APPENDIX D

Calculating Minimum Separation Distance (MSD)

The MSD calculation in Table D.1 requires you to calculate the base distance (the value for "A" is found in Table D.2), expansion factor (the value for "B" is found in Table D.3), manure system factor (the value for "C" is found in Table D.4)) and the livestock or animal unit factor (the value for "D" is found in Table D.5).

TABLE D.1
Minimum Separation Distances (MSD)

	MSD (metres)
Nearest neighbouring dwelling	A x B x C x D
Residential, commercial or recreational areas	2 x A x B x C x D
Public buildings	3 x A x B x C x D

TABLE D.2
Base Distance as a Function of Number of Animal Units (A)

Animal Units	**Base Distance (metres)**
0 - 100	300
101 - 200	400
201 - 300	475
301 - 400	550
401 - 500	600
501 - 600	650
> 600	700

Adapted from Manure Management Guidelines for New Brunswick, New Brunswick Agriculture and Rural Development, Novmeber 4, 1996

TABLE D.3

Expansion Factor as a Function of % Increase (B)

% Increase *	**Expansion Factor**
0 - 50	0.7
51 - 75	0.77
76 - 100	0.83
101 - 150	0.91
151 - 200	0.97
201 - 300	1.04
301 - 400	1.08
401 - 500	1.11
> 500	1.14
New Operations	1.16

* % increase = (proposed AU-present AU) ÷ present AU, then x 100.

TABLE D.4

Manure System Factor (C)

Manure System	**Factor**
Dry litter in-situ	0.7
Solid open manure pile	0.8
Semi-solid or liquid covered concrete tank	0.8
Semi-solid or liquid open concrete tank	0.9
Semi-solid or liquid uncovered earthen tank	1.0

TABLE D.5

Livestock Factor Based on Livestock & Housing Type (D)

Manure System	Type of Housing	Factor
Dairy Cows	Tie stall	0.65
Dairy Cows	Free stall	0.7
Dairy Heifers	Barn confinement	0.7
Dairy Heifers	Barn with yard	0.8
Veal		1.0
Beef	Barn confinement	0.7
Beef	Barn with yard	0.8
Swine		1.0
Horses		0.65
Sheep		0.7
Goats		0.7
Foxes		1.1
Mink		1.1
Rabbits		0.8

For example:

1) For an existing 80 cow dairy operation with less than 50% expansion, free stall, liquid manure with an earthen manure storage:

   MSD to nearest neighbouring dwelling (A x B x C x D) = 300 (Table D.2, base distance for 0-100 animal units) x 0.7 (expansion factor of less than 40 which falls under the 0-50 category as shown in Table D.3) x 1.0 (manure system factor in Table D.4) x 0.7 (livestock factor in Table D.5) = 147 metres.

2) For a new operation using the above example:

   MSD to nearest neighbouring dwelling = 300 (Table D.2, base distance for 0-100 animal units) x 1.16 (expansion factor for new operations as shown in Table D.3) x 1.0 (manure system factor in Table D.4) x 0.7 (livestock factor in Table D.5) = 244 metres.

3) What if the expansion will add different types of livestock? In this case an appropriate expansion factor must be calculated. For example, a 100 sow farrow and 50 weaner operation (semi-solid manure) that is currently selling weaners is expanding to add an additional 500 feeder hog component.

   In this example, you must calculate the expansion factor given that the farm is adding more of a different type of livestock (in this case, feeder hogs).

   i)First, calculate the current animal units using Table D.6:

   100 sows ÷ 5.1 (see Table D.6 at the end of this example) = 19.6
   50 weaners ÷ 23 (Table D.6) = 2.2

Therefore, current animal units are 19.6 + 2.2 = 21.8 [current]

ii) Then calculate the proposed new animal units:

500 feeder hogs ÷ 6.5 (Table D.5) = 76.9 animal units [proposed]

iii) Next, calculate the % increase in animal units:

% increase = (proposed animal units + present animal units) ÷ present animal units

% increase = (76.9 + 21.8) ÷ 21.8 = 4.59 x 100 = 459% increase

iv) From Table D.3, calculate the expansion factor to use in the MSD calculation:

459% falls into the 401-500% increase category which has a factor of 1.11

v) Finally, calculate the MSD:

MSD to nearest neighbouring dwelling = 300 (Table D.2, base distance for 0-100 animal units) x 1.11 (expansion factor in Table D.3) x 0.9 (semi-solid manure system factor in Table D.4) x 1.0 (livestock factor for swine in Table D.5) = 298 metres

TABLE E.6

Animal Units (AU)
Number of Animals Required to Produce the Nitrogen to Fertilize 0.4 Hectares (One Acre) of Hay

Animal Type	Animals/Ac (@ 110 kg N/ha or 44 kg/ac)
Dairy Cow (1)	0.8
Beef Cow	1.1
Beef Feeder	1.7
Sow (2)	5.1
Feeder Hog	6.5
Weaners	23
Sheep (2)	4.6
Goat (2)	4.6
Fox (3)	40 (4)
Mink (3)	80 (4)
Rabbit (3)	40 (4)

1. Includes calf until 150 kg (330 lb).
2. Includes offspring until weaned.
3. Includes offspring until market size.
4. Animal units adapted from Ontario.