

Ken Regehr Farm June 2017 Action Plan Summary

June 15, 2017

Introduction

On June 8, 2016, Ken Regehr Holdings Ltd. of 4516 Hullcar Road, Armstrong BC was served with a Pollution Prevention Order (PPO) under the Environmental Management Act (File: 108432). The PPO referenced the lands identified by PID 011-227-486 other than the portion occupied by Purple Springs Nursery Inc., as well as other lands associated with the operation, and identified the specific substance of concern as nitrate from agricultural waste. As part of the PPO requirements, the operation was required to have an Environmental Impact Assessment (EIA) completed, to develop an Action Plan based on the results of the EIA and to submit a formal written summary on June 30, 2017 summarizing items completed from the Action Plan.

This report is the June 30, 2017 Summary and includes results of monitoring conducted to June 15, 2017 and upgrades and management changes arising out of the Action Plan completed as of June 15, 2017. This report follows the format of the K. Regehr Action Plan, and Action Item numbering in this report reflects that of the Action Plan.

1. Groundwater monitoring results

Action required: Monitor Project wells 7, 8, 13 and 17 three times per year in 2017 and 2018. Samples are to be analyzed for nitrate-N, nitrite-N, ammonia-N, TKN, total nitrogen and chloride.

Ken Regehr irrigation wells were sampled on March 30, 2017. Sampling was done by Marta Green, P.Geo., of Associated Environmental. Samples were placed in a cooler with ice packs and delivered to Caro Analytical in Kelowna BC for analysis the same day. Samples were analyzed for a suite of nitrogen parameters. Table 1 contains the results for the nitrogen parameters tested. Original lab data is attached as a separate pdf file with chain of custody and QC data included.

The wells will be tested again in June and October of 2017.

Table 1. March 30 2017 Nitrogen data for Ken Regehr Irrigation Wells (all data as mg/L)

Parameter	Project 7	Project 8	Project 13 (after 10 min run)	Project 13 (after 60 min run)	BC drinking water quality guideline
Nitrate (as N)	<0.010	<0.010	0.037	0.281	10
Nitrite (as N)	<0.010	<0.010	<0.010	0.068	1
Ammonia, total (as N)	0.042	0.146	<0.020	<0.020	No guideline
Organic N	0.073	0.137	0.119	0.114	No guideline
Total Kjeldahl N	0.12	0.28	0.12	0.11	No guideline
Total N	0.115	0.283	0.119	0.462	No guideline

2. Water sample from constructed wetland

Action required: Test the constructed wetland 3 times per year during 2017 and 2018 for the same list of parameters as per groundwater testing (nitrate-N, nitrite-N, ammonia-N, TKN, total nitrogen and chloride) and results compared to results from Project well 13. Samples should be collected from the downstream end of the wetland at least 1 metre from shore. Each sample should consist of at least five sub-samples collected from around the wetland.

Table 2 below contains the results of the first wetland water sample from May 1 2017. Sampling was done according to BC Field Sampling Guideline specifications. Sample was placed in a cooler on ice and delivered to Caro Analytical in Kelowna BC for analysis the same day. Samples were analyzed for the same suite of nitrogen parameters as groundwater samples. Lab data is attached as a separate pdf file with chain of custody and QC data attached. The nitrate-N level in the lagoon water was 0.171 mg/L which is below the BC drinking water quality guideline of 10 mg/L. The wetland will be sampled again at the end of June 2017.

Table 2. May 1 2017 Wetland Lagoon Water Sample Nitrogen Data (all data as mg/L)

Parameter	Wetland lagoon	BC drinking water quality guideline
Nitrate (as N)	0.171	10
Nitrite (as N)	<0.010	1
Ammonia, total (as N)	2.88	No guideline
Total Kjeldahl N	37.2	No guideline
Total N	37.3	No guideline

3. Annual maintenance on constructed wetland

Action required: Conduct annual maintenance on the constructed wetland including removal of excess sediment to maintain wetland capacity, and maintenance of berms. Annual maintenance on the constructed wetland will be completed in fall 2017 when water levels are low. This will include removal of excessive sediment and berm maintenance.

4. Re-planting of areas of wetland with native plants

Action required: Re-plant areas of the constructed wetland with native aquatic macrophytes. Re-planting of areas of the wetland with native plants will occur in fall 2017 when water levels in the wetland are low. Cattails and bulrushes will be planted to enhance the function of the wetland.

5. Install staff gauge on constructed wetland/pond

Action required: Install a staff gauge on the wetland/pond system by June 1, 2017, and regular water level recording during snow-free months for 2017 and 2018.

The staff gauge was installed on May 31, 2017 and is now operational. Water levels will be recorded weekly during March, April, May, October and November, and monthly during the remaining snow-free

months. The first water level was recorded in June 2017 at 0.4 m above the established base level. Remaining 2017 levels will be reported in the next Summary.

6. Permeability study on feedlot

Action required: Conduct a permeability study on the base of the feedlot. The study was to establish permeability by collecting 7 soil samples for bulk density and texture analysis, and calculation of hydraulic conductivity using bulk density and texture data.

Field work for the permeability study on the feedlot was done on May 26, 2017 by Associated Environmental (AE) of Vernon BC. Ken Regehr Farm is currently awaiting the final report from AE. The report will be provided directly to the Ministry of Environment by AE.

7. 2017 Farm Book

Action required: Have a Farm Book or Nutrient Management Plan prepared for 2017 based on soil sampling results by a qualified person (defined as a CCA or QP in the Action Plan). The 2017 Plan was to be designed for a zero agronomic nitrogen balance on each field. It was to consider the results of the fall 2016 post-harvest soil nitrate study in developing 2017 manure application rates.

The 2017 Farm Book for all fields farmed by Ken Regehr Farm was written in spring 2017 by Doug Macfarlane, CCA, of Emerald Bay Ag Services, Vernon BC. It was developed for a zero nitrogen balance on each field and incorporates the results of the fall 2016 post-harvest soil testing conducted by the Ministry of Agriculture (AGRI). Manure application records and irrigation records are being kept by farm staff as required in the Action Plan.

8. Post-harvest soil testing of all fields over Hullcar aquifer 103

Action required: Collect post-harvest soil samples from all fields farmed by Ken Regehr in 2017 located over aquifer 103.

Post-harvest soil testing of all fields farmed by Ken Regehr Farm will be done in September or early October 2017 within two weeks of the final harvest on each field. Samples will be collected at 0-15, 15-30, 30-60 and 60-90 cm depths and analyzed for nitrate-N as well as other soil nutrients and quality parameters.

9. Participation in AGRI benchmark soil study

Action required: Participate in the AGRI benchmark soil study in 2017 if it is repeated.

Ken Regehr Farm will participate in the AGRI benchmark soil study in fall 2017 if it is continued. At the time of writing, no information was available about whether the study will be repeated in fall 2017.

10. Manure application rate reduction in Field 210

Action required: None. Field 210 was leased by Ken Regehr Farm in 2016. Ken Regehr Farm opted not to renew the lease on this field in 2017 and is therefore not farming this field in 2017.

11. Apply manure based on Farm Book recommendations

Action required: Manure applications in 2017 must be made based on the field and crop-specific recommendations contained in the 2017 Farm Book.

Table 3 shows the fields that were amended with feedlot manure up to June 13, 2017, the dates and the application rates. The application rate of manure slightly exceeded the prescribed application rate on three fields, 201 top back, 202 small field and 102 west. On fields 201 and 202, the prescribed manure application rate was 15 tons/acre and the actual application rate was 19.5 and 19.2 tons/acre respectively. This would have resulted in application of 15.6 lbs/acre more plant-available nitrogen than was prescribed. This amount of extra nitrogen would increase soil nitrate-N levels by 7.5 ppm in the top 15 cm of soil and is therefore not expected to result in significant residual nitrate-N in fall 2017. Field 102 was amended with 21.2 tons/acre while the prescribed application rate was 18 tons/acre. This would have resulted in 11 lbs/A more plant-available nitrogen than was prescribed, and is expected to increase soil nitrate-N levels by 5.5 ppm in the top 15 cm of soil. This also is not expected to significantly increase soil residual nitrate-N levels in fall 2017.

