-16	R3562690
L1836271-4 1437296 - FIELD #4 Sampled By: CLIENT on 27-SEP-16 Matrix: SOIL							

* 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
L1836271-4 1437296 - FIELD #4							
Sampled By: CLIENT on 27-SEP-16							
Matrix: SOIL							
Miscellaneous Parameters							
Mercury (Hg)	0.0196		0.0050	mg/kg	03-OCT-16	04-OCT-16	R3563579
Metals in Soil by CRC ICPMS							
Aluminum (Al)	7640		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Antimony (Sb)	0.17		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Arsenic (As)	3.91		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Barium (Ba)	89.0		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Beryllium (Be)	0.33		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Boron (B)	7.6		5.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Bismuth (Bi)	<0.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cadmium (Cd)	0.224		0.020	mg/kg	03-OCT-16	03-OCT-16	R3562810
Calcium (Ca)	25000		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Chromium (Cr)	17.1		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Cobalt (Co)	5.29		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Copper (Cu)	7.82		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Iron (Fe)	11400		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lead (Pb)	4.69		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Lithium (Li)	6.3		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Magnesium (Mg)	7010		20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Manganese (Mn)	405		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Molybdenum (Mo)	0.30		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Nickel (Ni)	15.3		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Phosphorus (P)	341		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Potassium (K)	1600		100	mg/kg	03-OCT-16	03-OCT-16	R3562810
Selenium (Se)	<0.20		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Silver (Ag)	<0.10		0.10	mg/kg	03-OCT-16	03-OCT-16	R3562810
Sodium (Na)	104		50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Strontium (Sr)	26.9		0.50	mg/kg	03-OCT-16	03-OCT-16	R3562810
Thallium (Tl)	0.151		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Tin (Sn)	<1.0		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Titanium (Ti)	148		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Uranium (U)	0.542		0.050	mg/kg	03-OCT-16	03-OCT-16	R3562810
Vanadium (V)	28.6		0.20	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zinc (Zn)	36.6		2.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Zirconium (Zr)	1.9		1.0	mg/kg	03-OCT-16	03-OCT-16	R3562810
Available N,P,K & S plus pH, EC(AG) & B							
Available Boron, Hot Water							
Boron (B), Hot Water Ext.	1.07		0.20	mg/kg	03-OCT-16	03-OCT-16	R3563273
Available Nitrate-N							
Available Nitrate-N	2.9		1.0	mg/kg	04-OCT-16	04-OCT-16	R3563810
Available Phosphate-P by Olsen							
Available Phosphate-P	10.2		1.0	mg/kg	04-OCT-16	04-OCT-16	R3564786
Available Potassium							
Available Potassium	315		20	mg/kg	04-OCT-16	04-OCT-16	R3564737
Available Sulfate-S							
Available Sulfate-S	49.8		4.0	mg/kg	04-OCT-16	04-OCT-16	R3564368
pH & EC 1:2 soil to water (Ag. Method)							
pH (1:2 soil:water)	7.80		0.10	pH	03-OCT-16	03-OCT-16	R3562690
Conductivity (1:2)	0.300		0.050	dS m-1	03-OCT-16	03-OCT-16	R3562690

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-HOTW-SK	Soil	Available Boron, Hot Water	CSSS (2008) Ch.9
Hot water is used to extract the plant-available and potentially plant-available boron from soil. Boron in the extract is determined by ICP-OES.			
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.			
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. Nitrate 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-AG-SK	Soil	pH & EC 1:2 soil to water (Ag. Method)	CSSS 16.3,18.3.1 - 1:2 water extract
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.			
SO4-AVAIL-SK	Soil	Available Sulfate-S	REC METH SOIL ANAL - AB. AG(1988)
Plant available sulfate in the soil is extracted using a weak calcium chloride solution. Sulfate in the extract is determined by ICP-OES. This extraction may also produce organic sulfur in the extracts when organic soils are analyzed.			

** 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.



Soil Test

BILL TO:
 ALS Quote # Q56352
 PHONE (204) 433-7189
 DEALER CODE: _____ FAX (204) 433-3335
 NAME: Tone Ag Consulting Ltd
 ADDRESS: Box 333
 TOWN: St. Pierre PROV: MB POSTAL CODE: R0A1W0
 EMAIL: rontone@toneag.com

MAIL RESULTS TO: (Check ONE Box Only) L1836271
 1. SAME AS "BILL TO" ADDRESS 2. SAME AS "BILL TO", BUT IDENTIFY CUSTOMER NAME ON REPORT AS:
 3. NAME AND ADDRESS BELOW melita
 N
 A
 T
 P
 L1836271-GOFC

DATE RECEIVED: 29.9.16 12:30PM

SAMPLE IDENTIFICATION NUMBER	SAMPLE IDENTIFICATION NUMBER	SAMPLE IDENTIFICATION NUMBER	SAMPLE IDENTIFICATION NUMBER
1437293	1437294	1437295	1437296

FIELD INFORMATION:
 Date Sampled: Sep 27/16
 Field Name: Field #1 Acres: 134
 Legal Location MUST be completed:
P1E1/2 3b 3 27 or E _____
 Qtr Sec Twp Range Meridian R.M.
 GPS: _____

FIELD INFORMATION:
 Date Sampled: Sep 27/16
 Field Name: Field #2 Acres: 98
 Legal Location MUST be completed:
NW 25 3 27 or E _____
 Qtr Sec Twp Range Meridian R.M.
 GPS: _____

