Sample Farms

Manure Management Report

August 15, 2010 to August 14, 2011

3,000 Sows, farrow to nursery (12 lbs.)

Prepared for:

Sample Farms
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Receipt #: 2011-SAMPLE

March 2011

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Executive Summary

A Manure Management Plan has been proposed for the Sample Farms operation.

- 3,000 Sows, farrow to nursery (12 lbs.) barn
- 2-cell earthen manure storage with a total capacity of 5 million gallons.

Manure Management Plan

- The land base allocated for liquid manure spreading (967 acres) could take up to 6,158,200 imp. gallons of manure.
- The manure actually applied was 1,760,000 imp. gallons of liquid manure on 258 acres.
- Nitrogen rates were approximately 69-136 lbs./acre for liquid manure.
- Phosphate rates were approximately 70-137 lbs./acre for liquid manure.
- The $N:P_2O_5$ ratios were approximately 1:1 for liquid manure.
- Crop removal varies from 2:1 to 4:1 depending on the crop. Lower $N:P_2O_5$ ratios in the manure mean that there is P_2O_5 in excess of what the plant needs and that there will probably be a buildup of soil test P. Since nutrients are applied on an N basis, this means that the crop is getting more P than it can use.
- **Land should be rotated every 3 to 5 years to reduce possibility of phosphate build up.**

Nutrient Levels

- High agronomic levels indicate that the soil has sufficient P for crop growth (on annual crops 10-15 lbs./acre of P may be applied with the seed to serve as a starter). Agronomic levels are lower than environmental levels (which are the levels at which Manitoba Conservation has determined there is a risk of environmental contamination).
- As of November 10, 2008 fields outside of the RMs of Hanover and Labroquerie with P > 60 ppm must be applied on a P basis. Operations with an extension in place can continue to apply fields with P > 60 ppm on an N basis until November 10, 2013. Current legislation will require fields in Hanover and Labroquerie to spread on a P basis by November 10, 2013.

Feed Model

- Shows feeding practices can be adjusted to minimize nutrients in manure, e.g. adding phytase and reducing phosphorous levels in feed, increasing feeding efficiencies.
- The P levels in feed rations - output of P2O5/ head was good @ 16.53 kg/sow
- Feed intake by sows is good at 1000 kg/head
- Land base needs to be increased to 1134 acres and eventually to 3241 acres or separator put in place to ensure sustainability in regard to P soil levels.

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1 Introduction

The Manitoba Government has set out stricter regulations to protect our environment. In 1998, they passed the Livestock Manure and Mortalities Management Regulations MR 42/98, under the Environment Act, which strengthens the protection of the environment, enhances enforcement capabilities, and helps ensure that livestock production will be sustainable in the long term. On March 30,2004 the amendment MR52/04 to the Livestock Manure and Mortalities Management Regulations MR 42/98 came into effect. On November 8, 2006 amendment 219/2006 was registered and 238/2006 was registered on December 7, 2006.

New regulations were enacted in November 2006 restricting the amount of allowable phosphorous in the soil. Fields with soil P levels > 60 ppm (120 lbs/acre) are to be applied on the basis of crop removal of P. 60-120ppm 2x crop P removal, 120-180 1x crop P removal. Fields with P between 60 and 180 ppm can have up to 5 years worth of P applied to them, but then the field cannot be manured again during that period unless soil test P is reduced below the original levels. Fields with soil P levels > 180 ppm (360 lbs/acre) cannot have manure applied to them. As of November 10, 2008 fields outside of the RMs of Hanover and Labroquerie with P > 60 ppm must be applied on a P basis. Operations with an extension in place can continue to apply fields with P > 60 ppm on an N basis until November 10, 2013. Current legislation will require fields in Hanover and Labroquerie to spread on a P basis by November 10, 2013.

As of March 30, 2004, Manitoba Conservation requires that manure management plans be completed annually by all livestock operations of 300 or more Animal Units. These plans must be submitted to Manitoba Conservation by July 10 for Fall spreading and by February 10 for Spring spreading. Manure management plans indicate the parcel(s) of land that will receive manure, the crop(s) to be grown, the amount of nutrients required to grow the crop(s), and the amounts of nutrients available in the manure. Further information can be found at http://web2.gov.mb.ca/laws/regs/2004/pdf/052-e125.04.pdf.

This information allows the operator to calculate the amount of manure that will be applied to the land. To minimize any surface removal, buildup, or movement of leacheates such as Nitrate-nitrogen, manure and other nutrient sources are to be applied at rates commensurate to crop fertility demands, as described in the Manure Management Plan. The goals are to achieve efficient utilization of manure, increase net income, and minimize environmental impacts.

2 Background

2.1 Operation Information

- Barn is located at SW 18-4-7E.
  - One barn of 3,000 Sows, farrow to nursery (12 lbs.).
- 750 Animal Units
- Manure Storage
  - Sample Main: 5 Million Gallons.
- Total anticipated storage time is 18 months.
- 2 Million Gallons of Manure to be applied.

The manure was applied to these fields in fall by broadcast as shown in Table 8.

2.2 Field Information

The land areas chosen for manure spreading (Figure 1) are located in the R.M. of Municipality.

Table 1 Field Descriptions

Field Name	Owner	Location	R.M.	Total Acres	Spreading Acres	Crop 2011
SF-01	Sample Farms	SW 18-4-7E	Municipality	112	112	Tame Grass - Est.
SF-02	Sample Farms	NW 17-4-7E	Municipality	131	131	Tame Grass - Est.
SF-03	Test Holding Company	W 1/2 SW 19-4-7E	Municipality	84	84	Tame Grass - Est.
SF-04	Example Owner	NW 19-4-7E	Municipality	132	132	Tame Grass - Est.
SF-05	Sample Farms	NE 20-4-7E	Municipality	160	160	Tame Grass - Est.
SF-06	Example Owner	NE 24-4-6E	Municipality	110	110	Tame Grass - Est.
SF-07	Test Holding Company	SW 24-4-6E	Municipality	153	153	Tame Grass - Est.
SF-08	Sample Farms	SE 23-4-6E	Municipality	85	85	Tame Grass - Est.
Totals	**# of Fields:**	**8**		**967**	**967**	

Sample Farms - Figure 1
Orthophoto

Legend
- EMS
- Fields
- Barn
- Highways
- Sections

0.5 0 0.5 1 Miles

N
W E
S

Data Sources: 1:30000
Fields and irrigation areas drawn by Tone Ag in consultation with landowner, and subject to change.
Orthophotos are 1:60,000 from Manitoba Land Initative website
Soil Features are 1:50,000 from Manitoba Land Initative website
Highways are from Manitoba Highways and Transportation 1:60,000 map 1994
Sections are from Manitoba Land Initative website

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2011-02-18

2.3 Soils Information

See Table 2 for a list of the soils groups for the fields in question. Appendix A has more soil information as well as a description of the map symbology.

Table 2 Soil Group Information

Field Name	Soil Group	Acres	% of Field	Potential Impact	Agri. Cap.	Regulatory Class (after cropping)
SF-01	MEB xx3x	73	65	Low	5W	max 30 lbs N/a
	SUW5 xx3x - SUW5 p	39	35	High	5W - 6W	max 30 lbs N/a
SF-02	MNT4 xx2x - PAN3 - SRL3	107	82	High	5W - 4M - 4M	max 30 lbs N/a
	BLO	24	18	High	3M	max 90 lbs N/a
SF-03	PLN7 - MNT3	33	39	Low	2M - 5W	max 30 lbs N/a
	KIC	31	37	Organic	O3W	max 30 lbs N/a
	SUW5 xx3x - SUW5 p	19	23	High	5W - 6W	max 30 lbs N/a
SF-04	PLN7 - MNT3	53	40	Low	2M - 5W	max 30 lbs N/a
	MNT	45	34	High	5W	max 30 lbs N/a
	MNT4 xx2x - PAN3 - SRL3	33	25	High	5W - 4M - 4M	max 30 lbs N/a
SF-05	MNT4 p - MNT4 xx3x - PAN2	97	61	High	6W - 5W - 4M	max 30 lbs N/a
	KIC	63	39	Organic	O3W	max 30 lbs N/a
SF-06	PLN7 - MNT3	110	100	Low	2M - 5W	max 30 lbs N/a
SF-07	MNT5 - MNT5 p	73	48	High	5W - 6W	max 30 lbs N/a
	PLN7 - MNT3	71	46	Low	2M - 5W	max 30 lbs N/a
	KIC	9	6	Organic	O3W	max 30 lbs N/a
SF-08	PLN7 - MNT3	81	95	Low	2M - 5W	max 30 lbs N/a
	LRY5 - DVD5	2	2	High	5M - 3M	max 30 lbs N/a
	MNT5 - MNT5 p	2	2	High	5W - 6W	max 30 lbs N/a

Due to rounding, the percentages may not add up to 100.
Limits for classes 5,6,7, and O do not apply to operations existing prior to March 2004 unless the director has notified the operator in writing that these limits do apply to the operation.

Table 3 Soil Impact Summary

	High	Moderate	Low	Minimal	Organic
Acres	441		421		103
Percent	46%		44%		11%

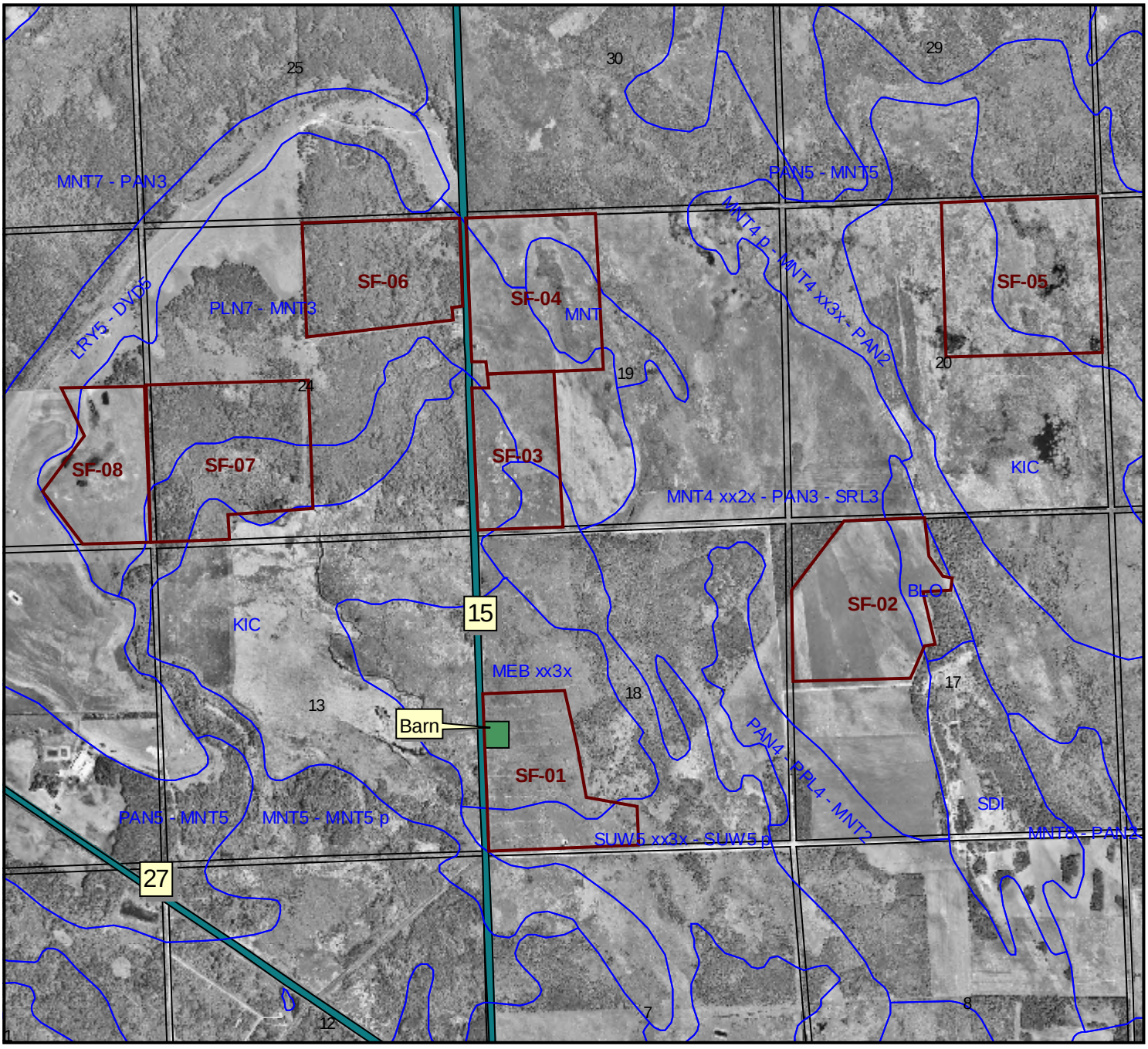
Potential Environmental Impact

Four degrees of risk are used when evaluating soils for environmental impact: Minimal, Low, Moderate, and High.