Table 3. 2017 manure application amounts and dates to June 13, 2017

Field ID	Field name	2017 Crop	Prescribed manure app'n rate	Actual manure app'n rate	Date of manure application
			Tons/acre	Tons/acre	
101	Home	Corn silage	18	10.6	April 24
102	West	Corn silage	18	21.2	April 15-19
103	Far west	Alfalfa	0	0	--
104	West hill	Alfalfa	0	0	-
105	Bottom feedlot	Corn silage	18-20	10.9	April 18-19
201	Top back	Corn silage	15	19.5	April 5-11
202	Small field	Cereal silage	15	19.2	April 12 + 14
203	Road	Corn silage	18-20	20.8	April 14
204	Reserve trees	Corn silage	Same as 205	20.5	April 21-22
205	Reserve	Alfalfa	10 or 25 (depending on cropping)	0	-
206	Lenns	Corn silage	20	0	-
207	Reserve top	Corn silage	20-25	0	-
208	Dorothy's	Alfalfa	0	0	-

12. Test manure from feedlot in spring prior to manure application

Action required: Feedlot manure must be analyzed in spring 2017 prior to manure application, and results used in calculating manure application rates for 2017.

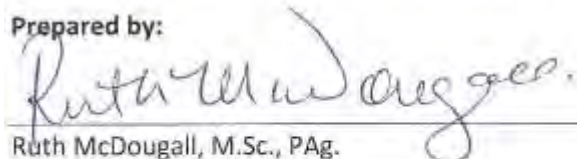
Manure from the feedlot was tested in spring 2017. The manure was tested for total and available nitrogen (ammonium-N and nitrate-N). Results of the manure test were used in calculating manure application rates on fields for 2017. The lab data is appended in a separate file.

13. Avoid use of inorganic nitrogen fertilizer unless insufficient manure available

Action required: Use of inorganic fertilizer to be avoided in 2017 and 2018 unless insufficient manure was available to meet crop needs or manure could not be applied to a field. If fertilizer N is used, it must be done based on a field sampling program and the recommendation of a qualified person.

No inorganic nitrogen fertilizer was used in spring 2017 and none is planned to be used on any of Ken Regehr's fields in 2017.

Prepared by:



Ruth McDougall, M.Sc., PAg.
Consulting Agrologist

June 15, 2017

CERTIFICATE OF ANALYSIS

REPORTED TO Purple Springs Nursery
4519 Hullcar Road
Armstrong, BC V0E 1B4

TEL (250) 546-8156
FAX -

ATTENTION Joe Klassen

WORK ORDER 7031661

PO NUMBER

PROJECT Analytical Testing

PROJECT INFO 2016-8112

RECEIVED / TEMP 2017-03-23 14:13 / 9°C

REPORTED 2017-06-13

COC NUMBER B 46976

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Work Order Comments:

This is a revised report. Refer to Appendix 3 for details



Authorized By:

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REPORTED TO PROJECT Purple Springs Nursery
Analytical Testing

WORK ORDER REPORTED 7031661
2017-06-13

Analysis Description	Method Reference	Technique	Location
Ammonia, Total in Water	APHA 4500-NH ₃ G*	Automated Colorimetry (Phenate)	Kelowna
Anions by IC in Water	APHA 4110 B	Ion Chromatography with Chemical Suppression of Eluent Conductivity	Kelowna
Nitrogen, Total Kjeldahl in Water	APHA 4500-Norg D*	Block Digestion and Flow Injection Analysis	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Method Reference Descriptions:

APHA Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association/American Water Works Association/Water Environment Federation

Glossary of Terms:

MRL Method Reporting Limit
 < Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
 mg/L Milligrams per litre

SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Purple Springs Nursery
Analytical Testing

WORK ORDER REPORTED 7031661
2017-06-13

Analyte	Result / Recovery	MRL / Limits	Units	Prepared	Analyzed	Notes
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Sample ID: Project 7 (7031661-01) [Water] Sampled: 2017-03-22 13:25

Anions

Chloride	20.0	0.10	mg/L	N/A	2017-03-25
Nitrate (as N)	< 0.010	0.010	mg/L	N/A	2017-03-25
Nitrite (as N)	< 0.010	0.010	mg/L	N/A	2017-03-25

General Parameters

Ammonia, Total (as N)	0.042	0.020	mg/L	N/A	2017-03-26
Nitrogen, Total Kjeldahl	0.115	0.050	mg/L	2017-03-24	2017-03-27

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100	0.0100	mg/L	N/A	N/A
Nitrogen, Total	0.115	0.0500	mg/L	N/A	N/A
Nitrogen, Organic	0.0730	0.0500	mg/L	N/A	N/A

Sample ID: Project 8 (7031661-02) [Water] Sampled: 2017-03-22 13:42

Anions

Chloride	21.0	0.10	mg/L	N/A	2017-03-25
Nitrate (as N)	< 0.010	0.010	mg/L	N/A	2017-03-25
Nitrite (as N)	< 0.010	0.010	mg/L	N/A	2017-03-25

General Parameters

Ammonia, Total (as N)	0.146	0.020	mg/L	N/A	2017-03-26
Nitrogen, Total Kjeldahl	0.283	0.050	mg/L	2017-03-24	2017-03-27

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100	0.0100	mg/L	N/A	N/A
Nitrogen, Total	0.283	0.0500	mg/L	N/A	N/A
Nitrogen, Organic	0.137	0.0500	mg/L	N/A	N/A

Sample ID: Project 13-10 min (7031661-03) [Water] Sampled: 2017-03-22 14:04

Anions

Chloride	24.9	0.10	mg/L	N/A	2017-03-25
Nitrate (as N)	0.037	0.010	mg/L	N/A	2017-03-25
Nitrite (as N)	< 0.010	0.010	mg/L	N/A	2017-03-25

General Parameters

Ammonia, Total (as N)	< 0.020	0.020	mg/L	N/A	2017-03-26
Nitrogen, Total Kjeldahl	0.119	0.050	mg/L	2017-03-24	2017-03-27

Calculated Parameters

Nitrate+Nitrite (as N)	0.0367	0.0100	mg/L	N/A	N/A
Nitrogen, Total	0.156	0.0500	mg/L	N/A	N/A
Nitrogen, Organic	0.119	0.0500	mg/L	N/A	N/A

Sample ID: Project 13-60 min (7031661-04) [Water] Sampled: 2017-03-22 15:04

Anions

Chloride	24.3	0.10	mg/L	N/A	2017-03-25
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SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Purple Springs Nursery
Analytical Testing

WORK ORDER 7031661
REPORTED 2017-06-13

Analyte	Result / Recovery	MRL / Units Limits	Prepared	Analyzed	Notes
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Sample ID: Project 13-60 min (7031661-04) [Water] Sampled: 2017-03-22 15:04, Continued

Anions, Continued

Nitrate (as N)	0.281	0.010 mg/L	N/A	2017-03-25	
Nitrite (as N)	0.068	0.010 mg/L	N/A	2017-03-25	

General Parameters

Ammonia, Total (as N)	< 0.020	0.020 mg/L	N/A	2017-03-26	
Nitrogen, Total Kjeldahl	0.114	0.050 mg/L	2017-03-24	2017-03-27	

Calculated Parameters

Nitrate+Nitrite (as N)	0.348	0.0100 mg/L	N/A	N/A	
Nitrogen, Total	0.462	0.0500 mg/L	N/A	N/A	
Nitrogen, Organic	0.114	0.0500 mg/L	N/A	N/A	

APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO Purple Springs Nursery
PROJECT Analytical Testing

WORK ORDER 7031661
REPORTED 2017-06-13

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
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Anions, Batch B7C1529

Blank (B7C1529-BLK1)			Prepared: 2017-03-24, Analyzed: 2017-03-24						
Chloride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Blank (B7C1529-BLK2)			Prepared: 2017-03-25, Analyzed: 2017-03-25						
Chloride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
LCS (B7C1529-BS1)			Prepared: 2017-03-24, Analyzed: 2017-03-24						
Chloride	15.9	0.10 mg/L	16.0		99	90-110			
Nitrate (as N)	4.08	0.010 mg/L	4.00		102	93-108			
Nitrite (as N)	1.96	0.010 mg/L	2.00		98	83-110			
LCS (B7C1529-BS2)			Prepared: 2017-03-25, Analyzed: 2017-03-25						
Chloride	16.0	0.10 mg/L	16.0		100	90-110			
Nitrate (as N)	4.09	0.010 mg/L	4.00		102	93-108			
Nitrite (as N)	1.92	0.010 mg/L	2.00		96	83-110			

General Parameters, Batch B7C1563

Blank (B7C1563-BLK1)			Prepared: 2017-03-24, Analyzed: 2017-03-27						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B7C1563-BLK2)			Prepared: 2017-03-24, Analyzed: 2017-03-27						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B7C1563-BS1)			Prepared: 2017-03-24, Analyzed: 2017-03-27						
Nitrogen, Total Kjeldahl	11.4	0.050 mg/L	10.0		114	84-121			
LCS (B7C1563-BS2)			Prepared: 2017-03-24, Analyzed: 2017-03-27						
Nitrogen, Total Kjeldahl	11.0	0.050 mg/L	10.0		110	84-121			

APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO PROJECT Purple Springs Nursery
Analytical Testing

WORK ORDER REPORTED 7031661
2017-06-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
General Parameters, Batch B7C1594									
Blank (B7C1594-BLK1)				Prepared: 2017-03-26, Analyzed: 2017-03-26					
Ammonia, Total (as N)	< 0.005	0.020 mg/L							
Blank (B7C1594-BLK2)				Prepared: 2017-03-26, Analyzed: 2017-03-26					
Ammonia, Total (as N)	< 0.005	0.020 mg/L							
Blank (B7C1594-BLK3)				Prepared: 2017-03-26, Analyzed: 2017-03-26					
Ammonia, Total (as N)	< 0.005	0.020 mg/L							
LCS (B7C1594-BS1)				Prepared: 2017-03-26, Analyzed: 2017-03-26					
Ammonia, Total (as N)	1.04	0.020 mg/L	1.00		104	86-111			
LCS (B7C1594-BS2)				Prepared: 2017-03-26, Analyzed: 2017-03-26					
Ammonia, Total (as N)	0.992	0.020 mg/L	1.00		99	86-111			
LCS (B7C1594-BS3)				Prepared: 2017-03-26, Analyzed: 2017-03-26					
Ammonia, Total (as N)	0.985	0.020 mg/L	1.00		98	86-111			
Duplicate (B7C1594-DUP2)				Source: 7031661-04		Prepared: 2017-03-26, Analyzed: 2017-03-26			
Ammonia, Total (as N)	0.014	0.020 mg/L		< 0.020				15	
Matrix Spike (B7C1594-MS2)				Source: 7031661-04		Prepared: 2017-03-26, Analyzed: 2017-03-26			
Ammonia, Total (as N)	0.266	0.020 mg/L	0.250	< 0.020	101	76-121			

APPENDIX 3: REVISION HISTORY

**REPORTED TO
PROJECT** Purple Springs Nursery
Analytical Testing

**WORK ORDER
REPORTED** 7031661
2017-06-13

Sample ID	Changed	Change	Analysis	Analyte(s)
7031661-	2017-06-13	Contact Name	N/A	N/A

CERTIFICATE OF ANALYSIS

REPORTED TO Purple Springs Nursery
4519 Hullcar Road
Armstrong, BC V0E 1B4

TEL (250) 546-8156
FAX -

ATTENTION Rico

WORK ORDER 7050048

PO NUMBER

RECEIVED / TEMP 2017-05-01 14:05 / 13°C

PROJECT Wetland Lagoon

REPORTED 2017-05-08

PROJECT INFO

COC NUMBER B48299

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

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Authorized By:

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Client Service Coordinator

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ANALYSIS INFORMATION

REPORTED TO PROJECT Purple Springs Nursery
Wetland Lagoon

WORK ORDER REPORTED 7050048
2017-05-08

Analysis Description	Method Reference	Technique	Location
Ammonia, Total in Water	APHA 4500-NH ₃ G*	Automated Colorimetry (Phenate)	Kelowna
Anions by IC in Water	APHA 4110 B	Ion Chromatography with Chemical Suppression of Eluent Conductivity	Kelowna
Nitrogen, Total Kjeldahl in Water	APHA 4500-Norg D*	Block Digestion and Flow Injection Analysis	Kelowna
pH in Water	APHA 4500-H+ B	Electrometry	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Method Reference Descriptions:

APHA Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association/American Water Works Association/Water Environment Federation

Glossary of Terms:

MRL Method Reporting Limit
 < Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
 mg/L Milligrams per litre
 pH units pH < 7 = acidic, pH > 7 = basic

SAMPLE ANALYTICAL DATA

REPORTED TO PROJECT Purple Springs Nursery
Wetland Lagoon

WORK ORDER 7050048
REPORTED 2017-05-08

Analyte	Result / Recovery	MRL / Limits	Units	Prepared	Analyzed	Notes
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Sample ID: Wetland Lagoon (7050048-01) [Water] Sampled: 2017-05-01 12:40

Anions

Nitrate (as N)	0.171	0.010	mg/L	N/A	2017-05-02	
Nitrite (as N)	< 0.010	0.010	mg/L	N/A	2017-05-02	

General Parameters

Ammonia, Total (as N)	2.88	0.020	mg/L	N/A	2017-05-04	
Nitrogen, Total Kjeldahl	37.2	0.050	mg/L	2017-05-04	2017-05-05	
pH	7.76	0.01	pH units	N/A	2017-05-04	HT2

Calculated Parameters

Nitrate+Nitrite (as N)	0.171	0.0100	mg/L	N/A	N/A	
Nitrogen, Total	37.3	1.00	mg/L	N/A	N/A	

Sample / Analysis Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO Purple Springs Nursery
PROJECT Wetland Lagoon

WORK ORDER 7050048
REPORTED 2017-05-08

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
Anions, Batch B7E0118									
Blank (B7E0118-BLK1)				Prepared: 2017-05-03, Analyzed: 2017-05-03					
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Blank (B7E0118-BLK2)				Prepared: 2017-05-03, Analyzed: 2017-05-03					
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
LCS (B7E0118-BS1)				Prepared: 2017-05-03, Analyzed: 2017-05-03					
Nitrate (as N)	4.00	0.010 mg/L	4.00		100	93-108			
Nitrite (as N)	1.86	0.010 mg/L	2.00		93	83-110			
LCS (B7E0118-BS2)				Prepared: 2017-05-03, Analyzed: 2017-05-03					
Nitrate (as N)	4.00	0.010 mg/L	4.00		100	93-108			
Nitrite (as N)	1.85	0.010 mg/L	2.00		93	83-110			
General Parameters, Batch B7E0137									
Blank (B7E0137-BLK1)				Prepared: 2017-05-04, Analyzed: 2017-05-04					
Ammonia, Total (as N)	< 0.020	0.020 mg/L							
Blank (B7E0137-BLK2)				Prepared: 2017-05-04, Analyzed: 2017-05-04					
Ammonia, Total (as N)	< 0.020	0.020 mg/L							
LCS (B7E0137-BS1)				Prepared: 2017-05-04, Analyzed: 2017-05-04					
Ammonia, Total (as N)	0.979	0.020 mg/L	1.00		98	86-111			
LCS (B7E0137-BS2)				Prepared: 2017-05-05, Analyzed: 2017-05-05					
Ammonia, Total (as N)	1.06	0.020 mg/L	1.00		106	86-111			

General Parameters, Batch B7E0275

APPENDIX 1: QUALITY CONTROL DATA

REPORTED TO PROJECT Purple Springs Nursery
Wetland Lagoon

WORK ORDER 7050048
REPORTED 2017-05-08

Analyte	Result	MRL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Notes
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General Parameters, Batch B7E0275, Continued

Reference (B7E0275-SRM1)

Prepared: 2017-05-04, Analyzed: 2017-05-04

pH	7.04	0.01	pH units	7.00		101	98-102			HT2
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General Parameters, Batch B7E0341

Blank (B7E0341-BLK1)

Prepared: 2017-05-04, Analyzed: 2017-05-05

Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
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LCS (B7E0341-BS1)

Prepared: 2017-05-04, Analyzed: 2017-05-05

Nitrogen, Total Kjeldahl	1.01	0.050	mg/L	1.00		101	84-121			
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QC Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

REPORT NO. C17081-80003
ACCOUNT NO. 05219

A&L CANADA LABORATORIES INC.