FIELD INFORMATION:
 Date Sampled: Sep 27/16
 Field Name: Field #3 Acres: 220
 Legal Location MUST be completed:
NW 26 3 27 or E _____
 Qtr Sec Twp Range Meridian R.M.
 GPS: _____

FIELD INFORMATION:
 Date Sampled: Sep 27/16
 Field Name: Field #4 Acres: 163
 Legal Location MUST be completed:
SW 26 3 27 or E _____
 Qtr Sec Twp Range Meridian R.M.
 GPS: _____

CROP TO BE SEEDDED ON: (Check ONE Box)
 Fallow Chemical Fallow Established Forage
 Legume/Pulse Cereal, Oilseed or Other Crop Stubble
 (if not fallow)
 Last Crop: _____ Yield: _____

CROP TO BE SEEDDED ON: (Check ONE Box)
 Fallow Chemical Fallow Established Forage
 Legume/Pulse Cereal, Oilseed or Other Crop Stubble
 (if not fallow)
 Last Crop: _____ Yield: _____

CROP TO BE SEEDDED ON: (Check ONE Box)
 Fallow Chemical Fallow Established Forage
 Legume/Pulse Cereal, Oilseed or Other Crop Stubble
 (if not fallow)
 Last Crop: _____ Yield: _____

CROP TO BE SEEDDED ON: (Check ONE Box)
 Fallow Chemical Fallow Established Forage
 Legume/Pulse Cereal, Oilseed or Other Crop Stubble
 (if not fallow)
 Last Crop: _____ Yield: _____

ROTATION:
 Continuous Cropping (3rd Consecutive Year)
 Crop/Fallow, or Crop/Crop/Fallow

STUBBLE MANAGEMENT:
 Baled Spread
 Other: _____

ROTATION:
 Continuous Cropping (3rd Consecutive Year)
 Crop/Fallow, or Crop/Crop/Fallow

STUBBLE MANAGEMENT:
 Baled Spread
 Other: _____

ROTATION:
 Continuous Cropping (3rd Consecutive Year)
 Crop/Fallow, or Crop/Crop/Fallow

STUBBLE MANAGEMENT:
 Baled Spread
 Other: _____

ROTATION:
 Continuous Cropping (3rd Consecutive Year)
 Crop/Fallow, or Crop/Crop/Fallow

STUBBLE MANAGEMENT:
 Baled Spread
 Other: _____

SAMPLING DEPTH: (Check ONE Box)
 0-12" 0-6, 0-24"
 0-6, 6-12" 0-12, 0-24"
 0-6, 6-12, 12-24" ODD DEPTH
 0-6, 6-24" 0- _____ OR 0-6, _____
 0-12, 12-24" 6- _____
 0-6" (Double Depths must include a 0-6" sample; Triple Odd Depths are not allowed).

SAMPLING DEPTH: (Check ONE Box)
 0-12" 0-6, 0-24"
 0-6, 6-12" 0-12, 0-24"
 0-6, 6-12, 12-24" ODD DEPTH
 0-6, 6-24" 0- _____ OR 0-6, _____
 0-12, 12-24" 6- _____
 0-6" (Double Depths must include a 0-6" sample; Triple Odd Depths are not allowed).

SAMPLING DEPTH: (Check ONE Box)
 0-12" 0-6, 0-24"
 0-6, 6-12" 0-12, 0-24"
 0-6, 6-12, 12-24" ODD DEPTH
 0-6, 6-24" 0- _____ OR 0-6, _____
 0-12, 12-24" 6- _____
 0-6" (Double Depths must include a 0-6" sample; Triple Odd Depths are not allowed).

SAMPLING DEPTH: (Check ONE Box)
 0-12" 0-6, 0-24"
 0-6, 6-12" 0-12, 0-24"
 0-6, 6-12, 12-24" ODD DEPTH
 0-6, 6-24" 0- _____ OR 0-6, _____
 0-12, 12-24" 6- _____
 0-6" (Double Depths must include a 0-6" sample; Triple Odd Depths are not allowed).

Check if crop is: Irrigated Spring Sampling Only:
 Depth of Moist Soil = _____ in.

Check if crop is: Irrigated Spring Sampling Only:
 Depth of Moist Soil = _____ in.

Check if crop is: Irrigated Spring Sampling Only:
 Depth of Moist Soil = _____ in.

Check if crop is: Irrigated Spring Sampling Only:
 Depth of Moist Soil = _____ in.

CROP OPTIONS: Yield/Protein Goal
 Crop _____ / _____
 1. _____ / _____
 2. _____ / _____

CROP OPTIONS: Yield/Protein Goal
 Crop _____ / _____
 1. _____ / _____
 2. _____ / _____

CROP OPTIONS: Yield/Protein Goal
 Crop _____ / _____
 1. _____ / _____
 2. _____ / _____

CROP OPTIONS: Yield/Protein Goal
 Crop _____ / _____
 1. _____ / _____
 2. _____ / _____

TESTS REQUIRED: (Circle ONE Package)
 Package 1 2 3 4
 Phosphorus Method (MB Only) Organic Matter
 If required please check: Colourimetric method
 Sodium Bicarbonate (Olsen) Walkley-Black method
 Other test(s): Quote # Q56352

TESTS REQUIRED: (Circle ONE Package)
 Package 1 2 3 4
 Phosphorus Method (MB Only) Organic Matter
 If required please check: Colourimetric method
 Sodium Bicarbonate (Olsen) Walkley-Black method
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