Six factors are considered in determining potential environmental impact.
1) **Soil texture** is a description of the relative proportions of fine and coarse particles that make up the soil.
2) **Geological Uniformity** considers the thickness of soil layers and the mixtures of different soil types and textures.
3) **Hydraulic Conductivity** measures the soil's ability of transmit water and leachate either vertically or horizontally.
4) Soils with a shallow **depth to water table** have a greater risk of contamination than soils with a deep water table.
5) High levels of **salinity** may affect groundwater due to leaching of the salts.
6) **Topography**, or slope, is also a consideration as risk of runoff, local flooding, buildup of water tables, and soil erosion increases with slope gradient.

Adapted from Soils of the Rural Municipality of Louise, D83. Manitoba Soil Resource, 1998, p. 77.

Sample Farms - Figure 2
Soils



Legend

0.5 0 0.5 1 Miles

N W E S

Soils
Township
Sections
Highways

Data Sources: 1:30000
Fields and irrigation areas drawn by Tone Ag in consultation with landowner, and subject to change.
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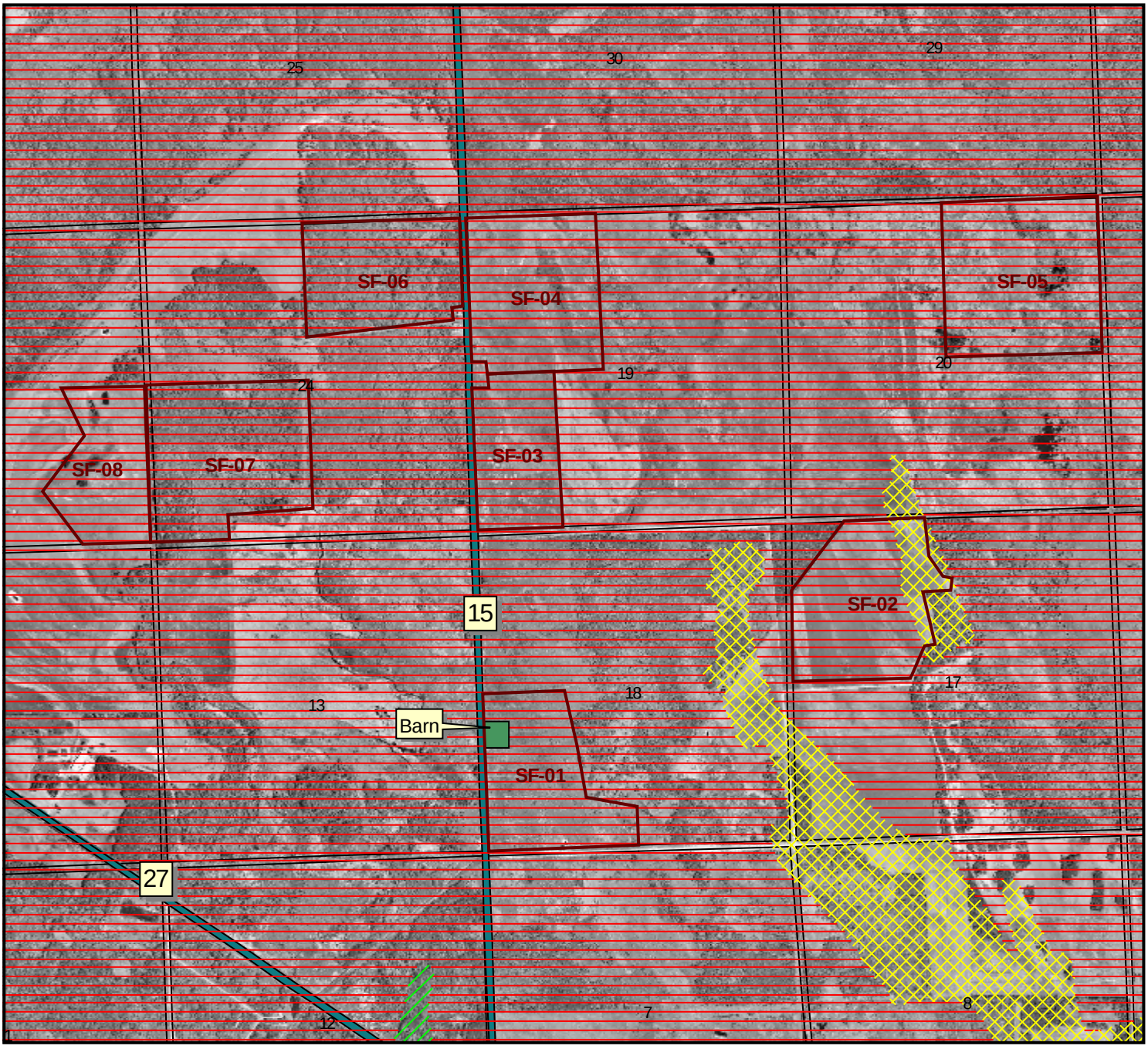
Sample Farms - Figure 3
Regulatory Classes



Legend

- Fields
- Barn

Regulatory Classes

- Max 140 lbs/a Nitrate N
- Max 90 lbs/a Nitrate N
- Max 30 lbs/a Nitrate N
- Highway
- Sections

0.5 0 0.5 1 Miles

N W E S

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Sample Farms - Figure 4
Soil Sample Sites

Legend

- Soil Sample Points Sept 2, 2010
- Fields
- Barn
- Highway
- Sections

0.5 0 0.5 1 Miles

N W E S

Data Sources: 1:30000
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3 Key Elements of a Manure Management Plan

The key elements of a Manure Management Plan include manure analysis and soil testing. When properly conducted, the annual soil test is not only used to determine appropriate nutrient application rates, but it serves to monitor any build up in soil nitrate levels that could risk groundwater quality.

3.1 Soil Sampling and Analyses Summary

The manure spreading fields were sampled on September 2, 2010. In each field, cores were taken at 15-20 sampling sites. A composite sample for each field depth was delivered to a lab for analysis. The results of the soil analyses are summarized in Table 4. The complete laboratory reports are included in Appendix B.

Table 4 Soil Nutrient Analyses

Land Description	Sample Date	Depth (inches)	Nitrate-N (lbs./ac)	Olsen Phosphorous P (ppm)	Potassium K(ppm)	SO_4-S (lbs./ac)	pH	EC / Sol Salts* (mmho/cm)
SF-01	9/2/2010	0-6	12	40	211	22	7.7	0.64
SW 18-4-7E	9/2/2010	6-24	15			39		0.63
	9/2/2010	0-24	27					
SF-02	9/2/2010	0-6	15	16	32		8	0.18
NW 17-4-7E	9/2/2010	6-24	19					0.09
	9/2/2010	0-24	34					
SF-03	9/2/2010	0-6	19	7	443	120	7.9	0.88
W 1/2 SW 19-4-7E	9/2/2010	6-24	27			360		1.98
	9/2/2010	0-24	46					
SF-04	9/2/2010	0-6	14	8	38	12	7.7	2.8
NW 19-4-7E	9/2/2010	6-24	5			11		1.2
	9/2/2010	0-24	19					
SF-05	9/2/2010	0-6	5	22	256		7.7	0.6
NE 20-4-7E	9/2/2010	6-24	15					0.4
	9/2/2010	0-24	20					
SF-06	9/2/2010	0-6	23	6	45	21	7.9	2.6
NE 24-4-6E	9/2/2010	6-24	12			14		1.3
	9/2/2010	0-24	35			35		
SF-07	9/2/2010	0-6	11	5	35	12	8	2.2
SW 24-4-6E	9/2/2010	6-24	5			11		1.2
	9/2/2010	0-24	16					
SF-08	9/2/2010	0-6	12	12	126		7.5	0.85
SE 23-4-6E	9/2/2010	6-24	7					0.9
	9/2/2010	0-24	19					

* 1:1 soil:water suspension

For a rough conversion from ppm to lbs./acre multiply ppm by 2 per 6 inches

Soil nitrate-nitrogen limits changed with amendment MR52/04 and are based on Agricultural Capability of the land. Residual nitrate nitrogen within 2 feet should not be more than 140 lbs./acre for Class 1, 2 and 3 (except for 3M and 3MW), 90 lbs./acre for Class 3M, 3MW and 4 and 30 lbs./acre for Class 5 **at any location on the land.** These rates should not be exceeded any time after crop is removed. During the growing season, not more than twice the amount should be available.

The agronomic levels of phosphorous are very high (> 19 ppm) for fields SF-01 (40 ppm) , and SF-05 (22 ppm) .

High agronomic levels indicate that the soil has sufficient P for crop growth (on annual crops 10-15 lbs./acre of P may be applied with the seed to serve as a starter). Agronomic levels are lower than environmental levels (which are the levels at which Manitoba Conservation has determined there is a risk of environmental contamination).

3.2 Target Nutrient Rates

Table 5 lists the nutrient requirements based upon the crop use and soil analysis for each spreading field.

Table 5 Target Nutrient Rates - lbs./ac

Land Description	Crop 2011	Yield / Acre	N	P_2O_5	K_2O	S
SF-01 SW 18-4-7E	Tame Grass - Est.	3 Tons	100	0	0	0
SF-02 NW 17-4-7E	Tame Grass - Est.	3 Tons	85	10	30	
SF-03 W 1/2 SW 19-4-7E	Tame Grass - Est.	3 Tons	70	30	0	0
SF-04 NW 19-4-7E	Tame Grass - Est.	3 Tons	100	25	30	0
SF-05 NE 20-4-7E	Tame Grass - Est.	3 Tons	100	0	0	
SF-06 NE 24-4-6E	Tame Grass - Est.	3 Tons	85	30	30	0
SF-07 SW 24-4-6E	Tame Grass - Est.	3 Tons	100	30	30	0
SF-08 SE 23-4-6E	Tame Grass - Est.	3 Tons	100	20	0	

Nitrogen, P_2O_5, K_20, and S recommendations based on recommendations from Manitoba Soil Fertility Guide.

3.3 Manure Sampling - Analyses

The manure analyses and available manure nutrients used in calculating the target manure rates are listed in Tables 6 and 7. The nitrogen available depends on the losses that occur during application (under Table 7). Ammonium loss is quoted from Farm Practices Guidelines, pg. 37.

Table 6 Manure Analyses *

Cell Description	N	NH_4 -N	Org.N	P_2O_5	K_2O	S	Ca	Mg	Na	pH	EC (mS/cm)	Cl	SAR	% Dry Matter
Sample Main Estimated* lbs./1,000 imp. gallons	27	20	7	11	19									2.2

* Taken from Farm Practices Guidelines, pg. 148.

Table 7 Available Manure Nutrients *

Cell Description	N-Injected	N-Broadcasted	P_2O_5	K_2O
Sample Main Estimated lbs./1,000 imp. gallons	21.8	14.8	11	19

*Nutrient Factors

N-Injected = No ammonium losses + 25% organic N available first year
N-Broadcasted = 35% ammonium losses + 25% organic N available the first year
N in Solid Manure = estimated at 50% of total N available the first year
P_2O_5 = 100% available the first year
K_20 = 100% available the first year

3.4 Target Manure Rate (TMR)

The target application rate for each spreading field is shown in Table 8.
The following formula was used to determine the manure rate:

TMR (gal/ac) = Target Nitrogen Rate (TNR) / Available Manure Nitrogen (AMN) X 1000 gallons.

The TNR for each field is obtained from Table 5 and is based on crop use and soil analysis for that field. AMN is based on the estimate shown in Table 6.

Table 8 Target Manure Rates (Nitrogen Based)

Land Description	Crop 2011	Spreading Acres	TNR (lbs./ac)	TMR[xx]	Total Target App.	Available $P_2 0_5$ (lbs./ac)	Available $K_2 0$ (lbs./ac)	Method*
Sample (imp. gallons)								
SF-01 SW 18-4-7E	Tame Grass - Est.	112	100	6,800	761,600	75	129	B
SF-02 NW 17-4-7E	Tame Grass - Est.	131	85	5,800	759,800	64	110	B
SF-03 W 1/2 SW 19-4-7E	Tame Grass - Est.	84	70	4,700	394,800	52	89	B
SF-04 NW 19-4-7E	Tame Grass - Est.	132	100	6,800	897,600	75	129	B
SF-05 NE 20-4-7E	Tame Grass - Est.	160	100	6,800	1,088,000	75	129	B
SF-06 NE 24-4-6E	Tame Grass - Est.	110	85	5,800	638,000	64	110	B
SF-07 SW 24-4-6E	Tame Grass - Est.	153	100	6,800	1,040,400	75	129	B
SF-08 SE 23-4-6E	Tame Grass - Est.	85	100	6,800	578,000	75	129	B
Totals		**967**			**6,158,200**			

* I = Injection, B = Broadcast
xx - This should be applied in spring or late summer before or after first cut/grazing (where applicable) in the high impact areas.

