

# Nutrient Management Protocol

For Ontario Regulation 267/03 Made under the  
Nutrient Management Act, 2002

July 20, 2007

Ministry of Agriculture, Food and Rural Affairs  
Ministry of the Environment

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## Part 1 - Introduction

This document is the Nutrient Management Protocol (“Protocol”) which is referred to in Ontario Regulation 267/03 made under the Nutrient Management Act 2002, S.O. 2002. It provides technical and scientific details and standards that are complementary to and in addition to those set out in the Regulation. Using this Protocol will be useful in developing and implementing nutrient management strategies and nutrient management plans that comply with regulatory requirements. Anyone reading this document should ensure that they have the most recent version of Ontario Regulation 267/03 and this Protocol.

Nothing in this Protocol takes away any obligation to comply with other applicable laws such as:

- any requirements under Part V of the *Environmental Protection Act*
- Technical Standards and Safety Authority (TSSA) requirements and
- the standards under the Ontario Building Code.

## Part 2 – Defining Your Operations

### 2.1 Defining Farm Units for Agricultural Operations

When submitting a nutrient management strategy (“NMS”) or a nutrient management plan (“NMP”) for approval a declaration has to be made that identifies all the land and any facilities in the farm unit. The Farm Unit Declaration Form, which is found at the Government of Ontario Central Forms Site (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf>) is used to make this declaration. One form is required for each farm unit declared and where an operation identifier has been provided by the Ontario Ministry of Agriculture, Food and Rural Affairs (“OMAFRA”), it must be recorded on the Farm Unit Declaration Form.

Throughout this document a reference to a farm unit refers to a farm unit on which an agricultural operation is carried out.

## Part 3 – Nutrient Units: How Farmers Determine Whether Their Farm Units are Subject to the Regulation

Using the nutrient units (“NU”) concept helps ensure an ‘apples to apples’ comparison between sizes and types of farm units. Land application requirements for a farm unit, are based on the specific farm unit’s NMP, not NUs. NUs are not the same as livestock units, which are used in regimes other than the *Nutrient Management Act, 2002*, S.O. 2002, and which have been used for the purpose of calculating Minimum Distance Separation setbacks in the previous version of that document.

### **3.1 Using Nutrient Units to Determine the Obligations of Agricultural Operations Carried Out at a Farm Unit**

For agricultural operations with farm animals it is necessary to determine the number of NUs managed on a farm unit. The number of NUs generated on a farm unit by a particular type of farm animal is calculated by dividing the number of farm animals by the number given in the Nutrient Units Column shown on Table 3.1 Livestock Information: Type, Nutrient Amount, Nutrient Unit and Housing Capacity. If the farm unit has more than one type of farm animal present on it then this calculation would have to be completed for each type of animal separately, then all the results totaled to give the total NU generated by farm animals on the farm.

**TABLE 3.1: Livestock Information: Type, Nutrient Amount. Nutrient Unit and Housing Capacity**

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Beef	Backgrounders (7 - 12.5 months)	Confinement	308	90	0.0724	9.0	0.0604	22	3	4.65
Beef	Backgrounders (7 - 12.5 months)	Yard/Barn	308	90			0.0604	22	3	3.72
Beef	Brood Cows (includes calves to weaning)	Confinement	590	100	0.0724	9.0	0.0604	30	1	9.29
Beef	Brood Cows (includes calves to weaning)	Deep Bedded	590	100			0.0812	45	1	9.29
Beef	Brood Cows (includes calves to weaning)	Yard/Barn	590	100			0.0604	30	1	4.65
Beef	Feeders (7 -16 months)	Confinement Bedded Pack	362	75			0.0687	30	3	4.65
Beef	Feeders (7 -16 months)	Confinement Pack Scrape	362	75	0.0724	9.0	0.0604	22	3	4.65
Beef	Feeders (7 -16 months)	Confinement Total Slats	362	75	0.0724	9.0			3	1.86
Beef	Feeders (7 -16 months)	Yard/Barn	362	75			0.0604	22	3	4.18
Beef	Short Keep (12.5 - 17.5 months)	Confinement	469	83	0.0724	9.0	0.0604	22	2	6.04
Chickens	Broiler Breeder Growers (females + males transferred out)	Floor System	0.708	83			0.1124	60	300	0.158
Chickens	Broiler Breeder Layer (females + males transferred in)	Cages	3.04	90			0.0749	60	100	0.121
Chickens	Broiler Breeder Layer (females + males transferred in)	Litter With Slats	2.63	90			0.0562	65	100	0.195
Chickens	Broilers	8 Week Cycle	0.635	70			0.1249	60	351	0.071
Chickens	Broilers	9 Week Cycle	0.726	70			0.1249	60	300	0.083

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Chickens	Broilers	10 Week Cycle	0.862	70			0.1249	60	250	0.099
Chickens	Broilers	12 Week Cycle	1.09	70			0.1249	60	199	0.124
Chickens	Layer Pullets (day olds)	Cages	0.408	83	0.1124	13.9	0.0624	25	500	0.028
Chickens	Layer Pullets (day olds)	Litter	0.408	83			0.1249	58	500	0.186
Chickens	Laying Hens	Belt And Other Removal System (daily)	1.43	96	0.1124	11.1	0.0624	20	150	
Chickens	Laying Hens	Belt With Air Drying (daily)	1.43	96			0.0624	30	150	
Chickens	Laying Hens	High Rise - Stored In Barn	1.43	96			0.0624	20	150	
Chickens	Laying Hens	Liquid - Stored In Barn	1.43	96	0.1124	11.1			150	
Chinchilla	Breeding Females (inc males/rep/market animals)		0.567	100			0.1561	66	320	0.743
Dairy	Calves Large Frame		90.7	100	0.0750	11.0	0.0955	45	6	3.25
Dairy	Calves Medium Frame (Guernsey Size)		74.4	100	0.0750	11.0	0.0955	45	7	2.97
Dairy	Calves Small Frame (Jersey Size)		60.8	100	0.0750	11.0	0.0955	45	8.5	2.60
Dairy	Heifers Large Frame	Deep Bedded	295	100			0.0516	40	2	6.50
Dairy	Heifers Large Frame	Free Stall	295	100	0.0714	11.0	0.0599	19	2	6.97
Dairy	Heifers Large Frame	Manure Pack Outside Access	295	100			0.0516	40	2	3.72
Dairy	Heifers Large Frame	Pack Scrape 1 Side	295	100	0.0714	11.0	0.0516	40	2	9.29
Dairy	Heifers Large Frame	Pack Scrape 2 Sides	295	100	0.0714	11.0	0.0516	40	2	8.36
Dairy	Heifers Medium Frame (Guernsey Size)	Deep Bedded	249	100			0.0516	40	2.4	5.20

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Dairy	Heifers Medium Frame (Guernsey Size)	Free Stall	249	100	0.0714	11.0	0.0599	19	2.4	5.57
Dairy	Heifers Medium Frame (Guernsey Size)	Pack Scrape	249	100	0.0714	11.0	0.0516	40	2.4	7.43
Dairy	Heifers Small Frame (Jersey Size)	Deep Bedded	204	100			0.0516	40	2.9	4.65
Dairy	Heifers Small Frame (Jersey Size)	Free Stall	204	100	0.0714	11.0	0.0599	19	2.9	4.92
Dairy	Heifers Small Frame (Jersey Size)	Pack Scrape	204	100	0.0714	11.0	0.0516	40	2.9	6.50
Dairy	Milking Age Cows Large Frame	4 Row Free Stall Head To Head	635	100	0.1165	9.1	0.0952	21	0.7	11.6
Dairy	Milking Age Cows Large Frame	4 Row Free Stall Tail To Tail	635	100	0.1165	9.1	0.0952	21	0.7	10.2
Dairy	Milking Age Cows Large Frame	6 Row Free Stall	635	100	0.1165	9.1	0.0952	21	0.7	9.29
Dairy	Milking Age Cows Large Frame	Bedded Pack	635	100			0.1020	45	0.7	16.7
Dairy	Milking Age Cows Large Frame	Pack Scrape	635	100	0.1165	9.1	0.1020	45	0.7	16.7
Dairy	Milking Age Cows Large Frame	3 Row Free Stall	635	100	0.1165	9.1	0.0952	21	0.7	9.76
Dairy	Milking Age Cows Large Frame	Sand	635	100	0.1264	9.1	0.1051	21	0.7	
Dairy	Milking Age Cows Large Frame	Tie Stall	635	100	0.1165	9.1	0.0952	21	0.7	10.2
Dairy	Milking Age Cows Medium Frame (Guernsey Size)	Bedded Pack	499	100			0.1020	45	0.85	15.3

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Dairy	Milking Age Cows Medium Frame (Guernsey Size)	Free Stall	499	100	0.1165	9.0	0.0952	21	0.85	9.29
Dairy	Milking Age Cows Medium Frame (Guernsey Size)	Pack Scrape	499	100	0.1165	9.1	0.1020	45	0.85	15.3
Dairy	Milking Age Cows Medium Frame (Guernsey Size)	Sand	499	100	0.1264	9.1	0.1051	21	0.85	
Dairy	Milking Age Cows Medium Frame (Guernsey Size)	Tie Stall	499	100	0.1165	9.0	0.0952	21	0.85	8.36
Dairy	Milking Age Cows Small Frame (Jersey Size)	Bedded Pack	431	100			0.1020	45	1	13.5
Dairy	Milking Age Cows Small Frame (Jersey Size)	Free Stall	431	100	0.1165	9.0	0.0952	21	1	8.36
Dairy	Milking Age Cows Small Frame (Jersey Size)	Tie Stall	431	100	0.1165	9.1	0.0952	21	1	7.43
Dairy	Milking Age Cows Small Frame (Jersey Size)	Pack Scrape	431	100	0.1165	9.1	0.1020	45	0.85	13.5
Dairy	Milking Age Cows Small Frame (Jersey Size)	Sand	431	100	0.1264	9.1	0.1051	21	1	
Deer/Elk	Elk Adults (>24 months) (includes unweaned offspring)		272	100			0.0456	30	2	
Deer/Elk	Elk Feeders		127	75			0.0456	30	6	
Deer/Elk	Elk/Red Deer Hybrid Adults (includes unweaned offspring)		170	100			0.0456	30	4	
Deer/Elk	Elk/Red Deer Hybrid Feeders		97.5	75			0.0456	30	10	