2136 Jetstream Rd, London, ON, N5V 3P5 Tel (519) 457-2575 Fax: (519) 457-2664



TO: EMERALD BAY AG SERVICES
10 MARYS EMERALD BAY ROAD
VERNON, BC V1H 2A7
CANADA
ATTN: DOUG MACFARLANE

FOR: KEN RECHER FEEDYARDS

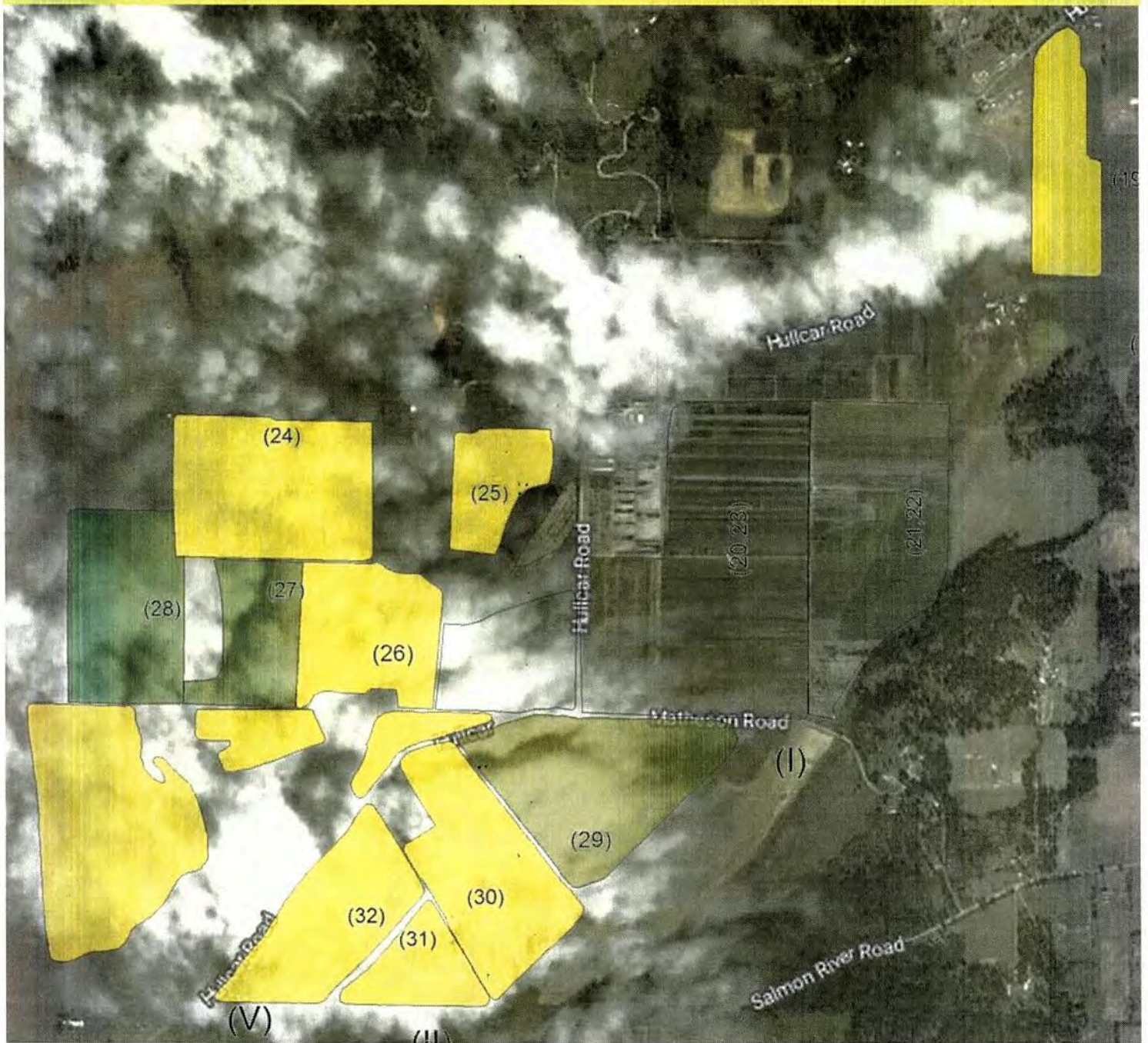
PAGE: 1

MANURE ANALYSIS

LAB NUMBER: 818009
SAMPLE ID: FEEDLOT

DATE RECEIVED: 2017-03-22
DATE REPORTED: 2017-03-29
DATE PRINTED: 2017-03-29

PARAMETER	ANALYSIS RESULT	POUNDS PER TON	ESTIMATED AVAILABILITY PER TON
Dry Matter	21.8 %		
Nitrogen (Total)	0.485 %	9.9	
NH ₄ -N	413 ppm	0.8	
Phosphorus (Total)	0.1308 %		
Phosphate (P as P ₂ O ₅) **	0.3008 %	6.0	2.4
Potassium (Total)	0.2259 %		
Potash (K as K ₂ O) **	0.2711 %	5.4	4.9
Organic Matter *	17.2 %		
Carbon:Nitrogen Ratio (C:N)	19:1		
Calcium	0.3292 %	6.6	
Magnesium	0.1203 %	-2.4	



2017 Crop Plan

Ken Regher Feedyard

REPORT NO. C17081-80003
ACCOUNT NO. 05219

A&L CANADA LABORATORIES INC.

2136 Jetstream Rd, London, ON, N5V 3P5 Tel (519) 457-2575 Fax: (519) 457-2664



TO: EMERALD BAY AG SERVICES
10 MARYS EMERALD BAY ROAD
VERNON, BC V1H 2A7
CANADA
ATTN: DOUG MACFARLANE

FOR: KEN REGHER FEEDYARDS

PAGE: 1 / 1

MANURE ANALYSIS

LAB NUMBER: 818009

SAMPLE ID: FEEDLOT

DATE RECEIVED: 2017-03-22

DATE REPORTED: 2017-03-28

DATE PRINTED: 2017-03-29

PARAMETER	ANALYSIS RESULT	POUNDS PER TON	ESTIMATED AVAILABILITY PER TON
Dry Matter	21.8 %		
Nitrogen (Total)	0.495 %	9.9	
NH4-N	413 ppm	0.8	
Phosphorus (Total)	0.1308 %		
Phosphate (P as P2O5) **	0.3008 %	6.0	2.4
Potassium (Total)	0.2259 %		
Potash (K as K2O) **	0.2711 %	5.4	4.9
Organic Matter *	17.2 %		
Carbon:Nitrogen Ratio (C:N)	19 : 1		
Calcium	0.3292 %	6.6	
Magnesium	0.1203 %	2.4	

Acreage Report

Acreage Report

Client	Farm	Field	Mapped Area (ac)	Tillable Area (ac)	Legal Area (ac)
Regher, Ken	Home	101 Home Field	17.19	17.20	0.00
		102 West fld	51.19	51.20	0.00
		103 Far West	40.53	40.50	0.00
		104 West Hill	22.85	22.50	0.00
		105 Bottom Feedlot	33.23	33.00	0.00
		Total Home	164.89	164.40	0.00
	PS	Purple Springs East	64.09	64.00	0.00
		Purple Springs West	106.35	106.00	0.00
		Purple Springs Yellow	29.47	29.50	0.00
		Total PS	199.91	199.50	0.00
	Rented	201 Top Back	60.44	60.40	0.00
		202 Small Field	10.51	10.00	0.00
		203 Road	7.97	8.00	0.00
		205 Reserve	52.06	52.00	0.00
		206 Lens Field	44.24	44.20	0.00
		207 Top Rserve	38.47	38.50	0.00
		208 Dorthys	15.90	15.90	0.00
		209 Swaans	26.85	26.90	0.00
		Total Rented	254.44	253.90	0.00
		Total Regher, Ken	619.15	617.80	0.00
		Total	619.15	617.80	0.00

10 MARY'S EMERALD BAY ROAD
VERNON, BC V1H 2A7

4516 HULLCAR ROAD

Grower Code:05218043

05218-N1106

Attn:DOUG MACFARLANE
250-548-3847

Farm:FEEDLOT
Field:101 HOME

Report Date:2016-10-18 Print Date:2017-03-30

SOIL TEST REPORT

Page:1

Sample Number	Legal Land Descript:	Depth	Lab Number	Organic Matter	Phosphorus - P ppm Bicarb	Phosphorus - P ppm Bray-P1	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH		CEC meq/100g	Percent Base Saturations				
										%K	%Mg		%Ca	%H	%Na		
K191A		6	18236	9.8	152 H	463 H	630 VH	375 M	3640 M	7.0		26.6	6.1	11.8	68.5	12.9	0.8
K191B		12	18237	3.9	85 H	262 H	467 VH	220 M	2240 M	7.2		15.1	7.9	12.2	74.3	4.6	1.0
K191C		24	18238	1.5	48 M	96 G	311 VH	155 M	2030 H	7.7		12.3	6.5	10.5	82.4	0.8	
K191D		36	18239	1.0	23 M	42 M	258 H	170 L	3620 VH	7.9		21.3	3.1	6.7	89.8	0.5	
Sample Number	Sulfur ppm S lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts meq/cm	Saturation %P	Aluminum Saturation		K/Mg Ratio	ENR	Chloride		Sodium Molybdenum	
										Al ppm	%Al*			Cl ppm	Na ppm	Mo ppm	
K191A	58 VH 104	32 H	58				1.4 H		145 H	410	0.0 G	0.52	111			50 M	
K191B	43 H 77	8 L	14						54 H	617	0.1 G	0.65	51			33 M	
K191C	22 L 79	3 VL	11						8 M	479	0.0 G	0.62	27			23 M	
K191D	34 M 122	3 VL	11						3 L	110	0.0 G	0.45	22			24 L	