The application rates in Table 8 adhere to the elements of a Manure Nutrient Management Plan for they are based on the following:

- Nutrient analyses for the manure were taken from Farm Practices Guidelines, pg. 148.
- Determination of target manure application rates was based on soil tests.
- Manure application was based on fall application as shown in Table 8. Applying the manure in spring or late summer, using the prescribed rates and application methods, will minimize any nutrient build up or leacheate movement below the rooting zone of crops. This in turn minimizes any adverse effect to potable groundwater, or surface water pollution from runoff. It also achieves the efficient utilization of manure as an organic fertilizer to obtain target yields.

4 Actual Manure Spreading

Table 9 Manure Analyses

Cell Description	N	NH_4 -N	Org.N	P_2O_5	K_2O	S	Ca	Mg	Na	pH	EC (mS/cm)	Cl	SAR	% Dry Matter
Sample Main Oct 18, 2010 Sample - Top	22	19	2	6	30	3.6			6	6.7	18			4.5
Sample Main Oct 19, 2010 Sample - Mid	29	21	10	9	17	4.0			5	7.1	17			2.8
Sample Main Oct 19, 2010 Sample - Bot	30	24	6	9	26	4.8			6	7	16			4.3

Table 10 Nutrients based on average of samples for all years

Field Name	Cell	Date Applied	Acres Applied To	Application Rate	lbs. / Acre Nitrogen	lbs. / Acre P_2O_5	lbs. / Acre K_20	Total Application
SF-03	Sample	10/15/2010	54	4,444	69	70	99	240,000
SF-04	Sample	10/16/2010	70	8,143	127	129	182	570,000
SF-06	Sample	10/17/2010	69	8,696	136	137	194	600,000
SF-07	Sample	10/19/2010	65	5,385	84	85	120	350,000
Total for Sample			**258**					**1,760,000**

*Nutrient Factors

N-Injected = No ammonium losses + 25% organic N available first year
N-Broadcasted = 35% ammonium losses + 25% organic N available the first year
N in Solid Manure = estimated at 50% of total N available the first year
P_2O_5 = 100% available the first year
K_20 = 100% available the first year

The manure actually applied was 1,760,000 imp. gallons of liquid manure on 258 acres.
Nitrogen rates were approximately 69-136 lbs./acre for liquid manure.
Phosphate rates were approximately 70-137 lbs./acre for liquid manure.
The N:P_2O_5 ratios were approximately 1:1 for liquid manure.
Crop removal varies from 2:1 to 4:1 depending on the crop. Lower N:P_2O_5 ratios in the manure mean that there is P_2O_5 in excess of what the plant needs and that there will probably be a buildup of soil test P. Since nutrients are applied on an N basis, this means that the crop is getting more P than it can use.

These rates are above the plant removal rates and are not sustainable when manure is applied on a yearly basis. This may lead to excessive nitrogen loss and phosphate build up. If this land continues to be pastured without hay being exported off the land approximately 80% of the phosphate removed by the grass is returned to the land by the cattle. The net result is a continued increase of soil test phosphorus.

Appropriate setbacks should always be maintained.

Table 11 Nutrient Uptake

Crop	P_2O_5 Uptake per Unit of Crop	P_2O_5 Removal per Unit of Crop	Example Manitoba Target Yields	P_2O_5 Removed from a field (lb/ac)
Alfalfa	n/a	13.8 lb/ton	5 tons/ac	69
Corn - Silage	n/a	12.7lb/ton	5 dry tons/ac	64
Barley - Silage	n/a	11.8 lb/ton	4.5 tons/ac	53
Corn - Grain	0.63 lb/bu	0.44 lb/bu	100 bu/ac	44
Fababeans	2.90 lb/cwt	1.79 lb/cwt	24 cwt/ac	43
Canola	1.47 lb/bu	1.04 lb/bu	40 bu/ac	42
Wheat - Winter	0.61 lb/bu	0.51 lb/bu	75 bu/ac	38
Potatoes	0.17 lb/cwt	0.09 lb/cwt	400 cwt/ac	36
Peas	0.84 lb/bu	0.69 lb/bu	50 bu/ac	35
Barley - Grain	0.56 lb/bu	0.42 lb/bu	80 bu/ac	34
Grass Hay	n/a	10.0 lb/ton	3 tons/ac	30
Soybeans	0.90 lb/bu	0.84 lb/bu	35 bu/ac	29
Wheat - Spring	0.8 lb/bu	0.59 lb/bu	45 bu/ac	27
Oats	0.41 lb/bu	0.26 lb/bu	100 bu/ac	26
Rye	0.84 lb/bu	0.45 lb/bu	55 bu/ac	25
Dry Edible Bean	n/a	1.39 lb/cwt	18 cwt/ac	25
Sunflowers	n/a	1.10 lb/cwt	22 cwt/ac	24
Lentils	1.37 lb/cwt	1.03 lb/cwt	18 cwt/ac	19
Flax	0.83 lb/bu	0.65 lb/bu	24 bu/ac	16

Based on table from Managing Feed and Crop Rotations to Reduce Land Base Requirements for Manure, Riekman et al. 2009.

Manure samples need to be taken at regular intervals during pumping, preferably after pumping out the first quarter, at the halfway point, and again at the three-quarter point. Equipment should be calibrated so that manure management plan targets are not exceeded. A flow meter should be used to enable operator to monitor application amounts.

Martin Entz, University of Manitoba has done research on phosphorous on clay soils under a 2 year alfalfa, flax, and wheat rotation. Where no fertilizer was applied, it took **11 years** to reduce soil test levels from 50 lbs./acre soil test phosphorous to 11 lbs./acre. It is much easier to prevent a buildup than to try and reduce it.

Table 12 Historic P Levels for fields in MMP

Field	Sample Date	P (ppm)	Sample Date	P (ppm)	Sample Date	P (ppm)	Sample Date	P (ppm)
SF-01			9/12/2008	21	9/10/2009	27	9/2/2010	40
SF-02			9/20/2008	14			9/2/2010	16
SF-03			4/24/2009	3			9/2/2010	7
SF-04			9/2/2008	9			9/2/2010	8
SF-05			9/2/2008	9			9/2/2010	22
SF-06			9/2/2008	11			9/2/2010	6
SF-07			9/2/2008	6			9/2/2010	5
SF-08			9/2/2008	13	4/24/2010	10	9/2/2010	12

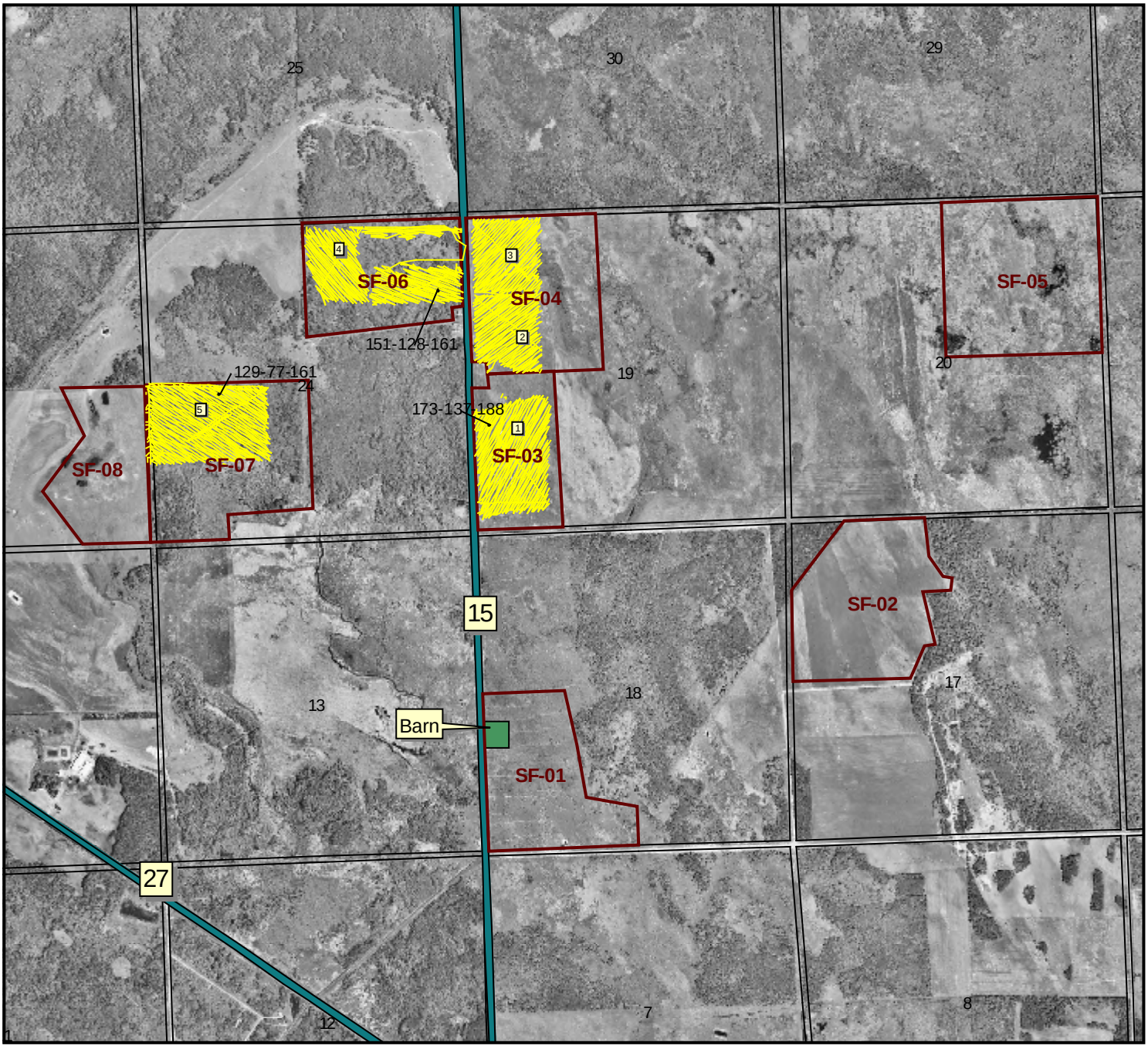
Table 13 Historic Application Levels for fields in MMP

Field Name	Date Applied	Acres Applied To	Rate Applied	Total Application
SF-01	Jul 10, 2008	75	5,500	412,500 imp. gallons
SF-01	Jun 1, 2009	90	6,000	540,000 imp. gallons
SF-02	Jun 10, 2007	75	9,280	696,000 imp. gallons
SF-02	Sep 10, 2009	75	9,333	700,000 imp. gallons
SF-03	Sep 19, 2008	45	5,900	265,500 imp. gallons
SF-03	Oct 15, 2010	54	4,444	240,000 imp. gallons
SF-04	Jul 11, 2006	65	5,900	383,500 imp. gallons
SF-04	Oct 16, 2010	70	8,143	570,000 imp. gallons
SF-05	Apr 25, 2009	108	11,111	1,200,000 imp. gallons
SF-06	Apr 25, 2009	79	10,000	790,000 imp. gallons
SF-06	Oct 17, 2010	69	8,696	600,000 imp. gallons
SF-07	Apr 25, 2008	92	10,000	920,000 imp. gallons
SF-07	Oct 19, 2010	65	5,385	350,000 imp. gallons
SF-08	Sep 10, 2009	80	11,250	900,000 imp. gallons

Sample

	2011	2010	2009	2008
imp. gallons	1,760,000	1,600,000	2,795,500	1,332,500
Total Acres	258	155	322	167
Avg. imp. gallons/Acre	6,822	10,323	8,682	7,979

Sample Farms - Figure 5
Manure Application



Legend

- Manured Oct 15-19, 2010
- Fields
- Barn
- Highway
- Sections

0.5 0 0.5 1 Miles

N W E S

Data Sources: 1:30000
Fields and irrigation areas drawn by Tone Ag in consultation with landowner, and subject to change.
Orthophotos are 1:60,000 from Manitoba Land Initative website
Soil Features are 1:50,000 from Manitoba Land Initative website
Highways are from Manitoba Highways and Transportation 1:60,000 map 1994
Sections are from Manitoba Land Initative website

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2011-02-18

5 Further Recommendations

5.1 Soil Monitoring Recommendations

5.1.1 Initial Monitoring

Initial monitoring to a depth of 12 feet is recommended for fields about which little is known regarding soil nutrient levels or which have been highly fertilized in past years, with the objective of determining what presently exists in the soil. Nutrient accumulations in fields are seldom uniform but vary with landscape due to variation in processes such as leaching, denitrification, crop growth and other factors.