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Deer/Elk	Fallow Deer Adults (>24 months)(includes unweaned offspring)		45.4	100			0.0456	30	13	
Deer/Elk	Fallow Deer Feeders		31.8	75			0.0456	30	23	
Deer/Elk	Red Deer Adults (>24 months) (includes unweaned offspring)		99.8	100			0.0456	30	7	
Deer/Elk	Red Deer Feeders		63.5	75			0.0456	30	14	
Deer/Elk	White Tailed Deer Adults (>24 months) (includes unweaned offspring)		56.7	100			0.0456	30	11	
Deer/Elk	White Tailed Deer Feeders		40.8	75			0.0456	30	21	
Ducks	Peking	Breeders	2.95	100			0.3765	57	105	0.465
Ducks	Peking	Growers	1.04	90	0.3627	7.0	0.3471	57	105	0.167
Emu	Adults (includes offspring to market size)		56.7	0					12	11.1
Fox	Breeding Females (including rep/market animals/males)		6.80	80			0.0874	36	25	9.29
Goats	Dairy Does (including unweaned offspring)	Confinement	77.1	100			0.0453	30	8	1.86
Goats	Dairy Kids	Confinement	16.3	100			0.0453	30	32	0.743
Goats	Feeder Kids (>20 kg)	Confinement	18.1	0			0.0375	30	32	0.743
Goats	Mature Meat Goat (including unweaned offspring)		72.6	0			0.0375	30	8	1.39
Horses	Large Frame (including unweaned offspring)	Box Stalls	680	100			0.0887	46	0.7	30.2
Horses	Medium Frame	Box Stalls	454	100			0.0887	46	1	23.2

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
	(including unweaned offspring)									
Horses	Small Frame (including unweaned offspring)	Box Stalls	227	100			0.0887	46	2	16.3
Mink	Breeding Females (including rep/market animals/males)		1.81	80			0.1249	36	90	2.32
Ostrich	Adults (includes offspring to market size)		136	0					4	9.29
Rabbits	Breeding Does (inc bucks/rep/fryers)	1 Tier Cages	4.54	100			0.1561	45	40	1.80
Rabbits	Breeding Does (inc bucks/rep/fryers)	2 Tier Cages	4.54	100			0.1561	45	40	0.892
Rabbits	Breeding Does (inc bucks/rep/fryers)	3 Tier Cages	4.54	100			0.1561	45	40	0.595
Sheep	Dairy and Feeder Lambs	Confinement	33.2	75			0.0378	30	20	0.929
Sheep	Dairy and Feeder Lambs	Outside Access	33.2	75			0.0378	30	20	0.557
Sheep	Dairy Ewes & Rams (including unweaned offspring and replacements)	Confinement	93.0	100			0.0556	40	6	2.14
Sheep	Dairy Ewes & Rams (including unweaned offspring and replacements)	Outside Access	93.0	100			0.0556	40	6	2.14
Sheep	Meat Ewes & Rams (including unweaned offspring and replacements)	Confinement	79.4	100			0.0556	40	8	2.14

Type	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Sheep	Meat Ewes & Rams (including unweaned offspring and replacements)	Outside Access	79.4	100			0.0453	30	8	1.39
Swine	Feeders	Full Slats	52.2	85	0.1311	5.0			6	0.836
Swine	Feeders	Full Slats (wet/dry feeders)	52.2	85	0.0837	7.0			6	0.836
Swine	Feeders	Deep Bedded	52.2	85			0.0780	45	6	1.30
Swine	Feeders	Partial Slats	52.2	85	0.1311	5.0			6	0.929
Swine	Feeders	Partial Slats (wet/dry feeders)	52.2	85	0.0837	7.0			6	0.929
Swine	Feeders	Solid Scrape	52.2	85	0.1311	5.0	0.0843	13	6	1.11
Swine	Feeders	Solid Scrape (wet/dry feeders)	52.2	85	0.0837	7.0	0.0843	20	6	1.11
Swine	Gilts - Breeders	-	90.3	85	0.0893	2.7			5	1.39
Swine	Sows (dry) and Boars	deep bedded pack	136	100			0.0818	45	3.5	2.79
Swine	Sows (dry) and Boars	non-SEW	136	100	0.1167	2.5	0.0974	15	3.5	2.79
Swine	Sows (dry) and Boars	SEW	136	100	0.1167	2.5	0.0974	15	3.33	2.32
Swine	Sows with Litters	non-SEW	181	100	0.1167	2.1	0.0974	15	3.5	6.50
Swine	Sows with Litters	SEW	181	100	0.1167	2.1	0.0974	15	3.33	5.11
Swine	Weaners	non-SEW	15.9	80	0.1779	2.7	0.1542	13	20	0.399
Swine	Weaners	non-SEW (wet/dry)	15.9	80	0.1305	3.6	0.1542	13	20	0.399
Swine	Weaners	SEW	11.3	80	0.1779	2.7	0.1542	13	20	0.353
Swine	Weaners	SEW (wet/dry)	11.3	80	0.1305	3.6	0.1542	13	20	0.353
Turkeys	Breeder Toms		15.9	100			0.0437	58		0.557
Turkeys	Broilers <6.2kg		2.00	85			0.0562	60	133	0.149

pe	Sub Type	Sub-Sub Type	Average Weight (kg)	Utilization (%)	Liquid Amount (m <sup>3</sup> 1000 kg/day)	Liquid DM* (%)	Solid Amount (m <sup>3</sup> 1000 kg/day)	Solid DM* (%)	Nutrient Units (animal /NU)	Livestock Housing Capacity (m <sup>2</sup> animal)
Turkeys	Hens 6.2 - 10.8 kg	-brooded in another building	4.08	77			0.0541	60	110	0.232
Turkeys	Hens 6.2 - 10.8 kg	-brooded in the same barn	2.87	85			0.0559	60	110	0.232
Turkeys	Toms >10.8 kg		6.03	80			0.0410	60	75	0.325
Turkeys	Turkey Breeder Layers		9.07	100			0.0437	58		0.372
Turkeys	Turkey Pullet (0 to 6 weeks)		0.680	80			0.1249	58	267	0.093
Veal	Grain Fed Veal		134	90	0.0724	9.0	0.0604	22	6	6.97
Veal	Milk Fed Veal		102	80	0.0906	0.7	0.1389	40	6	2.79

Notes: \* DM = dry matter

1. Average weight rounded to 3 significant digits
2. Manure production numbers rounded to 4 decimal places
3. Blank manure production and dry matter entries indicate a non-typical housing process.
4. Livestock housing capacity is rounded to 2 decimal places if above 0.2 m <sup>2</sup> /animal and 3 decimal places if below 0.2 m <sup>2</sup> /animal
5. Blank livestock housing capacity values indicate that information is not available
6. Livestock density is based on barn area only for a housing system(outdoor yard is not included)
7. Livestock housing capacity numbers are used to develop an estimated barn size

## **Part 4 - Introduction to Nutrient Management Strategies and Plans**

### **4.1 Purpose**

#### **4.1.1 Nutrient Management Strategy**

A NMS sets out an environmentally acceptable method for managing all prescribed materials generated at an agricultural or non-agricultural operation. Where prescribed materials are generated in the course of the operation, the operation shall ensure that the nutrients are managed in accordance with a NMS if the operation is phased in by the Regulation, Part II.

#### **4.1.2 Nutrient Management Plan**

A NMP details how nutrients are to be applied to a given land base. A NMP is based on both the components of the nutrients used and the characteristics of the field. The NMP optimizes the utilization of the nutrients by crops in the field and minimizes environmental impacts. A person who owns or controls an agricultural operation, which is phased in by the Regulation, Part II, and generates  $\geq 300$  NU or is located within 100 meters of a municipal well must ensure that nutrients are managed in accordance with a NMP if they land apply nutrients on their farm unit. This requirement is also applicable where non-agricultural source material is received at the agricultural operation unless certain notice requirements as set out in the Regulation are met. For those phased in farms that receive non-agricultural source materials then an approved NMP will also be required.

#### **4.1.3 Tools for Nutrient Management Plans and Strategies**

A person may use any method for preparing NMSs and NMPs that addresses the components required by this Protocol. One option is to make use of the OMAFRA computer program. The OMAFRA has developed "NMAN", a nutrient management computer program with an associated workbook for the purpose of completing a NMS or NMP for agricultural operations. A NMS or NMP for an agricultural operation can both be completed using the NMAN Software program or the associated workbook developed by the OMAFRA. NMSs for the non-agricultural generators must be prepared in accordance with Part 6 of this Protocol.

NMAN is designed to either produce or accommodate all of the components of the NMS and NMP. NMAN can be found on the OMAFRA website at: <http://www.omafra.gov.on.ca/english/nm/nman/software.htm> and is available from the OMAFRA for use with this Protocol and the Regulation.