OE VL • VERY LOW L • LOW M • MEDIUM H • HIGH VH • VERY HIGH *G • GOOD, M • MARGINAL, MT • MODERATE PHYTO-TOXIC, T • PHYTO-TOXIC, ST • SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

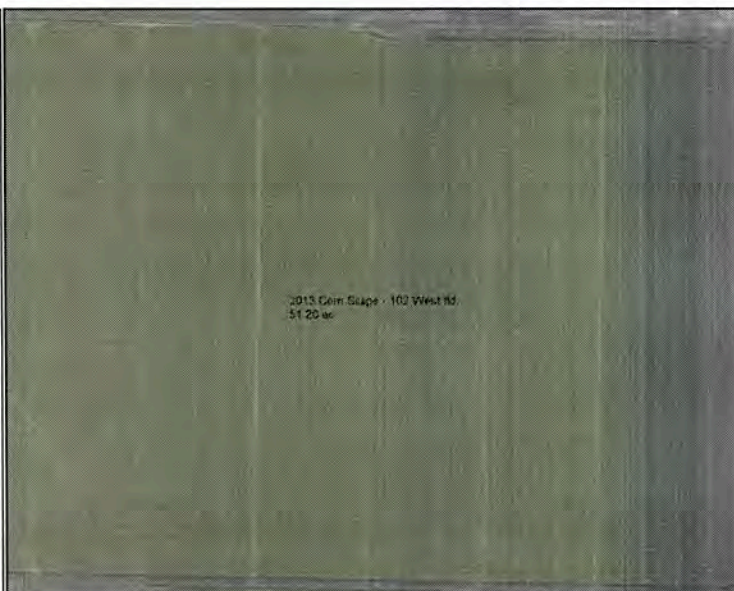
Very High (*High)																	Very High (*High)
High (*GOOD)																	High (*GOOD)
Medium																	Medium
Low																	Low
Very Low																	Very Low
	P1 *	%P *	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B					

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Lime Tons/Acre	N	P2O5	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
K191A	Corn Silage Western Corn Silage Western	25 tons	0.0	214	20	20	10	0	0	0	0.0			

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

Long term corn silage field just west of the feedlot. Good nitrogen remaining after the crop and medium levels at the deeper depths. Manure applications should be maintained to ensure any off season nitrogen leaching is minimized. The biggest challenge on this field is the elevated phosphorous levels and rotating into alfalfa in the near future would be recommended. Soil OM is excellent



2016	Corn Silage	2017	Corn Silage
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Planned Events and Records

[illegible]

Farm:FEEDLOT

Field:102 WEST FIELD

SOIL TEST REPORT

Report Date: 2018-10-21 Print Date: 2017-03-30

Page: 1

Sample Number	Legal Land Descript:	Depth	Lab Number	Organic Matter	Phosphorus - P ppm		Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH		CEC meq/100g	Percent Base Saturations				
					Bicarb	Bray-P1				pH	Buffer		% K	% Mg	% Ca	% H	% Na
K201A		6	27568	7.2	101 H	304 H	410 VH	300 M	3580 H	7.3	21.5	4.9	11.8	82.7	0.9		
K201B		12	27567	5.6	83 H	223 H	448 VH	240 M	2280 H	7.4	14.7	7.8	13.8	77.7	1.0		
K201C		24	27568	1.8	38 M	61 M	372 VH	190 M	1680 H	7.9	11.1	8.6	14.3	76.1	1.2		
K201D		36	27569	1.2	22 M	30 L	262 H	155 L	3550 VH	8.1	19.8	3.3	6.5	89.6	0.7		
Sample Number	Sulfur ppm \$ lb/acre	Nitrate Nitrogen ppm NO3-N lb/acre	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts me/cm	Aluminum saturation		%Al*	Kilg ENR Ratio	Chloride Cl ppm		Sodium Molybdenum Na ppm Mo ppm		
									%P	Al ppm			ppm	ppm			
K201A	47 H 85	19 M 34					0.9 M		24 H	127	0.0 G	0.42	85		46 M		
K201B	35 M 83	9 L 16							18 H	534	0.0 G	0.57	89		35 M		
K201C	27 M 97	2 VL 7							12 H	639	0.0 G	0.60	30		31 H		
K201D	28 L 101	6 L 22							2 L	118	0.0 G	0.51	24		33 M		

VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH
'G = GOOD M = MARGINAL MT = MODERATE PHYTO-TONIC, T = PHYTO-TONIC, ST = SEVERE PHYTO-TONIC

GRAPHIC SUMMARY

	P1 ⁺	%P ⁺	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B		Very High (*High)
Very High (*High)														Very High (*High)
High (*GOOD)														High (*GOOD)
Medium														Medium
Low														Low
Very Low														Very Low

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal	Lime Tons/Acre	N	P2O5	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
K201A	Corn Silage	Western Corn Silage	Western	25 tons	0.0	228	20	20	15	0	0	0	0	0	0.0
K201A	Corn Silage	Western Corn Silage	West Bld	25 tons	0.0	228	55	150	15	0	0	0	0	0	0.0

Planted in 2013. Soil Phosphorous levels are getting better with potassium levels almost low enough to where manure will be needed again in the next year. This is the 5th year of the alfalfa stand and it is time to rotate back to corn next year.



2016	<i>Alfa</i>	2017	<i>Alfa</i>
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Planned Events and Records

[illegible]

SOIL TEST REPORT

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH Buffer	CEC meq/100g	Percent Base Saturations			
					Bicarb	Bray-P1					% K	% Mg	% Ca	% Na
K211A		6	18244	6.2	95 H	262 H	168 M	2930 H	7.1	19.0	2.2	11.0	77.2	8.9
K211B		12	18245	2.8	55 G	128 H	172 H	1950 M	7.1	13.1	3.4	12.7	74.2	8.9
K211C		24	18246	1.4	20 L	37 L	179 H	1940 H	7.7	11.5	4.0	10.9	84.5	0.7
K211D		36	18247	0.8	9 VL	14 VL	100 M	3720 VH	8.0	20.1	1.3	6.0	92.4	0.4
Sample Number	Sulfur ppm S lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts meq/cm	Saturation %P	Aluminum Al ppm	Chloride Cl ppm	Sodium Molybdenum		
									%Al*	K/Mg Ratio		Na ppm	Mo ppm	
K211A	27 L	49	11 M	20	1.0 M			22 H	481	0.0 G	0.20	75	30 M	
K211B	41 VH	74	2 VL	4				24 H	682	0.1 G	0.27	40	25 M	
K211C	25 M	90	10 M	36				3 VL	486	0.0 G	0.37	26	19 M	
K211D	36 H	137	1 VL	4				1 VL	77	0.0 G	0.22	20	20 L	

OE VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH * G = GOOD, M = MARGINAL, MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC, ST = SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

Very High (*High)														Very High (*High)
High (*GOOD)														High (*GOOD)
Medium														Medium
Low														Low
Very Low														Very Low
	P1*	%P*	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B		

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Lime Tons/acre	N	P205	K20	Mg	Ca	S	Zn	Mn	Fe	Cu	B
K211A	Alfalfa	Alfalfa	0.0	0	0	300	15	0	5					1.5

Planted to alfalfa in 2013. 2014 soil test shows good levels in all nutrients with lower level nitrogen depleted but still lots being released from the high organic matter applied over the corn years with feedlot manure.

Soil potassium levels staying well elevated so no nutrients should be required for the 14-5 year life of the stand.

Manage with 103.



2016	<i>Alfalfa</i>	2017	<i>Alfalfa</i>
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Planned Events and Records

[illegible]

SOIL TEST REPORT

Report Date:2014-10-08 Print Date:2015-11-03

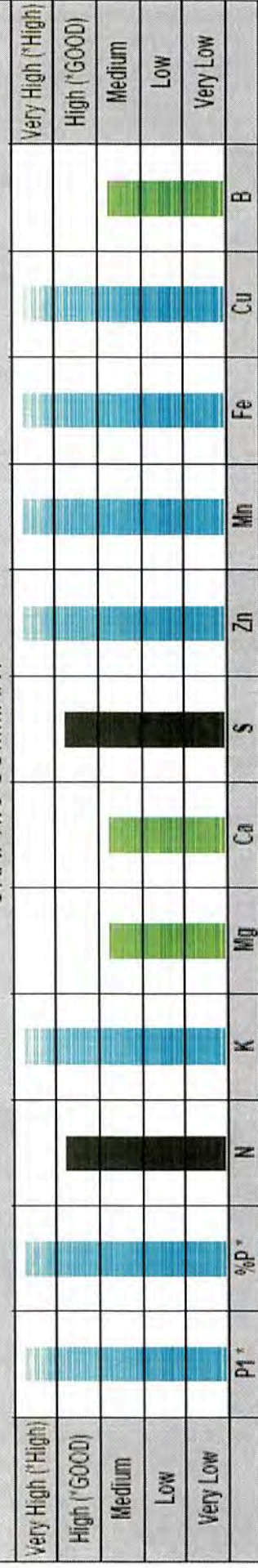
Page:1

Sample Number	Legal Land Descrpt:	Depth	Lab Number	Organic Matter	Phosphorus - P ppm		Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH		CEC meq/100g	Percent Base Saturations				
					Bray-P1	Bicarb				pH	Buffer		% K	% Mg	% Ca	% H	% Na
1041A		6	53606	7.5	86 H	237 H	313 VH	240 M	2510 M	7.1	7.1	17.0	4.7	11.7	73.7	8.9	0.9
1041B		12	53607	1.8	47 M	114 G	303 VH	165 M	1570 H	7.4	7.4	10.1	7.7	13.6	77.4	1.5	1.5
1041C		24	53608	1.2	36 M	81 M	264 VH	160 M	1350 H	7.5	7.5	8.9	7.6	15.0	75.9	1.7	1.7