Benchmark sampling should be used to assess nutrient accumulations within specific selected areas of fields, as follows:

- Do exploratory study of two fields that have a history of high N fertilization application.
- Select at least two upland sites (level or upper slope) to mid-slope sites and two level depressions (toe slope or lower slope) positions in each field. Each area should be about one-half acre.
- Sample each selected area separately by taking three boreholes per area at depth increments of 1.0 foot to 12 feet or to depth of groundwater.
- Analyze samples for nitrate, by depth for each area.
- Interpret results -- nitrate nitrogen accumulation between 0 to 4 feet should not exceed 150 N lbs./acre; nitrates accumulated below 4 feet should not exceed 20 N lbs./acre in each 1.0 foot. Services of a professional agronomist should be sought if levels of nitrate nitrogen exceed those noted above.

5.1.2 Annual Monitoring

Annual soil testing is required to tailor fertilizer application rates to crop requirements. All fields should be tested to provide information for sound fertilizer recommendations for various crops and fields. Follow the general instructions for soil testing, including:

- Sample annually in late fall.
- Sample depths of 0 to 6 inches and 6 to 24 inches.
- Sample one location per 5 acres with a minimum of 15 samples per field to produce a composite sample for each depth.
- Analyze samples for nitrate nitrogen and other nutrients as required for fertilizer recommendations.
- Interpret results -- nitrate nitrogen accumulation between 0 to 2 feet should not exceed the levels given in Table 14.

Table 14 Maximum Allowable Nitrogen in the top 60cm (2ft) of soil

Ag Capability Class	Residual Limit of Nitrate Nitrogen (lbs./ac) at end of growing season	Residual Limit of Nitrate Nitrogen (lbs./ac) during growing season
1,2,3 (except 3M or 3MW)	140	280
3M, 3MW, 4	90	180
5	30	60

5.1.3 Three to Five Year Monitoring

Once every three years, additional sampling should be undertaken at the landscape sites established for the benchmark sampling. The purpose is to ensure that the management/cropping/irrigation system is working as required to minimize nitrate accumulation/groundwater contamination risks. The sampling interval could be increased to five years if analyses after the first 3 to 6 years provide no evidence of issues for concern. Sampling procedures and guidelines for interpretation of results as outlined for initial monitoring should be followed. The producer should keep long-term records of fertilizer application rates for crops grown on both rented and owned land.

5.2 Setback Recommendations

To reduce the risk of runoff entering surface water, a setback is necessary to absorb the runoff and prevent it from traveling downslope. Table 15 from Farm Practices Guidelines pg. 25 should be used as guideline for application setbacks from watercourses and wells.

Table 15 Recommended Distances (m) from Watercourses, Sinkholes, Springs, Wells and Residential Property Lines for Manure Spreading

Slope	No Incorporation	Surface Applied and Irrigation Incorporation within 48 Hours	Injection
less than 4%	30	20	5
4-6%	60	40	10
6-12%	90	60	15

Distance based on soil not supporting perennial forage crops or with minimal trash cover
Where a perennial forage crop or good trash cover is present, distances may be reduced by 1/2

5.3 Nutrient Management

Ideal Proteins lower nitrogen excretion:
One concept that is being adopted with respect to feed formulation, is that of ideal proteins. An ideal protein is one in which dietary amino acids (AA) at specific ratios relative to lysine closely match the AA requirements of the animal (CAST, July 2002). By lowering the overall protein level in the diet and supplementing with synthetic AAs to correct the AA ratios, it is possible to reduce nitrogen excretion. It has been shown that lowering the dietary protein concentration by 2 per cent and supplementing the diet with synthetic lysine can result in a 20-25 per cent decrease in N excretion, and is cost-effective (CAST, July 2002).

Lower crude protein diets reduce water intake:
Furthermore, feeding lower crude protein diets reduces water intake of the pigs because they have less ammonia (NH3) to flush out of their systems, thus reducing both the amount of urine excreted and the amount of N present in the urine. This alone can reduce slurry volume by as much as 30 % (Feedstufs, Oct 22, 2002). Phase feeding has been shown to decrease overall N excretion. Feeding five diets in the grow/finish stages, rather than two, can decrease N excretion from 5-8 per cent (Thaler, 1997). (Funk, 2004)

Livestock generally absorb very little Cu, Zn, Mn in feed:
Concentrations of metals in manures closely reflect metal concentrations in feed that are added to feed to promote growth and to prevent microbial infections. Livestock generally absorb very little of the metal in their feed. Therefore, feeds supplemented with minerals (metals) usually result in manures containing high concentrations of the metals. For example, feeding rations high in Cu and/or zinc are often used as growth stimulants or as a disease control measure in swine. However, swine manure is estimated to contain 86% of the Cu, 100% of the Zn, 79% of the Mn and 66% of the Na offered to the pig (cited in Moore et al. 1998).

Phytase increases efficiency of P:
60 to 80% of P in traditional feed ingredients is present in the form of phytate, a compound that pigs do not use well. Phytase can play a vital role in increasing the efficiency of P in utilization. Phytase is an enzyme that releases the inorganic P from phytate so that it can be used by pigs. The excretion of P can be reduced by 25-50% with the addition of phytase.

In their paper, Feasibility and Effectiveness of Several Options for Regulating Manure Phosphorus Management in Manitoba, Esther Salvano, Ed Tyrchniewicz and Don Flaten had the following suggestions.

Add phytase to improve use of feed grain P and reduce dietary P supplementation -Western Canadian nutritionists estimate that recent supplementation of pig diets with phytase has reduced P excretion by 25%. According to the literature reviewed in Chapter 3 of our Phase 1 report (Flaten et al. 2003), the addition of phytase to the diet of finisher pigs typically reduces P excretion by up to 30%. Other reviews have cited a range of 5 to 62% reduction in P excretion when phytase is added to swine diets. Part of the

reason for the variability in effect of phytase is due to the variation in the amount of phytase added in the diet, the type of feed being used, and the degree to which total dietary P is reduced to offset the expected increase in P availability from the bulk feed source.

Furthermore, many producers in Manitoba have also decreased the overall quantity of nutritionally available phosphorus in swine diets to minimize the amount of P that is supplied in excess of animal requirements. This decrease in dietary P is expected to reduce P excretion by an additional 15%. Therefore, if P excretion can be reduced by a total of 40% as a result of adding phytase and reducing total and available dietary P intake, the land area required for manure spreading on a P-balance basis is reduced accordingly, making the adjustment to a P-balance based rate less extreme than without these measures.

C.M. Nyachoti found that adding Phytase to swine diets improved P digestibility in sows by 25-40%. (Nyachoti et al., Canadian Journal of Animal Science 86 pp 405-407) Adding Phytase also reduced the P excretion by about 25%. (Woyengo et al. 2007.)

Suggestions for Managing P in Manure

- Minimize feed wastage
- Decrease feed P content
- Reduce fertilizer imports
- Increase crop removal
- Expand the land base
- Treat the manure to remove P

Suggestions from Managing Feed and Crop Rotations to Reduce Land Base Requirements for Manure, Riekman et al. 2009

Typical salt levels in the hog feed rations may be higher than necessary. Hog operations in the clay soil areas of the Red River Valley region should have their feed rations periodically analyzed for sodium and chloride to ensure they do not exceed recommended levels. This is especially important for soils that already have high levels of salinity.

Pathogenic Organisms:

Table 16 Survival of Animal Fecal Pathogens in the Environment

Material	Temp.	Duration of Survival					
		Giardia	Crypto-sporidium	Salmonella	Campylo-bacter	Yersinia entercolitcia	E. Coli O157:H7
Reference		21-23	24-25	26-28	29-31	30-37	32-36
Water	frozen	<1 day	>1 year	>6 months	12 days	>1 year	>300 days
	cold (5C)	11 weeks	>1 year	>6 months	12 days	>1 year	>300 days
	warm (30C)	2 weeks	10 weeks	>6 months	4 days	10 days	84 days
Soil	frozen	<1 day	>1 year	>12 weeks	2-8 weeks	>1 year	>300 days
	cold (5C)	7 weeks	8 weeks	12-28 weeks	2 weeks	>1 year	100 days
	warm (30C)	2 weeks	4 weeks	4 weeks	1 week	10 days	2 days
Cattle Feces	frozen	<1 day	>1 year	>6 months	2-8 weeks	>1 year	>100 days
	cold (5C)	1 week	8 weeks	12-28 weeks	1-3 weeks	30-100 days	>100 days
	warm (30C)	1 week	4 weeks	4 weeks	1 week	10-30 days	10 days
Slurry		1 year	>1 year	13-75 days	>112 days	12-28 days	10-100 days
Compost		2 weeks	4 weeks	7-14 days	7 days	7 days	7 days
Dry Surfaces		1 day	1 day	1-7 days	1 day	1 day	1 day

Olson 2001

Generally, pathogens survived longer in environmental samples at cool temperatures.

Pork consumption is the highest among all meat consumed in Denmark and Holland and pork is a major source of human enteric illness. All human Yersinia and most S. Typhimurium infections in both countries are attributed to pork consumption and both pathogens are highly prevalent in domestic swine.

Some studies have also shown that pathogens from manure spread using currently acceptable application practices can travel through soil and reach receiving waters, which are subsequently used as public water sources.

Livestock agriculture is considered one of the primary causes of bacterial contamination of surface and ground waters. Clay soils could be less effective in limited bacterial transport compared to sandy soils.

Excerpts from the executive summary of the paper written by Holley, 2003.

5.4 Feed Model

- Shows feeding practices can be adjusted to minimize nutrients in manure, e.g. adding phytase and reducing phosphorous levels in feed, increasing feeding efficiencies.
- The P levels in feed rations - output of P2O5/ head was good @ 16.53 kg/sow
- Feed intake by sows is good at 1000 kg/head
- Land base needs to be increased to 1134 acres and eventually to 3241 acres or separator put in place to ensure sustainability in regard to P soil levels.

5.5 Management Recommendations

- Spreading of manure should be done as close as possible to the time of crop removal.
- The use of a NAP (Negative Air Pressure) system as an EMS cover has been estimated to reduces nitrogen losses to less than 7% compared to around 40% on open EMSs (MLMMI Report 99-02-06).
- Growing forages such as alfalfa to recycle or retrieve deep nitrate and phosphorus in the soil where there are high levels.
- Records of manure application rates, methods and locations should be kept on file with the operator. This file should also include manure nutrient analyses, soil tests and other pertinent information necessary to demonstrate compliance with the manure management plan.
- An agrologist should review any changes to this plan, and the plan should be amended prior to implementation of changes.

The project proponents are confident and committed to the manure nutrient management of their spreading lands. This demonstrates their responsibility to the implementation of sustainable application rates as determined in this report.

Given that the Target Manure Rates are followed, setbacks are observed, and the recommendations are adopted, I certify that the proposed manure management plan is sustainable with minimal environmental risk when land is rotated every 3 to 5 years.

_____ _____

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Tone Ag Consulting Ltd.