### **4.2 The Difference Between A Nutrient Management Strategy And A Nutrient Management Plan**

#### 4.2.1 Identification of the Components

A NMS for agricultural generators includes the following components that are also required components of a NMP:

1. Description of the operation
2. Contingency plan
3. List of storage facilities
4. Farm Unit Declaration Form
5. Farm Unit sketch

A complete list of components required for NMSs and NMPs for agricultural operations is found in table 4.2.1 below. Information on the requirements for a non-agricultural operation NMS can be found in Part 6 of the Protocol.

Within this Protocol, each component required to be included in a NMS and NMP in relation to prescribed material is discussed in relation to either a NMP or NMS. Some components are required by both the NMS and NMP.

**TABLE 4.2.1: Identifying Components Required in Nutrient Management Strategies and Nutrient Management Plans for Agricultural Operations**

	<b>Component</b>	<b>Considerations in a Strategy Y = Yes N = No</b>	<b>Considerations in a Plan Y = Yes N = No</b>
Operation Information	Description of the Operation	Y	Y
	Agreements	Y	Y
For Farm Units	Farm Unit Declaration Form	Y	Y
	Farm Unit Sketch	Y	Y
Inventory and Description of Prescribed Materials	List of Prescribed Materials (generated and received)	Y	Y
	Analysis of Nutrient Content or use of Appendix 1 information	N	Y
Destination and Storage	Destinations	Y	N
	Storage Facilities	Y	Y
Contingency Plan	Contingency Plan	Y	Y
Sign-off form	Sign-off form	Y	Y
Field Information	Field Properties	N	Y
	Field Sketches	N	Y
	Soil Samples and Analysis	N	Y
Crop Information	Crop Rotation and Yields	N	Y
	Tillage Practices	N	Y
Nutrient Application Information	Commercial Fertilizer Application	N	Y

	<b>Component</b>	<b>Considerations in a Strategy Y = Yes N = No</b>	<b>Considerations in a Plan Y = Yes N = No</b>
	Application of Prescribed Materials	N	Y
	Agronomic and Crop Removal Balance for Nitrogen	N	Y
	Agronomic and Crop Removal Balance for Phosphorous	N	Y
	Common Land Application Setbacks/Limits	N	Y
	Demonstration of Adequate Land base	N	Y
	Information on a regulated mixed anaerobic digestion (“AD”) facility	Y	N

## **Part 5 - Nutrient Management Strategy for Agricultural Operations**

### **5.1 Review and Updating of a Nutrient Management Strategy**

A NMS is a 5-year document that must be reviewed by the generator annually to ensure that it accurately reflects the anticipated operation on the farm unit during the following year. It is also recommended to identify and explain any deviation from the strategy in records that are kept of actual events. Part XI of the Regulation sets out the requirements for record keeping. Before the end of the 5 years a new strategy must be prepared. If the generator has applied for a building permit for a new barn or structure to house animals, a new regulated mixed AD facility or a new storage, including an earthen storage, a new strategy would be needed at that time.

It should be noted that it is also possible for a provincial officer or Director under the Act to issue an order under Section 29 or 30 of the Act requiring that the strategy be updated.

### **5.2 Required Contents of a Nutrient Management Strategy (Part III of the Regulation)**

A completed NMS must include requirements set out in the Regulation as well as:

1. Farm unit information and identifier numbers
2. Description of the operation
3. Farm Unit declaration form including details on the location of each farm property, roll number, generator or not, name
4. Agreements
5. Farm unit sketch
6. List of prescribed materials generated - manure/nutrient information (including type and analysis)
7. Information on a regulated mixed anaerobic digestion (“AD”) facility
8. Destinations of nutrients generated
9. Storage information - yearly amount, days of storage, amount remaining including storage sizing calculation
10. Contingency plan
11. Sign-off form

These requirements are explained in more detail below.

## 5.2.1 Farm Unit Information and Identifier Numbers

### 1. Farm Unit Information:

An operation that is either approved or registered will receive an “operation identifier”. The OMAFRA will be responsible for assigning operation identifiers.

### 2. Description of the Operation:

The description must give details about the general type of operation for which the NMS is being prepared. The written description should include items such as; the size of operation, overview of the livestock facilities, and the prescribed material being produced and/or received. It must include the name and contact information for the operator of the operation.

### 3. Farm Unit Declaration Form:

For an agricultural operation only, a Farm Unit Declaration is required. It identifies the contact information for the farm unit operator and identifies the facilities and land base associated with the operation. The Farm Unit Declaration is described in Part 2 of this Protocol. The farm unit must comply with the rules set out in Part I of the Regulation.

### 4. Agreements:

Any agreements required by the strategy must be signed and copies attached to the NMS. There are two types of agreements recognized by the Regulation. The agreements are:

Type of Agreement	Details
Broker Agreement	<p>This agreement is required for a transfer from a generator who is required by the Regulation to have a NMS to a broker, or, from a broker to a receiver who is required by the Regulation to have a NMP.</p> <p>Each party to the agreement must have a signed copy.</p> <p>Brokers must have the identifier of each generator or receiver who is subject to the Regulation and with whom they have an agreement, if an operation identifier has been previously assigned by the OMAFRA.</p>
Nutrient Transfer Agreement	<p>Where an owner /operator of one operation intends to have another person manage the prescribed materials s/he has generated, then a Nutrient Transfer Agreement is required to be executed by:</p> <ul style="list-style-type: none"> <li>• the generator of the prescribed material and the owner or controller of any other farm unit required to have a NMP under the Regulation or</li> <li>• an authorized representative of the intermediate operation to which the prescribed material is transferred for management.</li> </ul>

Type of Agreement	Details
	<p>The agreement must include the identifier for the generator and the person to whom the material is transferred, if an operation identifier has been previously assigned by the OMAFRA. The agreement must also include - a statement setting out the quantity of prescribed material that is to be transferred.</p> <p>This form indicates that nutrients are being transferred to or from a farm unit and requires that the NMS and/or NMP of each farm unit reflect that transfer. This form must be signed by the supplier and the receiver and must be included in the NMS or NMP for the supplier and the receiver of the agricultural source materials.</p>

**5. Farm Unit Sketch:**

Maps or sketches can be hand drawn, photos, or computer generated. A farm unit operator/controller may choose to do more than one sketch if it is not possible to show the land belonging to the farm unit on one sketch or if there is too much information for one sketch. Every map or sketch should be neat and readable and be presented with the direction north to the top of the page, denoted by a north arrow.

The sketch must address the following items (either by including them or stating that they do not exist):

Location of generation facilities and storage(s):

- permanent, temporary and proposed generating facilities
- permanent, temporary and proposed storage facilities and sites
- dimensions of all generating and storage facilities and sites

Location, description and dimensions of AD facility including:

- dimensions of any further treatment systems and digester system
- description of facilities used for the storage of farm feed or other anaerobic digestion materials
- dimensions of all storages used for the storage of for both on and off-farm anaerobic digestion materials

Distance to sensitive features within the farm unit and outside within regulated distances:

- known wells (includes gas, oil, test and water wells)
- municipal wells
- tile inlets
- surface water (as defined in Part I of the Regulation)

Location and dimensions of a vegetated filter strip system (“VFSS”) including:

- location and dimensions of the extended vegetated filter strip area
- location and dimensions of any permanent vegetated area or flow path associated with a VFSS

## 6. List of Prescribed Materials Generated:

Every NMS must have a summary of all the prescribed materials and volumes generated by the operation. The summary should identify whether each material is liquid or solid.

Note: when a farm that generates prescribed materials also receives nutrients, the receipt of the nutrients must be dealt with in the NMP.

### Manure

All the calculations required to determine the volume of manure generated are based upon the following rule:

#### Farm animal Numbers

“Farm animals” is defined in the Act as: “livestock, including poultry and ratites, fur-bearing animals, bees, cultured fish, deer and elk, game animals and birds or any additional animals, birds or fish prescribed by the regulations”.

For manure storage calculations on new or expanding facilities the number of farm animals must be equal to or greater than the number determined using the Housing Capacity Guidelines (provided in Table 3.1) or documentation must be included indicating that the maximum housing capacity of the barn is less than the Housing Capacity Guidelines. For all facilities NU is based on actual usage.

For existing facilities; manure storage calculations are based on actual usage of the facility.

For all facilities, manure production (and consequent land base calculations) is based on actual usage of the facilities.

In all cases, a comprehensive, written explanation must be included if the declared housing usage is less than the maximum housing capacity of the barn.

#### Animal Weights

If the NMS utilizes animal weights that are lower than the values provided by Table 3.1., a comprehensive, written explanation must be included to justify the lower weights.

#### Manure Volume

The total volume of liquid or solid manure generated annually on the farm unit must be provided for each type of farm animal present on the farm unit.

### AD output:

The quantity of material to be land applied that is produced by the regulated mixed AD facility must be accounted for in the NMS. If the operation is land applying AD output from a facility that is under a Certificate of Approval or a provisional Certificate of Approval issued under Part V of the *Environmental Protection Act*, then the output must be categorized as either agricultural source material or non-agricultural source material and the volume must be accounted for in the NMS.

### Other Prescribed Materials

The quantity of prescribed materials, other than manure or AD output generated at an operation must be listed using industry-specific documentation or records from previous time periods that can project the quantity to be produced over the time period to be covered by the NMS.

#### 7. Additional information required regulated mixed AD facilities

If the farm has an AD facility installed or about to be installed, the NMS will need to describe the off-farm material that is delivered to the property. The annual volumes of materials coming on to the farm property must be provided and it must be clearly demonstrated that the materials are listed in Schedule 1 or 2 of the Regulation.