Sample Number	Sulfur ppm S lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese		Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts ms/cm	Saturation		Chloride Cl ppm	Sodium Molybdenum			
				Mn ppm	55 VH					%P	Aluminum Al ppm		K/Mg Ratio	ENR	Na ppm	Mo ppm
1041A	40 H	72	50	29.2 VH	55 VH	102 VH	4.0 VH	0.6 M	0.5 L	63 H	482	0.0 G	0.40	88	19 M	34 M
1041B	55 VH	99	16							9 M	639	0.1 G	0.57	30		36 H
1041C	50 VH	180	25							15 G	697	0.1 G	0.51	24		35 H

OE VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH *G = GOOD, M = MARGINAL, MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC, ST = SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY



SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Lime Tons/Acre	N	P205	Mg	Ca	S	Zn	Mn	Fe	Cu	B
1041A	Corn Silage	Western Alfalfa Seeding	4 tons	0.0	0	75	10	0	0.0	0	0	0	2.0

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

Long term corn silage. 2016-100 pounds of available nitrogen remains after the corn crop with most in the top foot. Soil phos is good all the way down being low at the 1-2 foot level. Manure program is ample and could be reduced slightly.

2017– residual nitrogen is down to good.
@75 pounds. Maintain existing manure pro-
gram for 1 more year, other nutrients still
very high and a rotation into alfalfa is recom-
mended soon.



2016	Corn Silage	2017	Corn Silage
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Planned Events and Records

[illegible]

Attn: DOUG MACFARLANE

Farm:FEEDLOT

250-546-3847

[Field:201 TOP BACK](#)

SOIL TEST REPORT

Report Date: 2016-11-11 Print Date: 2017-03-30

Page: 1

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH	CEC meq/100g	Percent Base Saturations				
					Bicarb	Bray-P1			pH	Buffer	% K	% Mg	% Ca	% H	% Na
2011A		6	58083	5.6	58 G	151 H	458 VH	1430 M	7.2	10.5	11.2	15.1	88.2	4.6	1.0
2011B		12	58084	3.1	48 M	113 G	452 VH	1280 M	6.3	6.9	11.6	12.9	62.9	11.8	0.8
2011C		24	58085	1.4	28 M	42 L	214 VH	1190 M	6.8	6.9	6.3	10.9	67.8	13.5	1.5

Sample Number	Sulfur ppm & lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese		Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts meq/ton	Chloride				Sodium Molybdenum			
				Mn ppm	30 H					Aluminum saturation %P	Al ppm	%Al+	K/Mg Ratio	ENR	Cl ppm	Na ppm	Mo ppm
2011A	16 VL	29	11 M	20	14.8 VH	30 H	75 VH	1.8 H	0.4 L	0.3 VL	38 H	513	0.1 G	0.74	89	22 M	24 M
2011B	16 L	29	45 VH	81							21 H	689	0.4 G	0.90	43		20 M
2011C	8 VL	29	16 M	53							7 L	728	0.2 G	0.58	26		30 H

VE = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH
'C' = GOOD M = MARGINAL MT = MODERATE PYTO-TOXIC. T = TOXIC D = DANG. ST = SEVERE PYTO-TOXIC

GRAPHIC SUMMARY

	P1 ⁺	%P ⁺	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B	Very High ("High")
Very High ("High")	■	■		■				■		■			Very High ("High")
High ("GOOD")	■	■		■	■			■	■	■	■		High ("GOOD")
Medium	■	■	■	■	■	■		■	■	■			Medium
Low	■	■	■	■				■		■	■	■	Low
Very Low	■	■	■	■			■	■	■	■		■	Very Low

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal	Lime Tons/Acre	N	P205	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
2011A	Corn Silage Western	Corn Silage Western	20 tons	0.0	82	20	15	5	0	10	0.0	0	0	0	0.5
2011A	Corn Silage Western	Corn Silage Western	20 bu	0.0	0	25	35	5	0	10	0.0	0	0	0	0.5

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

202

Small Field

10 Acres

Manage with 201



2016	Corn Silage	2017	Cereal Silage
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Planned Events and Records

[illegible]

203

Road

8 Acres

Manage with 105 corn field No samples have been taken



2016	Corn Silage	2017	Corn Silage
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Planned Events and Records

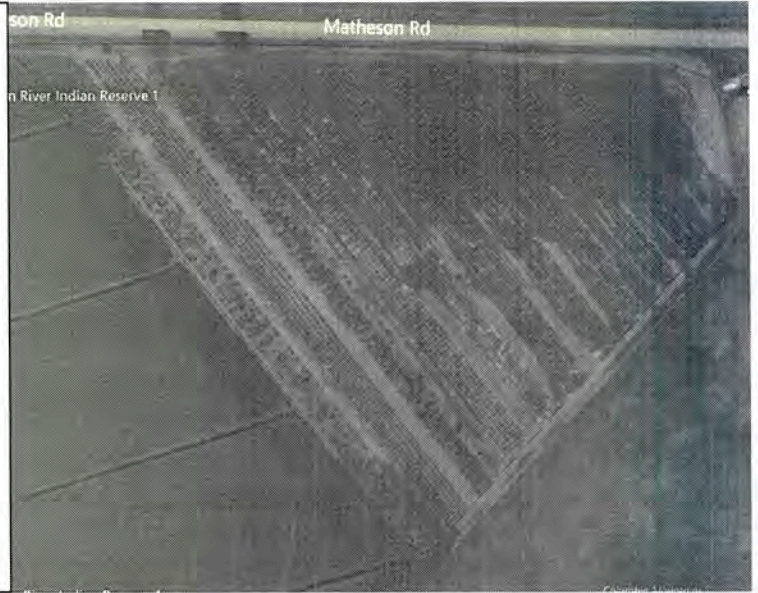
[illegible]

204

Reserve Trees

10.2 Acres

This field was In corn silage for 2016 and is being blended in and managed with 205 Reseve Field in the future.



2015	Trees	2016	Corn Silage
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Planned Events and Records

[illegible]

205**Reserve****41.4 Acres**

Note: This field can stay in alfalfa for 1 more year but potassium levels are low enough to where the crop would respond from additional potassium. The farm overall does not need any additional potassium though.



2016	Alfalfa	2017	Alfalfa or Corn Silage?
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Planned Events and Records			
Date	Event	Comments	Result
Spring	Manure	25 ton feedlot manure for corn silage or	
		10 ton manure on the old alfalfa stand.	
		25x9.9=247.5 Lbs N	
		10x9.9=99 Lbs N	
		18x9.9= 178.2 Lbs N	
		10x9.9= 99 Lbs N	
		Put the above changed rates on	

Farm: FEEDLOT

Field:205 RESERVE

SOIL TEST REPORT

Report Date: 2016-10-21 Print Date: 2017-03-30

Page:1

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - P ppm		Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH		CEC meq/100g	Percent Base Saturations					
					Bray-P1	Bicarb				pH	Buffer		% K	% Mg	% Ca	% H		
K231A		6	27513	4.9	50 G	110 H	143 M	235 M	2400 H	7.1	7.1	15.9	2.3	12.3	75.6	8.9	0.8	
K231B		12	27514	3.1	29 M	48 M	126 M	245 M	2300 M	7.1	7.1	15.4	2.1	13.2	74.5	8.9	1.2	
K231C		24	27515	1.3	11 VL	18 VL	126 M	190 H	1540 H	7.4	7.4	9.8	3.3	16.2	78.8		1.9	
K231D		36	27516	0.7	5 VL	6 VL	117 M	180 L	3780 VH	7.9	7.9	21.0	1.4	7.2	90.4		1.1	
Sample Number	Sulfur ppm S lbs/acre	Nitrate Nitrogen ppm NO3-N lbs/acre	Zinc Zn ppm	Manganese		Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts meq/cm	%P	Aluminum saturation		K/Mg Ratio	ENR	Chloride		Sodium Na ppm	Molybdenum Mo ppm
				Mn ppm							Al ppm	%Al*			Cl ppm			
K231A	23 L	41	16 M	29				0.6 M		25 H	575	0.1 G	0.19	62			31 M	
K231B	42 H	78	6 L	11						9 G	717	0.1 G	0.16	43			43 H	
K231C	35 H	126	1 VL	4						2 VL	601	0.1 G	0.20	25			42 VH	
K231D	60 VH	216	1 VL	4							173	0.0 G	0.19	19			51 H	