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APPENDIX A

Soil Information

Table 17 Soils Information

Land Description	Soil Name	Order	Symbol	Texture	Drainage	Family Particle Size	** Agri. Cap.	*Pot. Impact
SF-01 SW 18-4-7E	Meleb	GL.R.HG	MEBxx3x	L	Poor	LY	5W	Low
	Sundown	GL.R.HG	SUWxx3x	LS-Gr	Very Poor	SS	5W	High
	Sundown	GL.R.HG	SUWpxxxx	LS-Gr	Very Poor	SS	6W	High
SF-02 NW 17-4-7E	Berlo	LU.GLD.GL	BLOxxxx	LFS	Imperfect	SY	3M	High
	Malonton	GL.R.HG	MNTxx2x	FS	Poor	SY	5W	High
	Pansy	BR.GLE.EB	PANxxxx	FS	Imperfect	SY	4M	High
	Spearhill	CH.GLR.DG C	SRLxxxx	LS-Gr	Imperfect	SS	4M	High
SF-03 W 1/2 SW 19-4-7E	Kircro	OR.T.M	KICxxxx	M	Very Poor	ME/SY	O3W	Organic
	Malonton	GL.R.HG	MNTxxxx	FS	Poor	SY	5W	High
	Pelan	CH.GL.DGC	PLNxxxx	LFS	Imperfect	SY	2M	Low
	Sundown	GL.R.HG	SUWxx3x	LS-Gr	Very Poor	SS	5W	High
	Sundown	GL.R.HG	SUWpxxxx	LS-Gr	Very Poor	SS	6W	High
SF-04 NW 19-4-7E	Malonton	GL.R.HG	MNTxxxx	FS	Poor	SY	5W	High
	Malonton	GL.R.HG	MNTxx2x	FS	Poor	SY	5W	High
	Pansy	BR.GLE.EB	PANxxxx	FS	Imperfect	SY	4M	High
	Pelan	CH.GL.DGC	PLNxxxx	LFS	Imperfect	SY	2M	Low
	Spearhill	CH.GLR.DG C	SRLxxxx	LS-Gr	Imperfect	SS	4M	High
SF-05 NE 20-4-7E	Kircro	OR.T.M	KICxxxx	M	Very Poor	ME/SY	O3W	Organic
	Malonton	GL.R.HG	MNTxx3x	FS	Poor	SY	5W	High
	Malonton	GL.R.HG	MNTpxxxx	FS	Very Poor	SY	6W	High
	Pansy	BR.GLE.EB	PANxxxx	FS	Imperfect	SY	4M	High
SF-06 NE 24-4-6E	Malonton	GL.R.HG	MNTxxxx	FS	Poor	SY	5W	High
	Pelan	CH.GL.DGC	PLNxxxx	LFS	Imperfect	SY	2M	Low
SF-07 SW 24-4-6E	Kircro	OR.T.M	KICxxxx	M	Very Poor	ME/SY	O3W	Organic
	Malonton	GL.R.HG	MNTxxxx	FS	Poor	SY	5W	High
	Malonton	GL.R.HG	MNTpxxxx	FS	Very Poor	SY	6W	High
	Pelan	CH.GL.DGC	PLNxxxx	LFS	Imperfect	SY	2M	Low
SF-08 SE 23-4-6E	Davidson	CH.O.DGC	DVDxxxx	LFS	Well	SY	3M	High
	Leary	CH.O.DGC	LRYxxxx	LS	Rapid	SS	5M	High
	Malonton	GL.R.HG	MNTxxxx	FS	Poor	SY	5W	High
	Malonton	GL.R.HG	MNTpxxxx	FS	Very Poor	SY	6W	High
	Pelan	CH.GL.DGC	PLNxxxx	LFS	Imperfect	SY	2M	Low

* Pot. Impact - Potential Environmental Impact Rating ** Agri. Cap. - Agricultural Capability Class

****CLASSES OF SOILS - Agricultural Capability**

The first three classes are considered capable of sustained production of common field crops.

Class 1 - no important limitations for crop use.
Class 2 - moderate limitations that reduce the choice of crops or require moderate conservation practices.
Class 3 - moderate limitations that restrict the range of crops or require moderate conservation practices.
Class 4 - severe limitations that restrict the choice of crops or require special conservation practices or both.
Class 5 - severe limitations that restrict their capability to producing perennial forage crops.
Class 6 - capable only of producing perennial forage crops and improvement practices are not feasible.

AGRICULTURAL CAPABILITY SUBCLASS LIMITATIONS

E - Erosion: Includes soil where damage from erosion is a limitation.
I - Soils subjected to inundation by streams and lakes causing crop damage or restricting agricultural use.
M - Moisture limitation: soils where crops are adversely affected by droughtiness owing to inherent soil characteristics.
W - Excess water: Excess water from inadequate soil drainage, a high water table, seepage or runoff from surrounding areas.
C - Adverse climate: this subclass denotes a significant adverse climate for crop production.
D - Undesirable soil structure and/or low permeability.
F - Low fertility: this subclass is made up of soils having low fertility.
L - Coarse wood fragments: in the rating of organic soils, woody inclusions in the form of trunks, stumps and branches (>10 cm diameter) in sufficient quantity to significantly hinder tillage, planting and harvesting operations.
N - Salinity: designates soils that are adversely affected by the presence of soluble salts.
P - Stoniness : this subclass is made up of soils sufficiently stony to significantly hinder tillage, planting, and harvesting operations.
R - Consolidated bedrock: this subclass includes soils in which the presence of bedrock near the surface restricts their agricultural use.
T - Topography: this subclass is made up of soils where topography is a limitation.
X - Cumulative minor adverse characteristics: this subclass consists of soils having a moderate limitation.

DRAINAGE

Very rapidly drained - Water is removed from the soil very rapidly in relation to supply.
Rapidly drained - Water is removed from the soil rapidly in relation to supply.
Well drained - Water is removed from the soil readily but is not rapidly.
Moderately well drained - Water is removed from the soil somewhat slowly in relation to supply.
Imperfectly drained - Water is removed from the soil sufficiently slow in relation to the supply to keep the soil wet for a significant part of the growing season.
Poorly drained - Water is removed so slowly in relation to the supply that the soil remains wet for a comparatively large part of the time when the soil is not frozen.
Very poorly drained - Water is removed from the soil so slowly that the water table remains at or on the surface for a greater part of the time the soil is not frozen.

Table 18 Soil Textures - Mineral Soils

Textural Group	Class Symbol	Class Name
Very Coarse	VCoS	Very Coarse Sand
	CoS	Coarse Sand
	S	Sand
Coarse	LCoS	Loamy Coarse Sand
	LS	Loamy Sand
	FS	Fine Sand
	LFS	Loamy Fine Sand
Moderately Coarse	CoSL	Coarse Sandy Loam
	SL	Sandy Loam
	FSL	Fine Sandy Loam
	VFS	Very Fine Sand
	LVFS	Loamy Very Fine Sand
Medium	Si	Silt
	VFSL	Very Fine Sandy Loam
	L	Loam
	SiL	Silt Loam
Moderately Fine	SCL	Sandy Clay Loam
	SiCL	Silty Clay Loam
	CL	Clay Loam
Fine	SC	Sandy Clay
	SiC	Silty Clay
	C	Clay
Very Fine	HC	Heavy Clay

Taken from page 64 of D85.

Organic Soils - Degree of Decomposition

Fibric - f - Low decomposition, high plant material
Mesic - m - Moderately decomposed, presence of recognized plant material
Humic - h - Highly decomposed, little or no plant material present

ME - Mesic Family Particle size

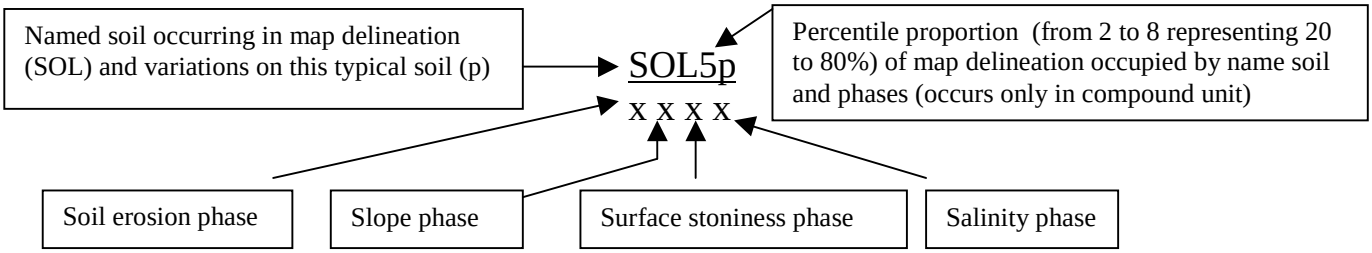
Soil Order

- Not Applicable
BR Brunisolic
CH Chernozemic
CY Cryosolic
GL Gleysolic
LU Luvisolic
OR Organic
PZ Podzolic
RG Regosolic
SZ Solonetzic
VE Vertisolic

Table 19 Particle Size

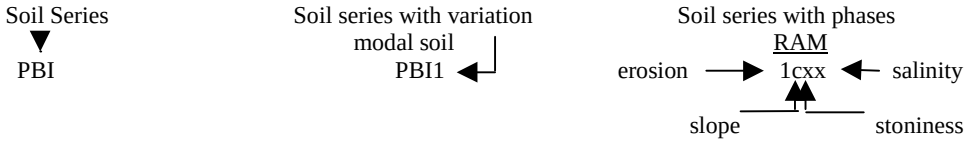
Particle Size	Symbol	Description
Coarse-Loamy	CL	A loamy particle size that has 15% or more by weight of fine sand (0.25-0.1mm) or coarser particles, including fragments up to 7.5 cm, and has 18-35% clay in the fine earth fraction
Clayey-Skeletal	CS	Particles 2mm - 25cm occupy 35% or more by volume with enough fine earth to fill interstices larger than 1mm; the fraction finer than 2mm is that defined for the clayey particle-size class.
Coarse-Silty	CSi	A loamy particle size that has 15% or more by weight of fine sand (0.25-0.1mm) or coarser particles, including fragments up to 7.5 cm, and has less than 18% clay in the fine earth fraction.
Clayey	CY	The fine earth contains 35% or more clay by weight and has less than 18% clay in the fine earth fraction and particles 2mm - 25cm occupy less than 35% by volume.
Fine-Clayey	FC	A clayey particle size that has 35-60% clay in the fine earth fraction.
Fibric (Organic)	FI	The least decomposed of all organic materials; there is a large amount of well-preserved fiber that is readily identifiable as to botanical origin. Fibers retain their character upon rubbing.
Fine-Loamy	FL	A loamy particle size that has less 15% by weight of fine sand (0.25-0.1mm) or coarser particles, including fragments up to 7.5 cm, and has 18-35% clay in the fine earth fraction.
Fragmental	FR	Stones, cobbles, and gravel, with too little fine earth to fill interstices larger than 1mm.
Fine-Silty	FSi	A loamy particle size that has less than 15% by weight of fine sand (0.25-0.1mm) or coarser particles, including fragments up to 7.5 cm, and has less than 18% clay in the fine earth fraction.
Humic (Organic)	HU	Highly decomposed organic material; small amounts of fiber are present that can be identified as to their botanical origin. Fibers can be easily destroyed by rubbing.
Leaf Litter	L	Leaf litter and twigs - undecomposed.
Loamy-Skeletal	LS	Particles 2mm - 25cm occupy 35% or more by volume with enough fine earth to fill interstices larger than 1mm; the fraction finer than 2mm is that defined for the loamy particle-size class.
Loamy	LY	The texture of fine earth includes loamy very fine sand, very fine sand, and textures with less than 35% clay; particles 2mm - 25cm occupy less than 35% by volume.
Mesic (Organic)	ME	Organic materials in an intermediate stage of decomposition; intermediate amounts of fiber are present that can be identified as to their botanical origin.
Bedrock	RK	The solid rock that underlies soil and the regolith or that is exposed at the surface.
Sandy-Coarse	SC	Soils that are developed on dominantly medium to coarse sand (but without significant gravel). These have lower water holding capacities than other sandy soils.
Sandy-Fine	SF	Soils that are developed on dominantly loamy fine sand to fine sand. have higher water holding capacities than coarse sands. Most Manitoba soils developed on sand are in this category.
Skeletal	SK	Soils with greater than 35% coarse fragments by volume, but with enough fines to fill the smaller pore spaces. This is normally used with a description of the fine material associated with it, such as SS (sandy skeletal) or LS (loamy skeletal).
Sandy-Skeletal	SS	Particles coarser than 2mm occupy 35% or more by volume with enough fine earth to fill interstices larger than 1mm; the fraction finer than 2mm is that defined for the sandy particle-size class.
Sandy	SY	The texture of fine earth includes sands and loamy sands, exclusive of loamy very fine sand and very fine sand textures; particles 2mm - 25cm occupy less than 35% by volume
Texture Complex	TX	Used for soils with a very wide range of parent material textures. For example, Eroded Slopes Complex.
Undifferentiated	UD	Used for soils where the texture of the underlying parent material is variable (SY, LY, CY), but it doesn't affect the soil series designation.
Very-Fine-Clayey	VC	A clayey particle size that has 60% or more clay in the fine earth fraction

MAP SYMBOLOGY



Map units

Simple Map units (only one soil named)



Compound Map Units (more than one named soil, soil variant of phase)

PBI61 – TDP4p
2e1x xxxs

Approximately 60% of this example map unit is moderately eroded (2), slightly stony (1), Pembina soils with a silty substrate (PBI1) occurring on strongly sloping (e) land; and 40% of the map unit is slightly saline (s), Tadpole soil with a thin (15-40 cm) peaty (TDPp) surface layer.