If the off-farm material is listed on Schedule 2 the NMS must demonstrate what the further treatment process will be and what temperature will be used for this treatment.

The NMS must demonstrate how the proposed AD facility will operate including the temperature and average treatment time for material to be processed in the AD facility.

#### 8. Destinations

For all prescribed materials generated on the farm unit or other operation, a detailed written description of their intended destination is required. The description should include:

- the quantity and type of prescribed materials
- any applicable signed agreements
- where prescribed materials are not intended to be used for nutrient purposes, the location and name of the destination of the materials; and
- where prescribed materials are intended to be used for nutrient purposes, the location and name of the destination of the materials including a statement as to whether the materials are to be:
  - applied to land according to the NMP for the same farm unit,
  - transferred to the NMS of another farm unit under a Nutrient Transfer Agreement,
  - transferred to another farm unit or operation which is not required to have a NMP or NMS under the Regulation,
  - transferred to an intermediate operation by a Nutrient Transfer Agreement, or
  - transferred to a broker under a Broker Agreement.

## 9. Storage Facilities

Storage facilities on the farm units or operations must be listed. For each storage facility, a written description is required that gives the capacity, dimensions and type of storage (for example: circular, rectangle, pile, covered, exposed to precipitation). Nutrient storage facilities must comply with “Part VIII: Siting and Construction Standards” and with “Part IX.1 Anaerobic Digestion” of the Regulation.

Note that if the operation would like to make a case that the volume of material to be stored will be reduced by use of a regulated mixed AD facility, then this must be demonstrated in the calculation of the storage volume required. In demonstrating this reduction, the calculation for the operation must also take into account the addition of the off-farm material that will be used as AD materials that are to be put into the AD facility.

For the purposes of calculating the storage capacity, those components of a VFSS that store nutrients are not considered to be part of the permanent nutrient storage facility on the farm. The components of a VFSS are not a permanent nutrient storage facility in this Regulation.

Determination of the size for new or expanding operations should make use of Table 3.1 and the following two tables – Table 5.1 and Table 5.2.

**Table 5.1 Solid Manure Density**

Dry Matter (%)	Density <sup>1</sup> (kg/m <sup>3</sup> )
15	961
18	913
20	881
25	833
30	801
35	753
40	721
43	673
45	641
48	593
50	561
53	513
55	481
58	400
60	320
65	320
70	320

Notes:

<sup>1</sup>. Density has been rounded to 3 significant digits.

## **Table 5.2 – Allowances for Freeboard and Precipitation**

### Freeboard<sup>1</sup>

Covered Storage (except covered barns with slatted floors):	0.15	m
Uncovered Storage:	0.30	m

Notes:

<sup>1</sup> Freeboard dimensions have been rounded to 2 significant digits.

### Precipitation Effects<sup>1</sup>

Livestock Yard Runoff	0.56	m/year
Solid Manure Storage Runoff	0.56	m/year
Roof Runoff	0.56	m/year
Direct Entry into Liquid Storage	0.83	m/year

Notes:

<sup>1</sup> Precipitation effects have been rounded to 2 significant digits.

## 10. Contingency Plans

A written contingency plan is required to describe actions in the event the NMS cannot be followed. See Part 11 of this Protocol for more detail on contingency planning.

## 11. Sign-off Form

The “Nutrient Management Strategy and/or Plan Sign-off” form is found at the Government of Ontario Central Forms Site (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf>) and serves as a sign-off document for the farmer and the person who prepared the NMS.

## **Part 6 –Nutrient Management Strategy for Non-Agricultural Generating Operations**

### **6.1 General**

As stated earlier in Part 4.1.1. of this Protocol, a NMS sets out an environmentally acceptable method for managing all prescribed materials generated at an agricultural or non-agricultural operation. Non-agricultural operations typically generate non-agricultural source material. Non-agricultural source material is defined in Part I of the Regulation as “any of the following materials, other than a commercial fertilizer or compost that meets the guidelines entitled *Interim Guidelines for the Production and Use of Aerobic Compost in Ontario* prepared by the Ministry of the Environment and dated November 2004, if they are intended to be applied to land as nutrients:

1. Pulp and paper biosolids.
2. Sewage biosolids.
3. Anaerobic digestion output, if less than 50 per cent, by volume, of the total amount of anaerobic digestion materials that were treated in the mixed anaerobic digestion facility were on-farm anaerobic digestion materials.
4. Any other material that is not from an agricultural source that is capable of being applied to land as a nutrient.

All non-agricultural operations that generate non-agricultural source material (which by definition are materials which are intended to be land applied) must ensure that prescribed materials generated in the course of the operation are managed in accordance with an approved NMS once the operation is phased in by Part II of the Regulation.

### **6.2 Required Contents of a Nutrient Management Strategy for Non-Agricultural Nutrient Generating Operations (Part III of the Regulation)**

This NMS consists of 8 parts as shown in the NMS for Non-Agricultural Operations Generating Non-agricultural Source Material Form (“Non-agricultural NMS form”).

This form is available at the Government of Ontario Central Forms Site: (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf>) on the web.

NMS: Each non-agricultural operation that generates non-agricultural source material must complete and submit as part of their first NMS, Non-agricultural NMS form Parts I through V.

Annual Strategy: Each non-agricultural generating facility must complete Non-agricultural NMS Form Part VI – Planned Destination of Material. This is an annual strategy of projected activities for the year to come. Year One will be submitted with completed Parts I through V when the Non-agricultural NMS is submitted to the Director for approval. Years Two through Five will be completed and retained on site with the NMS.

Annual Report: Each non-agricultural operation that generates non-agricultural source materials must complete Non-agricultural NMS Form Part VII – Annual Report of Management of Materials, and Part VIII, Report on Five-Year Strategy for Material Generated, within 60 days of each year end and retain them on site with the NMS. These reports include the actual annual activities that were carried out, reported at year end.

### **6.2.1 Facility Description and Approval Information**

Part I: This initial part of the NMS requires a facility description, including the following information:

- the name of the facility
- the name of the owner
- address
- phone number
- a contact name and their working title or position with the operation (the person responsible for the strategy)
- the annual volume of material generated by the operation
- a description of operations carried out on site.

In addition, an authorized officer of the operation must certify by signing their name to the NMS that, based on relevant information provided in good faith and excluding unforeseen or uncontrollable circumstances, the recommendations contained in the strategy are compliant with the *Nutrient Management Act, 2002*.

The approval information to be completed by the OMAFRA includes the date of submission of the strategy to the OMAFRA, the approval date, an operation identifier (assigned under Part III or Part XI of the Regulation), the name and signature of the approving OMAFRA Director, the approval date, terms and conditions of the approval, and the expiry date for the strategy.

### **6.2.2 Material Description and Storage Information**

Part II: This part requires a listing of the types of non-agricultural source material and all other material generated by the operation. The type, for example, could include sewage biosolids, pulp and paper biosolids or other type of material that is not from an agricultural source that is capable of being applied to land as a nutrient (this category includes materials such as materials recommended for land application by the Biosolids Utilization Committee). This list would include all materials regardless of whether they were intended to be applied to land.

The description of each material must be included and must set out whether the material is a liquid or solid as defined in Part 1 of the Regulation.

The projected average annual volume must be estimated and recorded for the period of the strategy.

Information on storage of all non-agricultural source materials generated at the facility must be provided. The physical address of each off-site storage facility and the facility's associated capacities must be provided.

Nothing in this section abrogates responsibility for the storage facilities for non-agricultural source materials from complying with all applicable laws including:

- part VIII of the Regulation (Construction Standards)
- any requirements under Part V of the *Environmental Protection Act*
- the TSSA and
- the standards under the Ontario Building Code.

### **6.2.3 Projected Five-Year Strategy for Non-Agricultural Source Material Generated**

Part III: This part requires a five-year volume projection for the various destinations of all the material generated by the operation. Destinations include land application, landfill disposal, incineration, processing (such as composting and AD) or other potential destinations. If there is a projected change in volume for any of the management methods, there must be a description detailing the reasons for that projection.

### **6.2.4 Nutrient Analysis of Material**

Part IV: This part requires a strategy for the analysis of non-agricultural source materials generated for land application. Generators must provide information about the content and quality of their non-agricultural source material. Part IX of the Regulation requires laboratory analyses of certain parameters such as nitrogen, phosphorus and potassium, as well as regulated metals and pathogens. Although the standards requirements for biosolids in the Regulation are similar to those in the joint Ministry of the Environment ("MOE") and OMAFRA publication entitled *Guidelines for the Utilization of Biosolids and other Wastes on Agricultural Lands, March, 1996*, sampling and testing requirements have been adjusted based on the size and capacity of the facility and the amount of material generated (see Part IX of the Regulation).

Additional parameters are presently under review and may be added to the Regulation. Sampling standards must comply with Part IX of the Regulation and the Sampling and Analysis Protocol. Results must be retained at the location of the operation or at a location that is accessible to the operator on a 24 hour a day basis in accordance with Part XI of the Regulation.

### **6.2.5 Contingency Plans**

Part V: This part requires a written contingency plan to describe actions that will be taken in the event that unforeseen circumstances which result in the inability to follow the NMS occur. The contingency plan should include alternative action to be taken in the event of a storage irregularity and provide for alternate disposal of the non-agricultural source material. In the event of a spill, all non-agricultural facilities must follow a spills contingency plan as well as Regulation 347 and Part IX of the EPA. See Part 11 of this Protocol for more information on contingency planning.