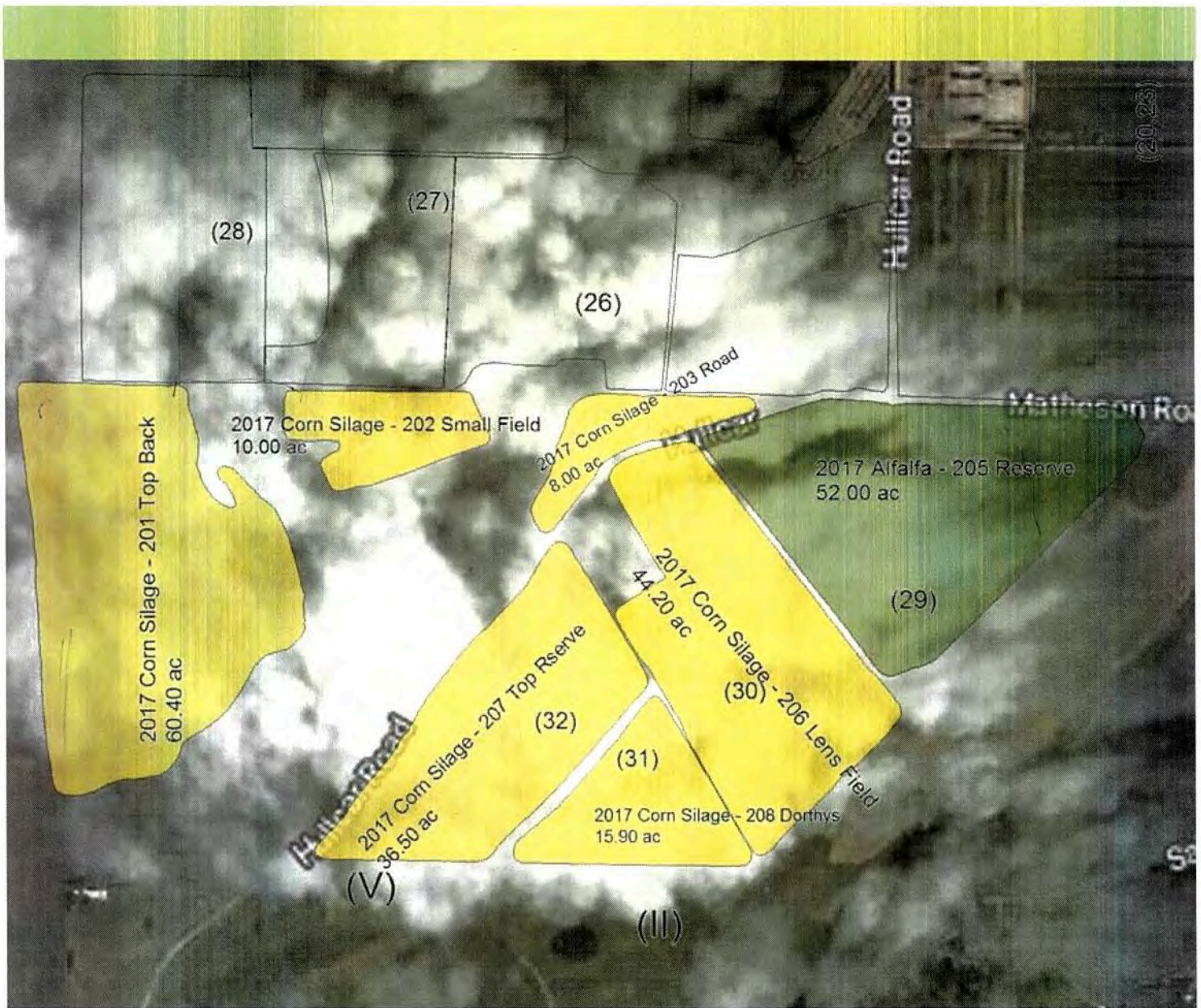
VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH
'G' = GOOD M = MARGINAL MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC ST = SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

	P1+	%P+	N	K	Mg	Ca	S	Zn	Mn	F8	Cu	B	Very High ('+High)
Very High ('+High)													Very High ('+High)
High ('GOOD)													High ('GOOD)
Medium													Medium
Low													Low
Very Low													Very Low

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal	Lime Tons/Acre	N	P2O5	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
K231A	Alfalfa	Alfalfa	7 tons	0.0	0	0	405	10	0	10					2.0



2017 Crop Plan

Prepared by:

Emerald Bay Ag Services

Vernon, BC

10 Mary's Emerald bay Road

250.550.0545

EmeraldBayAg.com

Soil residuals are good except phosphorous levels elevated. Maintain manure program



2015	Corn Silage	2016	Corn Silage
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2016 Planned Events and Records

[illegible]

SOIL TEST REPORT

Report Date:2016-10-18 Print Date:2017-03-30

Page:1

Sample Number	Legal Land Descript	Depth	Lab Number	Organic Matter	Phosphorus - P ppm	Bray-P1	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH		CEC meq/100g	Percent Base Saturations				
										Bicarb	Bray-P1		%P	Al ppm	%Al*	ENR Ratio	Chloride Cl ppm
K241A		6	18232	8.6	88 H	238 H	414 VH	335 M	3310 H	7.2	21.6	4.9	12.9	76.7	4.6	0.8	
K241B		12	18233	3.2	33 M	53 M	176 H	240 M	2270 H	7.4	14.0	3.2	14.3	81.3		1.4	
K241C		24	18234	1.5	14 L	21 L	125 M	235 M	2600 H	7.6	15.4	2.1	12.7	84.2		1.2	
K241D		36	18235	1.2	7 VL	10 VL	103 M	200 L	3910 VH	7.8	21.6	1.2	7.7	90.4		0.8	
Sample Number	Sulfur ppm S lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts melem	Saturation %P	Aluminum Al ppm	Sulfur S ppm	Chloride Cl ppm		Sodium Molybdenum Na ppm Mo ppm			
												ppm	Ratio	ppm	ppm		
K241A	52 H	94	14 M	25			0.9 M		62 H	491	0.0 G	0.38	99		42 M		
K241B	36 M	65	3 VL	5					4 L	753	0.1 G	0.22	44		44 H		
K241C	29 L	104	1 VL	4					2 VL	521	0.0 G	0.17	27		41 H		
K241D	29 L	104	1 VL	4					1 VL	123	0.0 G	0.16	24		38 M		

OE VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH G = GOOD M = MARGINAL MT = MODERATE PHYTO-TOXIC T = PHYTO-TOXIC ST = SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

Very High (*High)													Very High (*High)
High (*GOOD)													High (*GOOD)
Medium													Medium
Low													Low
Very Low													Very Low
	P1*	%P*	N	H	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal Tons/Acre	Lime Tons/Acre	N	P205	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

Attn: DOUG MACFARLANE

Farm: FEEDLOT

250-546-3847

Field: 207 & 208 RESERVE DORTHYS TO

Report Date: 2016-10-18 Print Date: 2017-03-30

Page: 1

SOIL TEST REPORT

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - P ppm	Potassium Bray-P1	Magnesium K ppm	Calcium Ca ppm	pH Buffer	CEC meq/100g	Percent Base Saturations				
					Bicarb	Feay-P1					% K	% Mg	% Ca	% H	% Na
K251A		6	18240	5.9	54 H	163 H	374 VH	3010 H	7.4	19.0	5.1	14.7	79.4	1.0	
K251B		12	18241	2.7	45 G	93 H	208 H	2320 H	7.2	15.3	3.5	14.7	75.7	4.6	1.5
K251C		24	18242	1.5	22 L	31 L	129 M	1770 H	7.5	11.2	3.0	16.4	79.1	1.8	
K251D		36	18243	1.0	16 L	21 L	127 M	3620 VH	8.0	20.2	1.6	8.2	89.5	0.7	
Sample Number	Sulfur ppm \$ lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts meq/cm	saturation Aluminum %P Al ppm	saturation %Al+ Ratio	Chloride Cl ppm	Sodium Na ppm	Molybdenum Mo ppm		
K251A	35 L	63	11 M	20			0.8 M		13 H	710	0.0 G	0.35	72	45 M	
K251B	39 M	70	4 VL	7					15 H	788	0.1 G	0.24	39	54 H	
K251C	23 L	83	1 VL	4					3 VL	638	0.0 G	0.18	27	48 H	
K251D	18 VL	65	1 VL	4					2 L	151	0.0 G	0.20	22	34 M	

OE VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH 'G = GOOD, M = MARGINAL, MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC, ST = SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

Very High (*High)												Very High (*High)
High (*GOOD)												High (*GOOD)
Medium												Medium
Low												Low
Very Low												Very Low
	p1 *	%p *	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal Tons/Acre	Lime Tons/Acre	N	P205	K20	Mg	Ca	S	Zn	Mn	Fe	Cu	B

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

208

Dorthys**15.9 Acres**

Using 207 Reserve top soil test.