Complex Maps Units (undifferentiated complex of soil/landscape features)

ERX — Eroded slopes complex

SEU — Shellmouth complex

Non-Soil Features

$CB Cobbled Beach	$ER Eroded Slope	$MH Marsh
$UL Unclassified	$UR Urban land/Roads	$ZZ bodies (lagoons, ponds, lakes)

Phases

Degree of Erosion
- x non-eroded or minimal
- 1 slightly eroded
- 2 moderately eroded
- 3 severely eroded
- o overblown

Degree of Salinity
- x non saline
- s weakly saline
- t moderately saline
- u strongly saline

Soil Features
- p peaty surface (15 to 40 cm thick)
- d drained soil (artificially improved drainage)

Stoniness
- x non stony
- 1 slightly stony
- 2 moderately stony
- 3 very stony
- 4 exceedingly stony
- 5 excessively stony

Slope class
- x 0-.5% level to nearly level
- b 0.5-2% nearly level
- c 2-5 % very gently sloping
- d 5-9 % gently sloping
- e 9-15 % moderately sloping
- f 15-30 % strongly sloping
- g 30-40% very strongly sloping
- h 45-70% extremely sloping

APPENDIX B

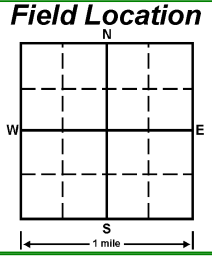
Soil Sample Reports

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-01**	SAMPLE	
CNTY	**7E**		
TWP	**4**	SECTION	**18**
QTR	**SW**	ACRES	**112**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:
SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**
TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION			
		VLow	Low	Med	High
Nitrate	0-6" 12 lb/ac 6-24" 15 lb/ac 0-24" 21 lb/ac	****	*		
Olsen Phosphorus	40 ppm	****	****	****	****
Potassium	211 ppm	****	****	****	****
Chloride					
Sulfur	0-6" 22 lb/ac 6-24" 39 lb/ac	**** ****	**** ****	** ****	****
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
Sol. Salts	0-6" 0.64 mmho/cm 6-24" 0.63 mmho/cm	**** ****	**** ****	*** ****	*

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

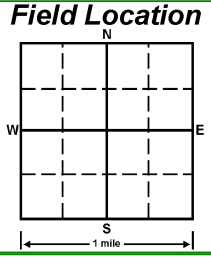
Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
7.7							

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-02**	SAMPLE	
CNTY	**7E**		
TWP	**4**	SECTION	**17**
QTR	**NW**	ACRES	**131**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:
SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**
TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION VLow	Low	Med	High
Nitrate	0-6" 15 lb/ac 6-24" 19 lb/ac 0-24" 34 lb/ac	****	***		
Olsen Phosphorus	16 ppm	****	****	****	****
Potassium	32 ppm	****	****	****	****
Chloride					
Sulfur	0-6" 6-24"	**** ****	**** ****	** ****	****
Boron					
Zinc		****	****	****	**
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter		****	****	****	****
Carbonate(CCE)					
Sol. Salts	0-6" 0.18 mmho/cm 6-24" 0.09 mmho/cm	**** ****	**** ****	*** ****	*

1ST CROP CHOICE			2ND CROP CHOICE			3RD CROP CHOICE		
YIELD GOAL			YIELD GOAL			YIELD GOAL		
SUGGESTED GUIDELINES			SUGGESTED GUIDELINES			SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION	LB/ACRE		APPLICATION	LB/ACRE		APPLICATION
N			N			N		
P_2O_5			P_2O_5			P_2O_5		
K_2O			K_2O			K_2O		
Cl			Cl			Cl		
S			S			S		
B			B			B		
Zn			Zn			Zn		
Fe			Fe			Fe		
Mn			Mn			Mn		
Cu			Cu			Cu		
Mg			Mg			Mg		
Lime			Lime			Lime		

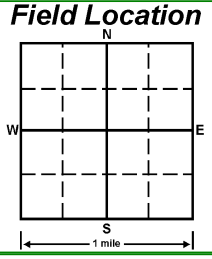
Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
8.0							

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-03**	SAMPLE	
CNTY	**7E**		
TWP	**4**	SECTION	**19**
QTR	**W 1/2 SW**	ACRES	**84**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:
SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**
TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION VLow	Low	Med	High
Nitrate	0-6" 19 lb/ac 6-24" 27 lb/ac 0-24" 46 lb/ac	****	****		
Olsen Phosphorus	7 ppm	****	****	****	****
Potassium	443 ppm	****	****	****	****
Chloride					
Sulfur	0-6" 120 lb/ac 6-24" 360 lb/ac	**** ****	**** ****	** ****	 ****
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
Sol. Salts	0-6" 0.88 mmho/cm 6-24" 1.98 mmho/cm	**** ****	**** ****	*** ****	 *

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

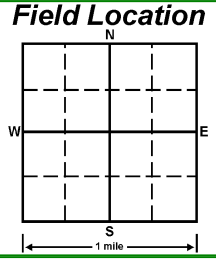
Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range) % Ca	% Mg	% K	% Na	% H
7.9							

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-04**	SAMPLE	
CNTY	**7E**		
TWP	**4**	SECTION	**19**
QTR	**NW**	ACRES	**132**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:
SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**
TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION			
		VLow	Low	Med	High
0-6" 14 lb/ac 6-24" 5 lb/ac 0-24" 19 lb/ac Nitrate		****			
Olsen Phosphorus	8 ppm	****	****	****	****
Potassium	38 ppm	****	****	****	****
Chloride					
0-6" 12 lb/ac 6-24" 11 lb/ac Sulfur		**** ****	**** ****	** ****	****
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
0-6" 2.8 mmho/cm 6-24" 1.2 mmho/cm Sol. Salts		**** ****	**** ****	*** ****	*

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE	APPLICATION	
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE	APPLICATION	
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE	APPLICATION	
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

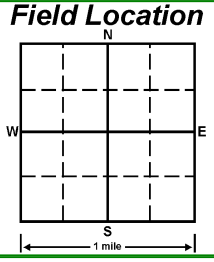
Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
7.7							

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-05**	SAMPLE	
CNTY	**7E**		
TWP	**4**	SECTION	**20**
QTR	**NE**	ACRES	**160**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:
SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**
TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION			
		VLow	Low	Med	High
Nitrate	0-6" 5 lb/ac 6-24" 15 lb/ac 0-24" 20 lb/ac	****			
Olsen Phosphorus	22 ppm	****	****	****	****
Potassium	256 ppm	****	****	****	****
Chloride					
Sulfur	0-6" 6-24"				
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
Sol. Salts	0-6" 0.6 mmho/cm 6-24" 0.4 mmho/cm	**** ****	**** ****	*** ****	 *

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

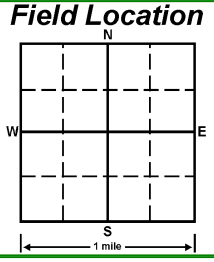
Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
7.7							

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-06**	SAMPLE	
CNTY	**6E**		
TWP	**4**	SECTION	**24**
QTR	**NE**	ACRES	**110**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:

SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**

TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION			
		VLow	Low	Med	High
Nitrate	0-6" 23 lb/ac 6-24" 12 lb/ac 0-24" 35 lb/ac	****	****		
Olsen Phosphorus	6 ppm	****	****	****	****
Potassium	45 ppm	****	****	****	****
Chloride					
Sulfur	0-6" 21 6-24" 14	**** ****	**** ****	** ****	****
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
Sol. Salts	0-6" 2.6 mmho/cm 6-24" 1.3 mmho/cm	**** ****	**** ****	*** ****	*

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

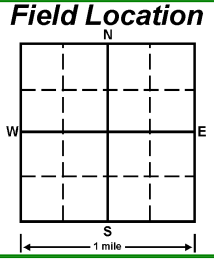
Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
7.9							

SOIL TEST REPORT

Soil Analysis by Aperture Laboratories
There will be cake

FIELD	**SF-07**	SAMPLE	
CNTY	**6E**		
TWP	**4**	SECTION	**24**
QTR	**SW**	ACRES	**153**
PREV. CROP	**Grass**		

Field Location



SUBMITTED FOR:

SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SUBMITTED BY: **TO0533**

TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION			
		VLow	Low	Med	High
0-6" 11 lb/ac 6-24" 5 lb/ac 0-24" 16 lb/ac Nitrate		****	****		
Olsen Phosphorus	5 ppm	****	****	****	****
Potassium	35 ppm	****	****	****	****
Chloride					
0-6" 12 6-24" 11 Sulfur		**** ****	**** ****	** ****	****
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
0-6" 2.2 mmho/cm 6-24" 1.2 mmho/cm Sol. Salts		**** ****	**** ****	*** ****	*

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
8.0							

Soil Analysis by Aperture Laboratories
There will be cake

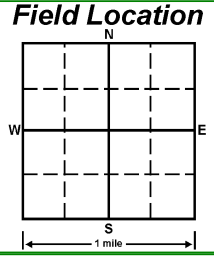
SUBMITTED FOR:
SAMPLE FARMS
BOX 789
123 FARM ROAD
FARMVILLE, MB
R3A 1W3

SOIL TEST REPORT

FIELD	**SF-08**	SAMPLE	
CNTY	**6E**		
TWP	**4**	SECTION	**23**
QTR	**SE**	ACRES	**85**
PREV. CROP	**Grass**		

SUBMITTED BY: **TO0533**
TONE AG CONSULTING LTD.
204-433-7189
BOX 333
ST. PIERRE, MB
ROA 1VO

Field Location



REF# **00000000**
LAB# **00000**
BOX# **0000**

Date Sampled:	**9/2/2010**	Date Received:	**9/4/2010**	Date Reported:	**9/8/2010**

NUTRIENT IN THE SOIL		INTERPRETATION			
		VLow	Low	Med	High
0-6" Nitrate	12 lb/ac	****	****		
6-24" Nitrate	7 lb/ac				
0-24" Nitrate	19 lb/ac				
Olsen Phosphorus	12 ppm	****	****	****	****
Potassium	126 ppm	****	****	****	****
Chloride					
0-6" Sulfur					
6-24" Sulfur					
Boron					
Zinc					
Iron					
Manganese					
Copper					
Magnesium					
Calcium					
Sodium					
Org.Matter					
Carbonate(CCE)					
0-6" Sol. Salts	0.85 mmho/cm	****	****	***	
6-24" Sol. Salts	0.9 mmho/cm	****	****	****	*

1ST CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

2ND CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

3RD CROP CHOICE		
YIELD GOAL		
SUGGESTED GUIDELINES		
LB/ACRE		APPLICATION
N		
P_2O_5		
K_2O		
Cl		
S		
B		
Zn		
Fe		
Mn		
Cu		
Mg		
Lime		

Soil pH	Buffer pH	Cation Exchange Capacity	% Base Saturation (Typical Range)				
			% Ca	% Mg	% K	% Na	% H
7.5							

APPENDIX C

Manure Analysis Reports

APERTURE Laboratories

MANURE REPORT

TONE AG CONSULTING SAMPLE FARMS
31022 RAT RIVER RD
BOX 333
ST. PIERRE JOLYS, MB R0A 1V0

SAMPLE: SAMPLE-TOP OCT 16 2010
TYPE: LIQUID MANURE DATE RECEIVED: 10/22/10
SOURCE: SWINE DATE REPORTED: 10/25/10
STORAGE: PO:
LAB NUMBER: 123

Moisture:	95%
Dry Matter:	4.5%
	lb/1000 gal
Total Nitrogen (N):	22
Ammonium Nitrogen:	19
Organic Nitrogen:	2
Phosphate (P_2O_5):	6
Potash (K_2O):	30
Sulfur	3.6
Sodium	6
pH:	8.1
Salts:	13 mmhos/cm

APERTURE Laboratories

MANURE REPORT

TONE AG CONSULTING SAMPLE FARMS
31022 RAT RIVER RD
BOX 333
ST. PIERRE JOLYS, MB R0A 1V0

SAMPLE: SAMPLE-MID OCT 17 2010
TYPE: LIQUID MANURE DATE RECEIVED: 10/22/10
SOURCE: SWINE DATE REPORTED: 10/25/10
STORAGE: PO:
LAB NUMBER: 123

Moisture:	97%
Dry Matter:	2.8%
	lb/1000 gal
Total Nitrogen (N):	30
Ammonium Nitrogen:	21
Organic Nitrogen:	10
Phosphate (P_2O_5):	9
Potash (K_2O):	17
Sulfur	6
Sodium	6
pH:	7.1
Salts:	17 mmhos/cm

APERTURE Laboratories

MANURE REPORT

TONE AG CONSULTING SAMPLE FARMS
31022 RAT RIVER RD
BOX 333
ST. PIERRE JOLYS, MB R0A 1V0

SAMPLE: SAMPLE-BOT OCT 19 2010
TYPE: LIQUID MANURE DATE RECEIVED: 10/22/10
SOURCE: SWINE DATE REPORTED: 10/25/10
STORAGE: PO:
LAB NUMBER: 123

Moisture:	95%
Dry Matter:	4.3%
	lb/1000 gal
Total Nitrogen (N):	30
Ammonium Nitrogen:	24
Organic Nitrogen:	6
Phosphate (P_2O_5):	9
Potash (K_2O):	26
Sulfur	4.8
Sodium	6
pH:	7.0
Salts:	16 mmhos/cm

APPENDIX D

Manitoba Conservation Manure Management Plan

LIVESTOCK MANURE AND MORTALITIES MANAGEMENT REGULATION

Manure Management Plan

Manitoba Conservation

All livestock operations in Manitoba with 300 animal units (A.U.) or more are required under Section 13(1) of the *Livestock Manure and Mortalities Management Regulation* under *The Environment Act*, to submit an annual manure management plan to Manitoba Conservation. The plan must be submitted by **July 10** for fertilization programs beginning in the fall, or by February 10 for fertilization programs beginning in the spring.