## 6.2.6 Planned Destination of Material

Part VI: This part is an annual strategy of activities that documents the proposed destination of materials. For all materials generated at the operation, a detailed, written description of their intended destination is required. In this part, the following information about the destination is required:

Land Application: non-agricultural source material intended to be applied to agricultural land:

- the associated NMP numbers or Certificate of Approval numbers;
- the approved area or area to which the materials will be applied,
- application rate;
- total volume to be applied;
- broker identification (including company name, Certificate of Approval numbers or licence numbers); and
- whether a broker agreement exists.

Landfill Disposal: where the material is intended to be disposed of in a landfill:

- the name and address of the landfill site including Certificate of Approval number; and
- total volume to be disposed to landfill.

Incineration: where the material is intended to be incinerated:

- the intended incineration volume;
- whether the incineration is intended to be on- or off-site; and
- off-site address and the Certificate of Approval number if applicable.

Processing Material: for other process method types (such as composting or AD):

- the total volume;
- on and off-site information;
- off-site address, if applicable;
- a description of the type of processing; and
- the Certificate of Approval number, if applicable.

Other: for other management methods (such as a new technology):

- a description of the method of management;
- total volume disposed;
- on- and off-site information; and
- off-site address, if applicable.

## 6.2.7 Annual Report of Management of Material

Part VII: This part requires an annual report that documents the actual destination of materials. In Part 6.2.6 above, a detailed written description of the intended destination of non-agricultural source materials generated is required to be prepared. Using that section as a starting point, generators should prepare, on a yearly basis, a detailed, written description of the actual (not projected) destination of materials. The following details should be provided:

Land Application: where non-agricultural source materials were applied to agricultural land:

- the associated NMP numbers or Certificate of Approval numbers;
- the actual area of application;
- application rate;
- total volume applied;
- broker identification, including company name, Certificate of Approval numbers or licence number; and
- whether a broker agreement was signed.

Landfill Disposal: where materials were disposed of in a landfill:

- name and address of the landfill site; and
- total volume disposed to landfill.

Incineration: where materials were incinerated:

- the volume incinerated;
- whether the incineration was on- or off-site; and
- off-site address.

Processing Material (such methods as composting or AD):

- the total volume processed;
- on- and off-site information;
- off-site address; and
- a description of the type of processing.

Other: (i.e. new technologies):

- a description of the method used;
- total volume disposed;
- on-site and off-site information; and
- off-site address.

### **6.2.8 Report on Five-Year Strategy for Non-Agricultural Source Material Actually Generated**

Part VIII: This part requires that the information that has been prepared annually under Part XI of the Regulation and Part 6.3 of this Protocol to be summarized. For example, the annual volumes of non-agricultural source material actually generated must be totaled to identify the five-year volume of material actually generated and applied.

In addition, there should be a summary of the various methods actually used to manage the material (land application, landfill disposal, incineration, processing such as composting, AD or other destination). If there is a difference in volumes for any of the management methods from what the NMS projected, an explanation must be provided. This report is to be retained at the site.

### **6.3 Renewal of a Nutrient Management Strategy**

Renewal of the NMS must occur in accordance with Parts III and IV of the Regulation.

## **Part 7 - Nutrient Management Plans**

### **7.1 Review and Updating of a Nutrient Management Plan**

A NMP must be reviewed by the farm unit operator annually to ensure that it accurately reflects the anticipated operation on the farm unit during the following year. This review can be used to explain any difference between the projections in the NMP and the records kept of actual events.

All NMPs must be reviewed every five years and must be updated annually to reflect current circumstances on the farm.

### **7.2 Required Contents of a Nutrient Management Plan (Regulation Part III)**

#### **7.2.1 Components of the Nutrient Management Plan**

- Analysis of nutrient content or nutrient values provided in Appendix 1
- Field information
- Cropping practices
- Nutrient application
- Nutrient application rates
- Land base information

#### **7.2.2 Nutrient Information, Analysis of Nutrient Content**

A nutrient analysis for each of the prescribed materials listed in the NMS must be provided. The nutrient analysis can be determined either by conducting laboratory analysis or by applying the average values found in Appendix 1. The databank is currently part of the NMAN program and depends on the type of prescribed material and the percentage of dry matter projected to be in the material.

Sampling and laboratory analysis must be done by an accredited laboratory as set out in Parts IX and IX.1 of the Regulation. If laboratory analysis produces results that vary by more than 30% of the Appendix 1 values, documentation is required to justify the difference. It should be noted that management practices or feed additives could potentially alter the nutrient content of a farm animal's manure.

If manure nutrients are modified due to the use of feed additives, adequate information must be attached to verify that the feed additive was actually used, and to verify the influence of the additive on the nutrient content of the manure. In addition, records must be maintained to confirm the continued use of the additive.

#### **7.2.3 Field Information**

All land identified in the farm unit must be included in a field section if prescribed materials are to be applied to this land during the NMP period.

### **7.2.3.1 Field Properties**

The following field properties must be provided in the NMP for each field identified in the farm unit:

1. the total tillable area for each field
2. the total tillable area available for nutrient application. Note: this is determined by subtracting the area not available for nutrient application due to required setbacks from the total tillable area for each field
3. the percentage of maximum sustained slope near the surface water if the field is within 150 metres of surface water
4. a statement as to whether the field is tile drained
5. predominant soil series and soil texture for the field
6. a statement regarding the presence or absence of known wells within regulated distances of the field boundaries
7. a statement as to whether surface water is adjacent to, or contained within, the field.

### **7.2.3.2 Field Sketch**

Many of the field properties are required in the format of a sketch for each field in the farm unit. The sketch must address the following field components:

- field identifier (from Farm Unit Declaration)
- sections within the field, if the field has more than one section, including individual field locations and boundaries
- whether the field has tile drains and, if so, the location of the tile inlets and tile outlets
- the following features must also be included on the sketch (or where the features do not exist, a statement indicating this must be included):
  - the location of all surface water
  - the location of non-agricultural land uses,
  - the location of any municipal wells within 100 metres of the field boundary
  - if land applying biosolids, the location of all other known wells within 90 metres of the field boundary
  - if land applying only agricultural source material, the location of all other known wells within 30 metres of the field boundary
  - the maximum sustained slopes within 150 metres of the top of bank of all surface water, and
  - the separation distances for surface water required to meet the regulatory requirements.

### **7.2.3.3 Soil Sampling and Analysis**

Soil sampling and analysis is to be performed according to Part IX of the Regulation.

## **7.2.4 Cropping Practices, Crop Rotation and Yields**

The following information is required for each field in the NMP:

- crop rotation for the duration of the NMP
- expected planting and harvest dates
- expected crop yields for the duration of the NMP; and
- previous years' crops.

## **7.2.5 Nutrient Application**

### **7.2.5.1 Commercial Fertilizer Application**

All liquid and solid commercial fertilizer to be applied must be identified for the entire duration of the NMP. This includes, but is not limited to: starter, pop-up, side-dressed, broadcast, banded, foliar, fertigated, incorporated or unincorporated applications.

For each application, the application date, incorporation method and amount of nutrient application must be identified.

### **7.2.5.2 Application of Prescribed Materials and Limits**

For each prescribed material listed in section 7.2.2 above, "Prescribed Materials Applied to Land in the Farm Unit" the NMP must identify the following for the entire duration of the NMP:

- prescribed material type and form;
- expected application date;
- expected application method;
- expected timing for incorporation; and
- expected application frequency;

## **7.2.6 Nutrient Application Rates**

A rate of application for each prescribed material intended to be applied to land must be determined for each part of the land managed in the farm unit (for example: each field, group of fields or field section). Application rates are based on many factors including: the characteristics of the land and cropping and nutrient information set out in the NMP. The application rates also are balanced using the agronomic and crop removal balances as described below. The NMP must show the number of times that nutrients will be applied in the year in order to demonstrate the maximum rate per application of nutrients. In addition, the NMP must show the total amount that is expected to be applied in the year as the maximum annual nutrient application rate.

**NOTE: Each of the components in this Part apply to agricultural source materials, non-agricultural source materials and commercial fertilizers and must be calculated in accordance with Part IX – Sampling, Analysis and Quality Standards and Land Application Rates of the Regulation.**

### **7.2.6.1 Agronomic and Crop Removal Balance of Nitrogen**

To determine the limits for nitrogen application you must calculate the Agronomic Balance and, if needed, the Crop Removal Balance as set out below:

- **Agronomic Balance**  
Agronomic Balance is the total available nitrogen from all applied nutrients minus crop production requirements (these requirements may be based on OMAFRA crop fertilizer recommendations).
- **Crop Removal Balance**  
Total available nitrogen minus the nitrogen removed from the field with the crop when it is harvested.

### **7.2.6.2 Agronomic and Crop Removal Balance for Phosphorus**

To determine the limits for phosphorus application you must calculate the Agronomic Balance and, if needed, the Crop Removal Balance as set out below:

- **Agronomic Balance**  
Agronomic Balance is the total available phosphorus from all applied nutrients (which is 40% of the total phosphorus in organic materials in the year it is applied) minus the crop production requirements (these requirements may be based on OMAFRA crop fertilizer recommendations).
- **Crop Removal Balance**  
Total available phosphorus (which is assumed to be 80% of the total phosphorus in organic material applied because it includes more than the prescribed materials for the present year and phosphorus becomes available over time for use by future crops) minus the phosphorus removed from the field with the crop when it is harvested.

### **7.2.6.3 Common Land Application Setback and Other Requirements from Regulation Part VI**

The NMP must also include the requirements found in Part VI of the Regulation.

### **7.2.7 Land base Information**

#### **Demonstration of Adequate Land base**

The NMP must demonstrate that a sufficient land base exists for the application of all the nutrients identified for land application to the farm unit so that none of the allowable application rates are exceeded and all of the setbacks are met.