Manage with 207



2016	<i>Alfalfa</i>	2017	<i>Alfalfa</i>
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Planned Events and Records

[illegible]

Attn: DOUG MACFARLANE

Farm: FEEDLOT

250-546-3847

Field: 207 & 208 RESERVE DORTHYS TO

Report Date: 2016-10-18 Print Date: 2017-03-30

Page: 1

SOIL TEST REPORT

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - Bicarb	Phosphorus - Bray-P1	Potassium	Magnesium	Calcium	pH	CEC	Percent Base Saturations
												% K % Mg % Ca % H % Na
K251A		6	18240	5.9	54 H	163 H	374 VH	335 M	3010 H	7.4	19.0	5.1 14.7 79.4 1.0
K251B		12	18241	2.7	45 G	93 H	208 H	270 M	2320 H	7.2	15.3	3.5 14.7 75.7 4.6 1.5
K251C		24	18242	1.5	22 L	31 L	129 M	220 H	1770 H	7.5	11.2	3.0 16.4 79.1 1.8
K251D		36	18243	1.0	16 L	21 L	127 M	200 L	3620 VH	8.0	20.2	1.6 8.2 89.5 0.7
Sample Number	Sulfur	Nitrate Nitrogen	Zinc	Manganese	Iron	Copper	Boron	Soluble Salts	Saturation	Aluminum	Chloride	Sodium Molybdenum
	ppm S lbs/ac	ppm NO3-N lbs/ac	Zn ppm	Mn ppm	Fe ppm	Cu ppm	B ppm	me/cm	%P	Al ppm	ppm	Na ppm Mo ppm
K251A	35 L	11 M	20				0.8 M		13 H	710	0.0 G	0.35 72 45 M
K251B	39 M	4 VL	7						15 H	788	0.1 G	0.24 39 54 H
K251C	23 L	1 VL	4						3 VL	638	0.0 G	0.18 27 46 H
K251D	18 VL	1 VL	4						2 L	151	0.0 G	0.20 22 34 M

OE VL = VERY LOW L = LOW M = MEDIUM H = HIGH VH = VERY HIGH G = GOOD M = MARGINAL MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC, ST = SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

Very High (*High)												Very High (*High)
High (*GOOD)												High (*GOOD)
Medium												Medium
Low												Low
Very Low												Very Low
	P1*	%P*	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal	Lime	N	P205	K20	Mg	Ca	S	Zn	Mn	Fe	Cu	B
				Tons/Acre											

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

2017— Good soil levels maintain manure build program for 2017

[illegible]

SOIL TEST REPORT

Report Date:2016-10-21 Print Date:2017-03-30

Page:1

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - P ppm	Potassium		Magnesium	Calcium	pH		CEC	Percent Base Saturations				
						Bray-P1	K ppm			Mg ppm	Ca ppm		pH	Buffer	%K	%Mg	%Ca
K161A		6	27562	4.7	36 G	70 G	257 H	250 L	4160 VH	7.6		23.7	2.8	8.8	87.9	0.6	
K161B		12	27563	2.9	25 M	37 M	167 M	295 L	5430 VH	7.5		30.2	1.4	8.1	89.9	0.7	
K161C		24	27564	1.4	15 M	23 L	126 M	290 L	5230 VH	7.8		29.0	1.1	8.3	90.0	0.6	
K161D		36	27565	1.0	7 L	13 L	93 L	225 VL	7200 VH	8.2		38.3	0.6	4.9	94.0	0.6	
Sample Number	Sulfur ppm S lbs/ac	Nitrate ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble salts mval/cm	Saturation		Chloride Cl ppm	sodium Molybdenum					
									%P	Al ppm		%Al*	Ratio	ENR	Na ppm	Mo ppm	
K161A	29 L	52	11				0.5 L		5 M	442	0.0 G	0.32	60		35 L		
K161B	39 L	70	9						3 M	509	0.0 G	0.17	41		48 M		
K161C	31 L	112	22						2 L	121	0.0 G	0.13	26		42 L		
K161D	45 M	182	22						1 VL	38	0.0 G	0.12	22		50 L		

CE VL • VERY LOW L • LOW M • MEDIUM H • HIGH VH • VERY HIGH *G • GOOD, M • MARGINAL, MT • MODERATE PHYTO-TOXIC, T • PHYTO-TOXIC, ST • SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

Very High (*High)												Very High (*High)
High (*GOOD)												High (*GOOD)
Medium												Medium
Low												Low
Very Low												Very Low
	P1*	%P*	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal	Lime Tons/Acre	N	P205	K20	Mg	Ca	S	Zn	Mn	Fe	Cu	B
K161A	Corn Silage Western Corn Silage	Western Corn Silage	20 tons	0.0	187	20	15	20	0	10					0.5
K161A	Corn Silage Western Corn Silage	Western Corn Silage	20 tons	0.0	187	50	125	20	0	10					0.5

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.

Grower Code:05219043
Farm:FEEDLOT
Field:210WAYNES

05219-N1117

Attn:DOUG MACFARLANE
250-548-3847

SOIL TEST REPORT

Report Date:2016-10-21 Print Date:2017-03-30

Page:1

Sample Number	Legal Land Descript.	Depth	Lab Number	Organic Matter	Phosphorus - P ppm	Phosphorus - P ppm	Bray-P1	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH	CEC meq/100g	Percent Base Saturations				
					Bicarb						Buffer		% K	% Mg	% Ca	% H	% Na
K151A		6	27558	6.8	68 H	185 H	292 VH	230 M	2780 H	2780 H	7.1	18.5	4.1	10.4	75.6	9.0	1.0
K151B		12	27559	3.1	32 M	58 G	158 M	280 M	2800 H	2800 H	7.2	17.8	2.3	13.1	78.7	4.6	1.4
K151C		24	27560	1.4	27 M	46 M	119 M	255 M	2370 H	2370 H	7.4	14.4	2.1	14.8	82.3	1.1	1.1
K151D		36	27561	0.6	24 M	36 M	89 M	230 M	2780 VH	2780 VH	8.0	16.2	1.4	11.8	86.1	0.8	0.8
Sample Number	Sulfur ppm S lbs/ac	Nitrate Nitrogen ppm NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts mal/cm	Aluminum Al ppm	%Al+ Ratio	Saturation K/Mg ENR	Chloride Cl ppm	Sodium Na ppm	Molybdenum Mo ppm			
K151A	24 L	43	18				0.5 L		41 H	583	0.1 G	0.39 81		42 M			
K151B	27 L	49	29						5 M	787	0.1 G	0.18 43		56 H			
K151C	20 VL	72	43						4 L	609	0.0 G	0.14 26		35 H			
K151D	11 VL	40	29						3 L	346	0.0 G	0.12 18		31 M			

OE VL=VERY LOW L=LOW M=MEDIUM H=HIGH VH=VERY HIGH *G=GOOD,M=MARGINAL,MT=MODERATE PHYTO-TOXIC,T=PHYTO-TOXIC,ST=SEVERE PHYTO-TOXIC

GRAPHIC SUMMARY

Very High (*High)	High (*GOOD)	Medium	Low	Very Low	P1+	%P+	N	K	Mg	Ca	S	Zn	Mn	Fe	Cu	Very High (*High)
																High (*GOOD)
																Medium
																Low
																Very Low

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Lime Tons/Acre	N	P205	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
K151A	Corn Silage Western Corn Silage Western	20 tons	0.0	131	20	15	15	0	10					0.5
K151A	Corn Silage Western Corn Silage West Bld	20 tons	0.0	131	50	125	15	0	10					0.5

Crop yield is influenced by a number of factors in addition to soil fertility. No guarantee or warranty concerning crop performance is made by A & L.