Section A – Operation Information

Name of Operation Sample Farms Ltd.

Mailing Address Box 789, Farmville, MB Postal Code R3A 1W3

Location of Operation SW 18-4-7E
Qtr. Sec. Twp. Rge. E/WPM or River Lot/Parish

Municipality Latitude: 49.1234 Longitude: 97.1234
Rural Municipality G.P.S. in Decimal Degrees (if available)

Name of Contact Ron Tone, Tone Ag Consulting Ltd.

Contact Numbers

433-7189		346-2067	433-3335
Business	Residence	Cellular	Facsimile

Owner (legal name) Sample Farms Ltd. 0123456789
Corp File # if app.

Mailing Address Box 789, Farmville, MB

Postal Code R3A 1W3

Contact Numbers

555-1234		555-4321	555-6789
Business	Residence	Cellular	Facsimile

Affiliate (legal name)

Note: Confirmation of manure spread including legal land description, actual application rates, analysis of manure, field maps, coordinates (if available), field access location, must be submitted after manure is spread. Additional plans may not be registered unless this information is received by Manitoba Conservation.

If this manure management plan is a requirement of a Director's Order or an Environment Officer Order, please indicate Order number: _____

FOR DEPARTMENT USE ONLY

Received by: _____ Date Received:
Office: _____
Follow-up required Yes ☐ No ☐
Nature of follow-up _____

Proprietary (confidential) information will be protected in accordance with Manitoba law.
Personal information is collected under the authority of *The Environment Act*, the *Livestock Manure and Mortalities Management Regulation*, and will be used to issue receipts, for surveys, administration and enforcement purposes. Information collected is protected by the privacy provisions of *The Freedom of Information and Protection of Privacy Act.* If you have any questions, contact the Access & Privacy Coordinator, Box 85, 200 Saulteaux Crescent, Winnipeg MB R3J 3W3; 1-204-945-4170.

Please complete this form and forward to the Environmental Livestock Section, Manitoba Conservation, Box 46, 200 Saulteaux Crescent, Winnipeg MB R3J 3W3. Phone: 204-945-3078/Fax: 204-948-2420

Section B - Animal Unit Inventory

Animal Type and Subtype[1]	A.U. Produced by One Livestock		Number of Livestock of Each Subtype	A.U. for Each Livestock Subtype
Eg. Beef – Feedlot Cattle	*.769*	X	*500*	*385*
Sows, farrow to nursery (12 lbs.)	.250	X	3,000	750
		X		
		X		
		X		
		X		
		X		

[1] Refer to Animal Unit Worksheet –Schedule A. Retain Schedule A for your records. If additional room is required, the operator may choose to submit a copy of Schedule A. **USE ONLY CATEGORIES LISTED IN THE WORKSHEET.**

NOTE: **If your Animal Inventories have INCREASED since last year, please indicate below:**

Animal Type and Subtype Which Have Increased	A.U. Produced by One Livestock		Number of New Livestock	A.U. Increase of New Livestock Subtype
N/A		X		
		X		

Section C – Manure Storage Systems Information[1]

Type of livestock manure stored	X Liquid manure (pumped as liquid; 0-5% dry matter) ☐ Semi-solid (paste like; 5-25% dry matter) ☐ Solid (handled with loader; over 25% dry matter)

Location of central manure storage facilities

Legal description of the location(s):	G.P.S. Coordinates (Decimal Degrees) (if available)	Anticipated Storage Time (months)	Construction Permit Number(s)[2] or Registration Number(s)[3] for Storage
SW 18-4-7E	49.1234, 97.1234	18	LMM-123

Location of solid manure field storage **(complete only if you have field storage)**

Field Storage Site #1 : Legal Location: _____	Anticipated Storage Duration (months) ___
Field Storage Site #2 : Legal Location: _____	Anticipated Storage Duration (months) ___
Field Storage Site #3 : Legal Location: _____	Anticipated Storage Duration (months) ___

[1] Use additional pages if necessary

[2] A construction permit has been required by Manitoba Conservation for construction of earthen manure storage structures since 1994 and for all other types of constructed manure storage structures since 1998. You may inquire about your permit number at your Manitoba Conservation regional office (see last page).

[3] Registration numbers will be issued by Manitoba Conservation for earthen manure storage structures built before 1994 and all other constructed storage structures built prior to 1998.

Section D – Manure Information for Land Application

(One manure type per page; reproduce pages 4 and 5 as necessary)

Type of Livestock	**Total A.U. of this Type**
Sows, farrow to nursery (12 lbs.)	750

Volume of Manure to be Land Applied

2,000,000

☐ Imp. Gallons (liquid manure)
☐ Tons (solid manure)
☐ Cubic Feet (solid manure)

Manure Analysis

Total **nitrogen** content in the manure 25.4 X lb/1000 imp.gal ☐ lb/ton

NH_4 17.1 X lb/1000 imp.gal ☐ lb/ton

Total P _____ X lb/1000 imp.gal ☐ lb/ton

% Dry Matter 2.8

The nutrient value stated above is:

☐ Actual (Please attach manure analysis report with this form)

X Estimated

If estimated, please indicate your source of information:

Source (ie Farm Practice Guidelines, Feed Model): Farm Practice Guidelines

Earliest Anticipated Manure application starting date[1]: September 25, 2010
(Month / Day / Year)

[1]This is the earliest date the first spread of manure will occur on this plan.

NOTE: If manure is to be treated, please complete and attach Schedule B – Manure Treatment
If manure is to be transferred to another party, please complete and attach Schedule C – Transfer of Manure or Effluent to a Second Party.

"transfer" excludes situations in which a contractor is hired, or the operator volunteers to land apply the manure from this operation. In this case, Section E - Field Application Summary must be completed.

Section E - Field Application Summary

Crop year for which manure will be applied: 2011 Manure Form: ☐ SOLID or X LIQUID

Livestock Type: Sows, farrow to nursery (12 lbs.) If no Manure is to be applied, check here: ☐

Legal Description	SW 18-4-7E	NW 17-4-7E	W 1/2 SW 19-4-7E	NW 19-4-7E
Field ID	SF-01	SF-02	SF-03	SF-04
Legal Owner's Name and Phone	Sample Farms	Sample Farms	Test HoldingCompany	Example Owner
	555-1234	555-1234	555-6542	555-8765
Field Size [1] (acres)	112	131	84	132
Soil Class and Subclass [2]	5W (65%) 5W - 6W (35%)	5W - 4M - 4M (82%) 3M (18%)	2M - 5W (39%) O3W (37%) 5W - 6W (23%)	2M - 5W (40%) 5W (34%) 5W - 4M – 4M (25%)
Proposed Crop	Grass	Grass	Grass	Grass
Is the Proposed Crop Grazed? (indicate by entering 'Yes')	No	No	No	No
0 – 6 inch (15 cm) depth soil phosphorus (P) in ppm [3]	40	7	8	6
0 – 24 inch (60 cm) depth soil nitrate (NO_3^--N) in lbs/acre [3]	27	34	46	19
Target Yield (bus/acre, lbs/acre, tons/acre)	3 tons/acre	3 tons/acre	3 tons/acre	3 tons/acre
Crop Nitrogen Recommendation [4] (lbs N/acre)	100	85	70	100
Crop Removal of Phosphate [5] (lbs P_2O_5/acre)	30	30	30	30
Manure Application Rate (gal/acre or tons/acre)	7,600 gal/acre	6,400 gal/acre	5,300 gal/acre	7,600 gal/acre
* if using multi-year P_2O_5 rate circle # equal to multiple of years [6]	2 3 4 5	2 3 4 5	2 3 4 5	2 3 4 5
Application Season (spring / fall / summer)	Fall	Fall	Fall	Fall
Application Start Date (month / day / year)	Sept 25, 2010	Sept 25, 2010	Sept 25, 2010	Sept 25, 2010
Application Method [7]	E	E	E	E
Non manure Nitrogen Fertilizer (lbs N/acre)	0	0	0	0
Non manure Phosphate Fertilizer (lbs P_2O_5/acre)	0	0	0	0
Applicator – Name, Phone, Licence	Applicators Inc.			
	555-8520			

[1] Indicate only the available acres for manure spreading (exclusive of setbacks from surface water courses, etc.).
[2] Must list correct Agricultural Capability Class and subclass as determined by Published Manitoba Soil Survey Report, or electronic data distributed by Manitoba Land Initiative website. Use the worst class manure will be spread on.
[3] As shown on the soil analysis report appended to this form. If soil analysis reports are not available at the time of submitting the form, they **must** be forwarded to Manitoba Conservation 14 days **before** application of manure to allow for processing.
[4] Indicate the recommended nitrogen (N) application rate suggested by the soil fertility guide or soil analysis report, whichever is lower.
[5] Indicate the crop removal rate of phosphate (P_2O_5) as determined by the most appropriate source of information.
[6] When soil test phosphorus levels are 60 ppm to 179 ppm manure may be applied at a rate of up to 5 times the annual crop removal rate of P2O5.
[7] Choose 1 of the following and put the corresponding letter on the form: **A**. Broadcast and incorporate after 2 days, **B**. Broadcast + Incorporate after 3 days. **C**. Broadcast and incorporate within 2 days. **D**. Broadcast and no incorporation. **E**. Broadcast and no incorporation on forages. **F**. Injection. **G**. Irrigation and incorporation within 3 days. **H**. Irrigation and no incorporation.

Section E - Field Application Summary

Crop year for which manure will be applied: 2011 Manure Form: ☐ SOLID or X LIQUID

Livestock Type: Sows, farrow to nursery (12 lbs.) If no Manure is to be applied, check here: ☐

Legal Description	NE 20-4-7E	NE 24-4-6E	SW 24-4-6E	SE 23-4-6E
Field ID	SF-05	SF-06	SF-07	SF-08
Legal Owner's Name and Phone	Sample Farms	Example Owner	Test HoldingCompany	Sample Farms
	555-1234	555-8765	555-6542	555-1234
Field Size [1] (acres)	160	110	153	85
Soil Class and Subclass [2]	6W - 5W - 4M (61%) O3W (39%)	2M - 5W (100%)	5W - 6W (48%) 2M – 5W (46%) O3W (6%)	2M - 5W (95%) 5M - 3M (2%) 5W - 6W (2%)
Proposed Crop	Grass	Grass	Grass	Grass
Is the Proposed Crop Grazed? (indicate by entering 'Yes')	No	No	No	No
0 – 6 inch (15 cm) depth soil phosphorus (P) in ppm [3]	22	6	5	12
0 – 24 inch (60 cm) depth soil nitrate (NO_3^--N) in lbs/acre [3]	20	35	16	19
Target Yield (bus/acre, lbs/acre, tons/acre)	3 tons/acre	3 tons/acre	3 tons/acre	3 tons/acre
Crop Nitrogen Recommendation [4] (lbs N/acre)	100	85	100	100
Crop Removal of Phosphate [5] (lbs P_2O_5/acre)	30	30	30	30
Manure Application Rate (gal/acre or tons/acre)	7,600 gal/acre	6,400 gal/acre	7,600 gal/acre	7,600 gal/acre
* if using multi-year P_2O_5 rate circle # equal to multiple of years [6]	2 3 4 5	2 3 4 5	2 3 4 5	2 3 4 5
Application Season (spring / fall / summer)	Fall	Fall	Fall	Fall
Application Start Date (month / day / year)	Sept 25, 2010	Sept 25, 2010	Sept 25, 2010	Sept 25, 2010
Application Method [7]	E	E	E	E
Non manure Nitrogen Fertilizer (lbs N/acre)	0	0	0	0
Non manure Phosphate Fertilizer (lbs P_2O_5/acre)	0	0	0	0
Applicator – Name, Phone, Licence	Applicators Inc.			
	555-8520			

[1] Indicate only the available acres for manure spreading (exclusive of setbacks from surface water courses, etc.).
[2] Must list correct Agricultural Capability Class and subclass as determined by Published Manitoba Soil Survey Report, or electronic data distributed by Manitoba Land Initiative website. Use the worst class manure will be spread on.
[3] As shown on the soil analysis report appended to this form. If soil analysis reports are not available at the time of submitting the form, they **must** be forwarded to Manitoba Conservation 14 days **before** application of manure to allow for processing.
[4] Indicate the recommended nitrogen (N) application rate suggested by the soil fertility guide or soil analysis report, whichever is lower.
[5] Indicate the crop removal rate of phosphate (P_2O_5) as determined by the most appropriate source of information.
[6] When soil test phosphorus levels are 60 ppm to 179 ppm manure may be applied at a rate of up to 5 times the annual crop removal rate of P2O5.
[7] Choose 1 of the following and put the corresponding letter on the form: **A**. Broadcast and incorporate after 2 days, **B**. Broadcast + Incorporate after 3 days. **C**. Broadcast and incorporate within 2 days. **D**. Broadcast and no incorporation. **E**. Broadcast and no incorporation on forages. **F**. Injection. **G**. Irrigation and incorporation within 3 days. **H**. Irrigation and no incorporation.