## Part 8 – Registration of Existing Large Farms

The Regulation requires that some farms register their agricultural operation. The following information will need to be provided to the Director at the OMAFRA for the purposes of the registration:

- the contact information for the owner and/or operator of the operation;
- a description and location sketch of the lands contained in the farm unit including area in hectares or acres;
- a description of the operation generating prescribed materials on the farm unit including livestock types and numbers;
- a projection of the amount of prescribed materials generated by the operation carried out on the farm unit and those prescribed materials received on the farm unit each year;
- a description of the buildings, treatment equipment and structures used in the generation and management of the prescribed materials;
- the amount and receivers of prescribed materials transferred off the farm unit;
- the days of storage available;
- an indication of the presence or absence of the following features
  - wells,
  - surface water, and
  - drainage tiles at the farm unit; and
- the presence or absence of a NMS and NMP prepared by a certified individual including the name and certification number of the preparer.

## **Part 9 - Common Land Application Requirements**

### **9.1. Determination of Slope**

Determining the maximum sustained slope of the land is a necessary part of determining application rates and setbacks. As the maximum sustained slope increases (gets steeper), the risk of liquid manure runoff at or following the time of application increases, as does the risk of soil erosion that can carry phosphorus into surface water. It is required to determine the slope of the field, or part of field, if it is within 150 metres (493 feet) of surface water.

Maximum sustained slope is expressed as a percentage in the Regulation, rather than as degrees. Per cent maximum sustained slope is simply the change in elevation of the land over a horizontal distance of one hundred units. A field that drops half a foot in one hundred feet has a maximum sustained slope of 0.5%, which is quite flat. A field that drops 15 feet in one hundred feet has a maximum sustained slope of 15%, which is quite steep. To put this in context, the Ministry of Transportation recommends steep grade warning signs whenever the road grade exceeds 9% over a distance of 150 metres.

There are several methods to determine the maximum sustained slope of the land, including but not limited to:

- topographic maps (for long, simple slopes);  
hand held Clinometer;
- transit;
- Topographic Survey by a licensed Surveyor; or
- survey grade GPS, with elevation measurement.

The choice of a particular method will depend on the level of precision required, and the resources available to determine the maximum sustained slope. More precise methods are generally more expensive. Visual estimation of maximum sustained slope may provide adequate precision in many cases, but more precise measurements will be required where maximum sustained slopes are near the break points between different maximum sustained slope classes.

### **9.2 Determination of Percentage of Crop Residue**

In some circumstances, application of agriculture source materials to the soil without incorporation is allowed where at least 30% of the soil surface is covered with crop residue at the time of application. This is provided for in Part VI of the Regulation.

The percentage of crop residue cover can be determined using the rope transect method. The material required is a light rope (about 8 m in length) with knots or other markings spaced along the rope at 15 cm intervals so that there are a total of 50 knots. This rope is laid out across the soil surface, preferably at an angle to the crop rows, and pulled slightly taut. The number of knots that are touching pieces of crop residue (minimum dimensions 2 mm by 2.5 cm) is counted. This number, when multiplied by two, is the per cent crop residue cover. This determination should be made a minimum of four times in different parts of the field, and the results averaged.

### **9.3 Minimum Depth to Groundwater**

Part VI of the Regulation prohibits the application of non-agricultural source material to land unless there is at least 30 centimetres of “unsaturated” soil at the surface of the land.

#### **9.3.1 Procedures for Determining Unsaturated Soil Conditions**

“Unsaturated”, in relation to soil condition, refers to a soil water content that is less than 100 per cent of the total pore space, or is at a negative soil water pressure as determined using the following procedure:

- dig a hole or remove a soil core to a 30 cm depth
- observe whether water flows into the hole from the surrounding soil (this may take up to an hour in clay soils).

Water will only flow under saturated conditions, so if water is observed, the soil does not meet the applicable criteria for unsaturated soil.

## **Part 10 - Outdoor Confinement Areas**

### **10.1 Snow That Contains Manure**

Part VII of the Regulation allows a person to store or use snow which has been removed from an outdoor confinement area and that contains manure subject to certain conditions.

#### **10.1.1 Context**

Snow that contains manure, removed from an outdoor confinement area, is known in the industry as “feedlot snow”, “winter yard scrapings” or “brown sugar”. This material is of extreme bulk relative to nutrient content, and is known to cause handling and storage difficulties on many operations where outdoor livestock housing is used.

#### **10.1.2 Parameters for Snow Containing Manure from Permanent Outdoor Confinement Areas:**

For the purposes of Part VII of the Regulation the snow containing manure is characterized by;

- having originated from a permanent outdoor confinement area
- the presence of ice or snow crystals
- the presence no other foreign materials except livestock urine, feces
- feed or bedding
- a dry matter content of no greater than 16%; and
- being solid despite its low dry matter content such that this material cannot be pumped at time of handling or application, but rather it can be piled or handled as a solid.

The preferred method for determining the nutrient content described above is through using pooled samples (10 litres each) which are subjected to analysis in triplicate. Sampling and laboratory methods for determining dry matter, total nitrogen and total phosphorus are outlined in the Sampling and Analysis Protocol.

#### **10.1.3 Bedding and Feed in Snow**

Snow that contains manure is permitted to contain some bedding and feed. This is in recognition of the fact that sometimes feed and bedding will become mixed in with the snow after a storm event and may be removed when the snow is removed. Not all scrapings from an outdoor confinement area will be able to meet the parameters described above. Any winter application of manure that does not meet the above guidelines must be in compliance with the Regulations for winter spreading contained in Part VI of the Regulation.

## **Part 11 – Contingency Planning**

### **11.1 General**

A contingency plan is a written document that sets out actions to be taken in the event that a NMS or NMP cannot be followed. For example, the storage facility planned for in a NMS may become filled with rainwater before the manure inside it is applied. Another example is a “spill” or unanticipated release of nutrients. Preparing contingency plans in advance facilitates the implementation of corrective action on short notice.

Contingency plans are a required component of NMSs and NMPs and must be tailored to the particular conditions of each operation. The contingency plan should be reviewed by all relevant parties, including the owners of the land where manure, AD output or biosolids will be applied. Key people in every operation should be familiar with the contingency plan and know how to implement it.

Contingency plans should list in detail the contacts, equipment and other resources that are available should a contingency event occur, such as:

- the owner/operator (who can authorize expenditures)
- the number for the Spills Action Centre: (1-800-268-6060)
- the local municipality (which can be contacted for drainage information and for assistance in spill response)
- people renting or willing to lend equipment who are close at hand; and
- equipment such as loader tractors and emergency storage trailers.

After a situation has required that a contingency plan be put into effect, the plan should be evaluated to determine if improvements are needed and, if so, changes must be made accordingly.

When the implementation of a contingency plan causes you to change any aspect of your NMS or NMP, it is important to assess the significance of the change and determine whether or not an updating of the NMS or NMP is necessary.

### **11.2 More Nutrients than the Nutrient Management Strategy or Nutrient Management Plan have Addressed**

If the application rates for nutrients in a NMP are not at the maximum, the NMP can be reviewed to ascertain whether the application rate and possibly the frequency of application can be increased for certain parts of land. Any changes made to the NMP must be recorded to reflect the actual amount of nutrient applied. In some cases this may mean an updating of the NMP is necessary.

If the application rates for nutrients in a NMP are at the maximum, the operator must be prepared to set up alternate uses for the nutrient. Some possibilities include:

- finding a broker who can take the excess nutrient (a Broker Agreement would be required in such circumstances)
- finding an intermediate generator who will accept the excess nutrient (a Nutrient Transfer Agreement would be required in such circumstances), or
- acquiring more land through ownership, control or other arrangements.

In addition, operators may consider other disposal methods such as landfilling, composting, incineration or other processing methods.

### **11.3 More Nutrients than the Storage Design Capacity**

In some cases, generally due to adverse weather conditions, manure storages may be in danger of overtopping. The preferred solution is to land-apply the manure where doing so will not result in an adverse effect. Other options include:

- alter the NMP if the application rates are not already at the maximum and update the plan as required by the Regulation,
- transferring the nutrients to an available storage facility with excess capacity (a Nutrient Transfer Agreement may be required),
- finding a broker who can take the excess (a Broker Agreement would be required),
- finding an Intermediate Generator who will accept the excess (a Nutrient Transfer Agreement would be required), and
- acquiring access to more land through ownership or control or by means of an Application Agreement or rental or other agreement.

Operators may consider other disposal methods such as landfilling, composting, incineration or other processing methods.

### **11.4 Agricultural Operations: Unanticipated Release of Nutrients (for example spills, breaks in equipment or storage)**

There are important issues to be dealt with in a contingency plan due to the adverse effects that can result from a spill. The contingency plan must outline the required equipment, contacts and safety precautions. The idea is to minimize the potential for a spill and if one does occur to ensure that the operator and the employees know what actions to implement.

### **11.4.1 To Avoid A Spill:**

Spread the nutrient according to your NMP or put it in an adequate nutrient storage for later application. In addition:

- calibrate your nutrient application equipment regularly so that you can follow the rate specified in your NMP;
- follow setbacks to surface water required by the NMP for the site;
- mark all tile outlets and tile inlets for nutrient application and inspection purposes;
- for a direct flow system use two people with a radio link or an automatic shutdown system;
- follow the NMP for the appropriate tillage practices; and
- avoid spreading before rain events.

### **11.4.2 To Stop A Spill:**

- immediately stop the cause of the spill if possible;
- shut down the appropriate pumps and valves;
- ensure the system cannot be restarted; and
- then contact the 24 hour Spills Action Centre at 1-800-268-6060.