Section F -Certification of Manure Management Plan

Note: The Plan must be certified or it is VOID. Mark appropriate box with "X".

I certify that the information contained in this plan is true and that no relevant information has been withheld.

Date _____ _____

Signature of Operator

Plan Prepared by:
☐ Operator
X Other

If other than operator:

I certify that the information contained in this plan is true and that no relevant information has been withheld.

Date July 10, 2010 Ron Tone, President, Tone Ag Consulting Ltd.
Signature of person preparing plan on behalf of operator

Address and phone number of person preparing plan: Box 333, St. Pierre, MB R0A 1V0 204-433-7189

MIA # [1]/CCA # _____

[1] - if exempt from registration to MIA as per Section 13(7) of MR 42/98 enter 0000.

FOR ADDITIONAL INFORMATION,
PLEASE CONTACT ONE OF THE FOLLOWING REGIONAL OFFICES

Red River Region 123 Main Street, Suite 160 Winnipeg MB R3C 1A5 Telephone: (204) 945-7100 Facsimile: (204) 948-2338	**Western Region** 1129 Queens Ave. Brandon MB R7A 1L9 Telephone: (204) 726-6064 Facsimile: (204) 726-6567
Red River Region Unit 5, 284 Reimer Avenue Box 2019 Steinbach MB R5G 1N6 Telephone: (204) 346-6060 Facsimile: (204) 326-2472	**Western Region** 27 – 2nd Av SW. Dauphin MB R7N 3E5 Telephone: (204) 622-2030 Facsimile: (204) 638-8626
Red River Region 3rd Floor 25 Tupper Street N Portage la Prairie MB R1N 3K1 Telephone: (204) 239-3204 Facsimile: (204) 239-3215	**Interlake Region** 75 – 7th Ave. Gimli MB R0C 1B9 Telephone: (204) 642-6095 Facsimile: (204) 642-6108
Eastern Region Air Services, Provincial Highway #502 Lac du Bonnet MB R0E 1A0 Telephone: (204) 345-1444 Facsimile: (204) 345-1440	
To report environmental emergencies call 944-4888 (24 hours)	

APPENDIX E

Feed Model

FEED CONSUMPTION MODEL
QUEBEC DATABASE
PIG **Sample Farms**

LIVESTOCK DATA

DATE: March 15, 2011

PERIOD	Number
Day	365

LIVESTOCK		Replacement (%)	Start Weight (kg)	End Weight (kg)	Mortality Number	Mortality Weight (kg)	Gain Weight (kg)
Sow	3000	40.00%	125	130	95	200	12650
Weanling per sow	24						

	Livestock Number (year)	Start Weight (kg)	Livestock Number (yr)	End Weight (kg)	Mortality Number	Weight (kg)	Gain Weight (kg)
Gilt (fed in separate building)	0	0	0	0	0	0	0
Weanling (5 to 23 kg)	0	0	0	0	0	0	0
Finisher	0	0	0	0	0	0	0

FEED a 0.1% P reduction = approximately $2/sow less DCP

Type	Quebec %	Mass (kg)	Protein-N (%)	Phosphorus (P) (%)	PERIOD N (kg)	PERIOD P (kg)	ANNUAL N (kg)	ANNUAL P (kg)
Dry Sow 0.7 S	0.50 - 0.60 Q	2,000,000	12	0.8	38400	16000	38400	16000
Breeder Sow 0.65 S					0	0	0	0
Lactation Sow 18%	0.55 - 0.65 Q	1,000,000	18	0.8	28800	8000	28800	8000
Lactation Sow 20%					0	0	0	0
Materna Sow (Gilt 100 kg to 130kg)					0	0	0	0
Boar Feed		0	0	0	0	0	0	0
Gilt (Developer 1)		0	0	0	0	0	0	0
Gilt (Developer 2)		0	0	0	0	0	0	0
Gilt (Developer 3)		0	0	0	0	0	0	0
Starter 1 5-25 kg,	0.55-0.65	0	0	0	0	0	0	0
Starter 2		0	0	0	0	0	0	0
Starter 3		0	0	0	0	0	0	0
Starter 4		0	0	0	0	0	0	0
Starter 5		0	0	0	0	0	0	0
Pre-grower		0	0	0	0	0	0	0
Grower 1 25-50 kg	0.55-0.65	0	0	0	0	0	0	0
Grower 2 50-70 kg	0.50-0.60	0	0	0	0	0	0	0
Grower 3 70-90 kg	0.45-0.55	0	0	0	0	0	0	0
Grower 4		0	0	0	0	0	0	0
Grower 5		0	0	0	0	0	0	0
Finisher 1 90-110 kg	0.40-0.50	0	0	0	0	0	0	0
Finisher 2		0	0	0	0	0	0	0
Finisher 3		0	0	0	0	0	0	0
Finisher 4		0	0	0	0	0	0	0
TOTAL		3,000,000			67200	24000	67200	24000

BUDGET

		PERIOD N (kg)	ANNUAL N (kg)	PERIOD P (kg)	P205 (kg)	ANNUAL P (kg)	P205 (kg)
Feed		67200	67200	24000	54934	24000	54934
On Farm (sow+weanling < 5,6 kg)		10396	10396	2336	5347	2336	5347
On Farm (gilt)		0	0	0	0	0	0
Weanling - Output (Nursery)		0	0	0	0	0	0
Pig - Output (Grower/Finisher)		0	0	0	0	0	0
Total Output (operation)		56804	56804	21664	49587	21664	49587
Volatilization-Building (%)	25	14201	14201				
Volatilization-Storage (%)	5	2130	2130				
Manure		40473	40473	21664	49587	21664	49587
			POUND 89040				POUND 109091

Indicators of Productivity		Feed (kg/head)	Efficiency Feed/Kg of Gain	Output P205 (kg/head)	Man	Quebec		
Sow	1150 Q	1000		16.53	16.7	13-14		
Gilt		n/a		n/a		3.01	21 to 135 kg	
Weanling (5 to 23 kg)	29 Q	n/a	n/a	n/a	0.167	0.117	5 to 23 kg	
Finisher (25 to 107 kg)	210-220 Q	n/a	n/a	n/a	2.05	1 to 1.47	23 to 108 kg..	Variable
		Weanling	1.4 - 4.65					
		Finisher	2.66					

LAND BASE CALCULATOR

OTHER LIVESTOCK ON FARM	(lb P205)		Turkey <9.9 kg = 0.161 kg/hd sold		
(Layer, poultry, cattle, etc…)	0		Turkey >9.9 kg = 0.469 kg/hd sold		
Broiller- 0.0402kgP2O5/bird sold					
Broiler 6.5 cycles/yr					
Layer-0.367 kgP2O5/layer 1 cycle/yr	% of Cropland	Crop Yield	Crop Removal Rate P205	Crop Removal Rate P205	
Dairy - 75kg P2O5/milking cow+replace	(should =100)				
		(bu/ac)	(lb P205/bu)	(lb P205/ac)	
Spring wheat	0	40	0.59	23.6	
Barley	0	80	0.42	33.6	
Oats	0	100	0.26	26	
Grain corn	0	100	0.44	44	
Canola	0	35	1.04	36.4	
Flax	0	24	0.65	15.6	
Sunflowers	0	50	0.32	16	25lbs (C), 30lbs.(O)
Soybeans	0	35	1	35	
		(tons/ac)	(lb P205/ton)		
Alfalfa	20	3.5	13.8	48.3	
Grass	80	3	10	30	
Corn silage	0	5	12.7	63.5	
Barley silage	0	4.5	11.8	53.1	
Average Crop Removal Rate (lb P205/ac)	33.66				
Land Base required (ac)	3241				

PHOSPHORUS STATUS REPORT

INPUT OF P205	(lb)
Livestocks on Farm	109091
Fertilizers	0
Manure imported	0
Biosolids imported	0
TOTAL	109091

DISPOSAL OF P205

Land Base Managed by the operation
(Owned, rented, agreement)

Crop	Soil P Test (Olsen-P)	< 60 ppm	60-120 ppm	120-180 ppm	> 180 ppm
			Area (ac)		
Spring wheat		0	0	0	0
Barley		0	0	0	0
Oats		0	0	0	0
Grain corn		0	0	0	0
Canola		0	0	0	0
Flax		0	0	0	0
Sunflowers		0	0	0	0
Soybeans		0	0	0	0
Alfalfa		200	0	0	0
Grass		640	160	0	0
Corn silage		0	0	0	0
Barley silage		0	0	0	0
Area (ac)		840	160	0	0
Total Area (ac)	1000				
Capacity (lb P205)		86580	9600	0	0

	LMMMR (219/2006)	CROP REMOVAL (EXISTING)	CROP REMOVAL (NEW-EXPANDING)
Total Land Disposal of P205 (lb)	96180	33660	28860
Manure Treatment (P205 exported)	0	0	0
TOTAL	96180	33660	28860
PHOSPHORUS STATUS	12911	75431	80231

Extra Land Base Needed	134	2241	2780
Total Needed Land Base	1134	3241	3780

If have 3000 MT of feed in total
If DCP is 21%

Most impact on P production

Amount of feed ---Yes
P content of feed---Yes
pigs sold -- Yes

Strategies

P testing of plant sources
phase feeding and split sex feeding
minimize insurance additions
genetic selection
high health herd status
design farm specific diets

If want to reduce P by 0.1% in feed
0.1% of 1 MT = 1 kg of P
In 1 kg of DCP there is 0.21 kg of P
1 kg of P in feed /0.21 kg P/kg DCP = 4.77 kg of DCP
4.77/1000 x 3,336 MT= 15.92 MT
If DCP cost is $600/MT
DCP saved is $600/MT x 15.92MT= $9552.00

% P in Dical	21	%
If you reduce P in diet by	0.1	%
kg of Dical/tonne of feed	4.76	kg

15.92 MT of say corn need to fill in equivalency
If corn is $220/MT
$220/MT x 15.92 MT= $3502.40

Price of Dical per kg	$0.70
Dical cost per tonne of feed	$3.33
Price of corn per kg	$0.22
Cost for void	$1.05
Net savings/tonne	$2.29
Total savings on herd	$6,857.14
or savings per sow	$2.29

Savings a/f replacement w/corn =
$9552.00 - $3502.40= $6050.00

Alternate Feeds

…..DDGS
….Fababeans
….Resturant oils needs to be 30% l
….Lysine vs proteins for Amino Acic
….Rye -Ergot 1ppm in sow it will abort but for G/F is good!
…..Triticale

Results

..savings on P
… savings on land required
… savings on application costs

Other Stategies

Particle size of feed 650-700 microns for optimum digestibility- most farms are at 700-900 microns(*obtain sample*) Yes

Is Phytase used? **No (will start)** Name Ronazine 2000
Concentration _____ Units/Tonne _____
Has P levels been reduced since Phytase added? **Will start**

Trace minerals can be removed the last 3 wks of finishing diets

Adherring to the feeding program i.e. comparing budget to actual. Yes

Breed of Sows KPA