### **11.4.3 To Contain the Spill:**

- minimize opportunity for nutrients to enter tile drain or plug the tile in the event flow appears to be contaminating the tile drains;
- if the spill is moving over the ground surface, an earthen berm should be built with farm or commercial equipment, such as backhoes or dump trucks; and
- notify downstream users.

The following contacts should be posted by all phones for immediate access in case of a spill:

- Spills Action Centre (1-800-268-6060);
- bulldozer or backhoe operator;
- municipality; and
- neighbours.

## **11.5 Weather or Equipment Conditions Impeding Planned Storage or Application**

### **11.5.1 Timing Change**

When the timing of a nutrient application must be changed, adjust nutrient amounts to reflect the change in timing. In making such adjustments, however, you must not exceed the maximum annual nutrient application rate or the maximum rate per application and must comply with the requirements of the Regulation.

Adjust subsequent applications of nutrients to accommodate the change in timing of the nutrient application and record the change in your NMP.

### **11.5.2 Crop Change**

Nutrient amounts and formulation should be adjusted (where possible) to account for a change in crop. If the nutrients have already been applied, the amount and formulation should be adjusted for the next crop where possible, to account for the previous crop change.

### **11.5.3 Commercial Fertilizer Blend Change**

Where the nutrient composition that is listed in the NMP is altered, the altered formulation should be reflected in the NMP. Subsequent nutrient applications should reflect changes to the original NMP.

## **11.6 Managing Off-Farm Source Material**

Where the farm has a regulated mixed AD facility present, there may be off-farm materials stored on the property. The contingency plan must have some plan for dealing with any material that may not be able to be used in the AD facility for any reason. The operator may consider other disposal methods such as landfilling, composting or other processing methods that may be permitted.

## **11.7 Managing the VFSS**

Where the farm unit has made use of a VFSS to deal with the runoff, the contingency plan must consider and outline options for how to safely dispose of the runoff if the VFSS fails to function effectively. The contingency plan must demonstrate how the runoff can be managed until the VFSS is once again functioning properly.

## Part 12 – Construction and Siting

### 12.1 Engineer's Commitment Certificate

The Regulation requires that the design and construction of a new permanent nutrient storage facility, VFSS and mixed regulated AD facility or an expansion, or alteration of these facilities or parts thereof shall be carried out by or under the supervision of a professional engineer. The Engineer's Commitment Certificate which is found at the Government of Ontario Central Forms Site (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf>) will need to be completed for any new or expanding operations where the Regulation requires the oversight of an engineer.

### 12.2 Dry Matter Content of Manure

There are several locations in the Regulation that rely on the dry matter content of manure. The dry matter content of manure can be established through sampling, referring to Appendix 1 for average values or reference to the information that follows.

Average Dry Matter Values - To help determine whether manure has a dry matter content of ( $\geq 18$  to  $< 30\%$ ), ( $\geq 30$  to  $< 50\%$ ) or ( $\geq 50\%$ ), the following basic guidelines can be followed:

1. Manure Types with 50% or greater dry matter:
  - All poultry on litter, such as Broilers, Broiler Breeders, Layer Pullets, Turkeys
2. Manure Types with  $\geq 30\%$  to  $< 50\%$  dry matter that could realistically move to the  $\geq 50\%$  category with additional bedding:
  - All Horses
3. Manure Types with  $\geq 30\%$  to  $< 50\%$  dry matter:
  - Bedded Beef Cows and Calves
  - Bedded Goats, Sheep, Rabbits
4. Manure Types with  $\geq 18\%$  to  $< 30\%$  dry matter that could realistically move to the  $\geq 30\%$  to  $< 50\%$  category with additional bedding:
  - Deep Bedded Beef Feeders
  - Deep Bedded Dairy Operations
  - Deep Bedded Hog Operations
5. Manure Types with  $\geq 18\%$  to  $< 30\%$  dry matter:
  - Laying Hens in Cages with Belt or Deep Pack Manure System
  - Bedded Dairy Operations
  - Bedded Beef Feeders
6. Manure Types with less than 18% dry matter that could realistically move to the  $\geq 18\%$  to  $< 30\%$  category with additional bedding or allowing liquid portion to be stored in liquid tank:
  - Bedded Hogs

## **APPENDIX 1 – MANURE DATABANK TAKEN FROM NMAN PROGRAM – JUNE 2007**

### **Available Nutrients and Value for Manure from Various Livestock Types**

The nutrients from manure have a nutrient and economic value. The tables that follow give an indication of the available nitrogen, phosphorus and potassium from various livestock types. The information is based on the most current databank of nutrients (February 2007) and makes a few assumptions. All information in the tables is presented in an “as-is basis”, in other words the nutrients as applied at the listed dry matter content.

The useable nitrogen is the amount of nitrogen available in the year of application assuming the manure is spring applied and incorporated within 24 hours. A simplified method for calculating nitrogen available for fall applications would be to take one half of the % total nitrogen and multiply that number by 100 for liquid manure or 20 for solid manure. Actual value will vary (especially for liquid manure) with late summer application (lower availability) versus late fall application (higher availability). The amount of phosphorus and potash does not vary with season of application. 40% of the phosphorus in manure is available in the year of application; the remaining 40% in subsequent years.

There is some nitrogen that is available in subsequent years and that amount is higher for solid manure than for liquid manure. The value of that nitrogen is reflected in the column that reads: “Year 2-4 value” which also reflects half of the total available phosphorus value.

The actual immediate nutrient value for crop production will be less than what is reflected in the tables if the nutrients being applied are not required for the production of the crop. For example the nitrogen from manure applied to a legume crop, or the phosphorus and/or potassium applied to a field with a soil test higher than 60 mg/L (ppm) or 250 mg/L (ppm) for P and K respectively.

## Liquid Manure – Available Nutrients and Value for Manure from Various Livestock Types

Animal Type	DM Range	Ave DM	Usable N <sup>1</sup>	P205	K20	Year 1 value <sup>2</sup>	Year 2-4 value	Total N	NH4-N	NH4-N	P	K	# Samples
			%	lbs/1000 gallons		\$/1000 gal		%	ppm	%	%	%	
<b>Hog</b>	average	3.7	26.8	11.8	19.0	23.81	5.85	0.40	2679	0.27	0.13	0.18	1160
	10-18%	12.7	49.0	35.0	33.5	48.54	16.66	0.79	4747	0.47	0.38	0.31	45
	6-10%	7.5	40.8	23.0	28.1	38.04	11.34	0.65	3977	0.40	0.25	0.26	161
	4-6%	4.9	33.0	15.6	23.8	29.90	7.82	0.51	3262	0.33	0.17	0.22	195
	2-4%	2.9	25.2	10.1	17.3	21.84	5.03	0.37	2544	0.25	0.11	0.16	387
	0-2%	1.3	16.2	4.6	11.9	13.52	2.27	0.22	1691	0.17	0.05	0.11	373
	finisher	7.6	44.1	21.2	32.4	40.21	10.11	0.64	4465	0.45	0.23	0.30	57
	weaners	3.0	22.8	12.9	17.3	21.74	5.99	0.33	2316	0.23	0.14	0.16	25
	SEW	2.2	16.9	5.5	14.0	14.86	3.00	0.26	1669	0.17	0.06	0.13	15
	dry sows	1.9	21.6	9.2	11.9	18.04	4.01	0.27	2313	0.23	0.10	0.11	26
<b>Dairy</b>	average	8.4	17.7	7.7	26.0	19.73	4.77	0.35	1524	0.15	0.08	0.24	
	10 – 18%	13.7	22.4	12.5	34.2	26.47	7.64	0.49	1797	0.18	0.14	0.32	264
	8 – 10%	9.0	18.9	7.2	25.8	20.08	4.72	0.38	1620	0.16	0.08	0.24	222
	6 – 8%	7.0	18.0	6.6	25.3	19.23	4.07	0.33	1628	0.16	0.07	0.23	196
	2 – 6%	4.4	13.4	5.0	20.2	14.74	2.98	0.24	1228	0.12	0.05	0.19	212
	0 – 2%	1.0	5.9	1.7	11.9	7.19	0.96	0.09	582	0.06	0.02	0.11	54
<b>Beef</b>	average	7.9	15.5	7.3	23.4	9.94	4.41	0.31	1329	0.13	0.08	0.22	85
	10 – 18%	14.5	21.6	12.1	35.9	15.61	7.48	0.48	1714	0.17	0.13	0.33	28
	6 – 10%	7.8	16.8	7.2	21.7	9.38	4.44	0.33	1456	0.15	0.08	0.20	16
	2 – 6%	3.8	12.4	4.5	16.0	6.60	2.59	0.21	1178	0.12	0.05	0.15	27
	0 – 2%	1.2	5.2	1.5	11.0	3.89	0.97	0.09	476	0.05	0.02	0.10	11
<b>Poultry</b>	average	10.5	58.0	27.7	32.4	20.80	13.31	0.82	5570	0.56	0.30	0.30	137
	10 -18%	13.8	65.7	34.9	36.6	24.93	16.75	0.95	6203	0.62	0.38	0.34	76
	6 – 10%	8.2	57.6	24.6	31.1	19.16	11.86	0.8	5608	0.56	0.27	0.29	36
	2 – 6%	4.2	36.9	10.5	22.7	11.00	5.21	0.49	3701	0.37	0.11	0.21	24
	pullets	16.3	70.6	39.6	37.8	27.16	19.72	1.09	6320	0.63	0.43	0.35	10
	layers	10.9	56.9	27.4	30.3	20.07	13.23	0.81	5440	0.54	0.30	0.28	55
<b>Runoff</b>		0.7	3.2	1.0	9.2	3.16	0.57	0.05	310	0.031	0.01	0.09	49
<b>Milk-fed Veal</b>		1.5	5.5	2.1	19.4	9.41	1.06	0.08	553	0.06	0.02	0.18	3
<b>Biosolids</b>	aerobic	2.0	4.3	5.5	0	4.34	3.14	0.12	109	0.01	0.06	0	10
	anaerobic	4.4	13.1	12.9	0	11.68	6.87	0.28	776	0.08	0.14	0	39

- <sup>1</sup> Useable N = amount of Nitrogen available in the year of application assuming spring application incorporated within 24 hours
- A simplified useable N for **fall applied** manure = [(% total N x 0.5) x 20] for solid manure
- <sup>2</sup> Value of manure is based on purchase price of an equivalent amount of mineral fertilizer (N-P205-K20 = 0.50-0.40-0.30 \$/lb)
- The actual immediate value for crop production will be less if all the nutrients applied are not required for growing the crop

## Solid Manure - Available Nutrients and Value for Manure from Various Livestock Types

Animal Type	DM Range	Ave DM	Usable N <sup>1</sup>	P205	K20	Year 1 value <sup>2</sup>	Year 2-4 value	Total N	NH4-N	NH4-N	P	K	# Samples
Available Nutrients (in year of application)				Value				Total Nutrient Content (as is basis)					
		%	lbs/ton			\$/ton		%	ppm	%	%	%	
<b>Hog</b>	average	30.2	8.0	8.5	12.1	11.04	4.48	0.90	2702	0.27	0.46	0.56	61
<b>Dairy</b>	average	25.0	3.6	3.0	10.5	6.17	2.01	0.59	1221	0.12	0.17	0.49	174
	30% +	38.9	3.1	3.1	11.4	6.24	2.21	0.65	796	0.08	0.17	0.53	36
	18 - 30%	21.3	3.7	3.0	10.3	6.14	1.95	0.57	1331	0.13	0.16	0.48	138
<b>Beef</b>	average	28.4	3.8	4.3	12.2	7.27	2.81	0.74	1028	0.10	0.24	0.57	184
	30% +	38.1	4.3	6.9	15.9	9.66	4.21	0.95	951	0.10	0.38	0.74	62
	18 - 30%	23.5	3.5	3.0	10.4	6.06	2.10	0.63	1067	0.11	0.16	0.48	122
<b>Sheep</b>	average	33.8	5.9	5.2	16.7	10.01	3.04	0.80	2299	0.23	0.28	0.78	57
<b>Dairy Goats</b>	average	35.2	7.5	5.2	22.2	12.49	3.39	1.07	2865	0.29	0.28	1.03	41
<b>Composted Cattle</b>		38.3	5.8	5.2	23.8	12.09	3.43	0.86	543	0.05	0.28	1.10	29
<b>Compost all types</b>		38.9	6.3	8.3	17.7	11.77	4.56	0.84	1035	0.10	0.45	0.82	63
<b>Grain-fed Veal</b>	average	28.8	4.4	3.3	10.2	6.58	2.46	0.79	1328	0.13	0.18	0.47	18
<b>Horses</b>	average	37.4	2.6	2.8	9.3	5.22	1.85	0.50	749	0.07	0.15	0.43	41
	>50%	63.0	1.8	3.9	19.1	8.18	2.81	0.80	591	0.06	0.21	0.89	4
	<50%	34.6	2.6	2.7	8.2	4.82	1.74	0.47	769	0.08	0.15	0.38	37
<b>Poultry</b>	average	55.3	21.1	22.1	26.8	27.42	12.09	2.45	5339	0.53	1.20	1.24	809
	80% +	85.1	22.7	31.1	37.6	35.07	17.79	3.36	2129	0.21	1.69	1.74	59
	60 - 80%	71.0	23.8	25.9	33.5	32.34	14.65	3.00	4868	0.49	1.41	1.55	358
	40 - 60%	50.0	19.7	22.8	26.8	27.00	12.08	2.25	5144	0.51	1.24	1.24	146
	18 - 40%	28.5	17.7	13.6	14.3	18.56	6.90	1.55	6976	0.70	0.74	0.66	246
	layers	34.2	21.0	16.3	17.4	22.21	8.47	1.93	7810	0.78	0.89	0.80	161
	pullets	47.9	27.5	25.0	29.2	32.52	14.12	3.14	7236	0.72	1.36	1.35	50
	broilers	68.5	23.8	24.5	32.8	31.53	14.30	3.09	4364	0.44	1.33	1.52	48
	Broiler breeder growers	63.6	15.1		28.3	26.48	13.21	1.92	2965	0.30	1.42	1.31	24
	Broiler breeder layers	65.1	17.1	29.1	33.7	30.27	14.85	2.21	3175	0.32	1.58	1.56	74
<b>Turkeys</b>		50.6	26.1	25.8	31.3	32.74	13.60	2.74	8038	0.80	1.40	1.45	61
<b>Biosolids</b>	dewatered	32.1	26.7	24.1	2.4	23.70	15.45	3.76	3443	0.34	1.31	0.11	89

- <sup>1</sup> Useable N = amount of Nitrogen available in the year of application assuming spring application incorporated within 24 hours
- A simplified useable N for **fall applied** manure =  $[(\% \text{ total N} \times 0.5) \times 20]$  for solid manure
- <sup>2</sup> Value of manure is based on purchase price of an equivalent amount of mineral fertilizer (N-P205-K20 = 0.50-0.40-0.30 \$/lb)
- The actual immediate value for crop production will be less if all the nutrients applied are not required for growing the crop

## Other Livestock - Available Nutrients and Value for Manure from Various Livestock Types

Animal Type	Ave DM	Usable N <sup>1</sup>	P <sub>2</sub> O <sub>5</sub> <sup>2</sup>	K <sub>2</sub> O	Year 1 Value <sup>3</sup>	Year 2-4 Value	Total N	NH <sub>4</sub> -N	NH <sub>4</sub> -N	P	K	# Samples
	Available Nutrients (in year of application)	Value	Total Nutrient Content (as is basis)									
	%	lbs/ton	\$/ton	%	ppm	%	%	%				
Bison	19.4	1.6		1.7	1.97	1.24	0.37	315	0.03	0.09	0.08	10
Elk	30.5	3.1		5.2	4.59	2.61	0.73	620	0.06	0.20	0.24	13
Red Deer	25.0	2.6	3.1	4.3	3.86	2.22	0.62	514	0.05	0.17	0.20	6
White Tailed Deer	31.1	5.0	7.9	7.6	7.93	5.19	1.27	784	0.08	0.43	0.35	6
Fallow Deer	29.4	3.6	6.4	7.6	6.66	3.94	0.87	680	0.07	0.35	0.35	6
Llama	34.9	3.1	6.4	5.4	5.73	3.75	0.75	558	0.06	0.35	0.25	16
Alpaca	27.1	3.3	7.4	5.0	6.07	3.92	0.66	867	0.09	0.40	0.23	11
Wild Boar	29.8	4.4	6.1	7.6	6.90	3.55	0.72	623	0.06	0.33	0.35	6
Chinchilla	65.7	11.1	11.4	21.6	16.58	7.12	1.87	3642	0.36	0.62	1.00	7
Rabbit	45.5	5.6	15.8	13.8	13.27	8.19	1.22	1281	0.13	0.86	0.64	20
Fox	35.4	16.6	27.8	8.2	21.89	13.35	1.80	4856	0.49	1.51	0.38	9
Mink average	50.6	32.8	30.9	15.1	33.28	15.30	2.97	12465	1.25	1.68	0.70	65
kittens	70.3	47.0	35.1	19.0	43.26	18.01	4.16	18363	1.84	1.91	0.88	8
adults	60.1	44.2	39.8	20.2	44.10	19.75	3.95	17055	1.71	2.16	0.94	21
composted carcasses	45.9	6.12	10.3	5.6	8.87	5.27	0.79	1149	0.11	0.56	0.26	7
females & kits	41.7	34.9	30.7	14.3	34.04	15.43	3.17	13262	1.33	1.67	0.66	8
Pheasants	60.6	14.1	12.9	8.4	14.71	8.08	1.93	2063	0.21	0.70	0.39	9
Partridge	71.9	29.7	23.4	24.6	31.59	15.36	4.01	4705	0.47	1.27	1.14	8
Quail	59.6	33.8	19.8	23.1	31.76	15.77	4.96	3384	0.34	1.075	1.07	8
Squab (Pigeon)	48.6	16.2	17.5	17.9	20.49	9.89	2.04	3335	0.33	0.95	0.83	6
Duck	36.3	11.2	5.5	8.0	10.23	3.42	1.1	3867	0.39	0.30	0.37	8
Ostrich	40.8	3.6	9.9	7.1	7.92	5.02	0.68	633	0.06	0.54	0.33	7
Emu	25.9	7.6	5.3	6.9	7.99	3.42	1.01	2516	0.25	0.29	0.32	9
Rhea	28.7	5.9	9.9	7.6	9.21	5.09	0.84	1837	0.18	0.54	0.35	3

- <sup>1</sup> Useable N = amount of Nitrogen available in the year of application assuming spring application incorporated within 24 hours
- A simplified useable N for **fall applied** manure = [(% total N x 0.5) x 20] for solid manure
- <sup>2</sup> Represents half the total phosphorus that is immediately available. The other half is available within a year of application
- <sup>3</sup> Value of manure is based on purchase price of an equivalent amount of mineral fertilizer (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O = 0.50-0.40-0.30 \$/lb)
- The actual immediate value for crop production will be less if all the nutrients applied are not required for growing the crop