Virginia Engineering Design Note 316

Design of Large Animal Mortality Composting Facilities

April 2013

Large animals can be composted in windrows or static piles on unroofed pads or in roofed bins. The selection of the facility type is determined by the size and number of animal mortality, the site conditions, the producer requirements, etc. When the number of expected annual mortality is fairly small (less than about five large animals), a square or round static pile could be used. A windrow would be used when the number of expected annual mortality is larger. The same technique is used to size the composting pad. A bin composter could be selected if there are site constraints or environmental concerns that would preclude the use of an unroofed facility. This Design Note can be used to size the mortality composting pad. Use AWMFH, Chapter 10, or NEH 637, Chapter 2, to design a bin composter.

Reminder: The required separation distances for selecting a mortality composter site are not affected by the type of mortality composter that is selected. Refer to Virginia Engineering Design Note 2 for required separation distances.

Needed Information

1. Average annual number of mortality (D) and average weight.
2. Dimensions of average animal. (Use Table 2 and round up to whole numbers.)
3. Preferred composter type.
4. Amount of space available for composting facility.

Composting Period

Table 1. Cycle times required for composting mortalities of various sizes. (Keener and Elwell, 2000)

Mortality size (lbs.)	**4**	**10**	**50**	**100**	**220**	**350**	**500**	**1000**	**1500**
Primary stage (days)	10	16	35	50	75	95	115	160	195
Secondary stage (days)	10	10	12	15	25	30	40	55	65
Storage stage (days)	30	30	30	30	30	30	30	30	30

Table 2. Average dimensions of cows and pigs for selected weights.

Animal	**Weight, lbs**	**Length, ft**	**Width, ft**	**Height, ft**
Cow	600	6.4	1.9	4.0
	1000	7.9	2.3	4.5
	1500	8.5	2.7	4.7
Pig	30	2.2	0.4	1.4
	125	3.4	0.9	2.0
	250	4.4	1.0	2.6

Windrow or Static Pile Composting Facility

Operation

Composting is a biological process that breaks down waste material into a useful product. There are normally three stages in the composting process: primary, secondary, and finishing. In the primary stage, the animal carcasses are placed in a static pile or a windrow along one side of the pad and left alone until the primary time is complete. The mortality composting time is determined by the weight of the carcass but can vary depending on the cover material used as the carbon source. A few days after the windrow is built, the material will heat up as the bacteria population begins to increase. Towards the end of the primary stage, the material will become cooler as the process begins to slow down.

After the primary time is complete, the material will be moved to the other side of the pad to begin the secondary composting stage. Since the volume of material is reduced by about half in the primary stage, the secondary stage requires only half the space. During the transfer from the primary windrow to the secondary windrow, it is important to pick up the compost and put it into the new windrow rather than push it from one place to another. This will fluff the material and ensure that oxygen is added. The secondary windrow will also heat up. This stage is much shorter than the primary stage.

When the secondary time is complete, the compost material is ready for the finishing stage. The compost must be stirred again but finishing can be done on the pad or in an off-site location. The finishing time of 30 days allows the compost to stabilize prior to land application. The compost typically will not heat up during the finishing stage. Since the heat cycles in the primary and secondary stages will destroy the weed seeds, the compost material should be covered to avoid re-contamination with weed seeds that are blown onto the pile if weeds are a concern during land application.

Design

The planned management of the compost pad and the site constraints will determine the total amount of storage area needed. Assume that the mortality is evenly distributed throughout the year. Pad space will be needed for primary and secondary composting. Finished compost does not need to be stored on the pad in most cases. Table 3 contains a list of the variables used in these computations.

Step 1. Determine the primary compost time in days (PCT-d) from Table 1. Interpolate as needed. Calculate the number of composting cycles (C) per year. C = 365 / PCT-d, rounded to nearest whole number. This process will size the pad for two windrows. (Secondary composting requires less time than primary composting. With two windrows, all of the composting in one windrow will be complete by the time the space is needed again. If space constraints require more than two windrows, make the adjustments in Steps 6-8.)

Step 2. Determine the secondary compost time in days (SCT-d) from Table 1. Interpolate as needed. The PCT and the SCT will be used in the Management Worksheet. A Finishing time of 30 days will also be used in the Management Worksheet.

Table 3. Variables used in the computations.

Variable	Meaning
A	Dimension of animal across **width** of windrow (Table 2, rounded up to whole number) A = Length of animal if carcass is placed cross-wise on windrow A = Height of animal if carcass is placed length-wise in windrow
B	Dimension of animal down **length** of windrow (Table 2, rounded up to whole number) B = Height of animal if carcass is placed cross-wise on windrow B = Length of animal if carcass is placed length-wise in windrow
C	Number of composting cycles per year (Step 1)
D	Average annual number of mortality (from Producer)
E	Total number of animals in windrow (Step 6)
F	Number of animals along length of windrow (Step 6)
G	Length of carcasses in the windrow (Step 6)
LC	Length of carcasses in windrow based on windrow layout (Step 6)
PCT-d	Primary compost time in days (Step 1, Table 1))
PCT-m	Primary compost time in months (used in Management Worksheet)
SCT-d	Secondary compost time in days (Step 2, Table 1)
SCT-m	Secondary compost time in months (used in Management Worksheet)
TL	Total length of pad (Step 8)
TLW	Total length of windrow (Step 7)
TW	Total width of pad (Step 5)
TWW	Total width of windrow (Step 4)
W	Width of carcass (Table 2, rounded up to whole number)
WC	Width of carcasses in windrow (Step 3)
WPC	Width of primary compost pile (Step 3a)

Step 3. Determine the width of the carcasses (WC) in the primary compost windrow (Figure 1). The site constraints and allowable width of the primary compost pile will determine the orientation of the carcasses. If the carcasses are placed lengthwise in the windrow, "A" will be equal to the height of the animal (example: 5' for a 1500-lb cow). If the carcasses are placed cross-wise in the windrow, "A" would be measured from head to tail (example: 4' for a 125-lb pig). Decide if the pile will be one or two carcasses wide. Large carcasses, such as dairy cows, could be placed spine-to-spine oriented lengthwise or could be placed cross-wise with a single

animal per row. Smaller carcasses, such as calves or pigs can be placed end-to-end across the width of the windrow. Adjacent carcasses need to be separated by 2 feet.

One animal wide: WC = A

Two animals wide: WC = A + 2' + A

Step 3a. Determine the total width of the primary compost pile (WPC). This is measured on top of the bedding (directly under the carcasses). "W" is the width of the carcass from Table 2, rounded up to a whole number.

WPC = (W+1) + WC + (W+1)

If WPC > 20', change the orientation of the animals or make the windrow only one animal wide. A windrow that is greater than 20' in width may not get adequate air circulation. Repeat Step 3.

Step 4. Determine the total width needed for the primary and secondary windrow. The secondary windrow will be parallel to the primary windrow. It will be created by scooping up the primary windrow from one side of the pad and dumping it on the other side (Figure 2). The carcass width of the secondary windrow will be half the carcass width of the primary windrow. Add this width to the calculated carcass width of the primary windrow. The bedding under the primary compost pile will be 2' deep with a 1:1 taper on each side. This will add 4' to the width of the windrow. Add the end tapers to get the total width of one windrow (TWW).

TWW = (W+1) + WC + (½ *WC) + (W+1) + 4'

Step 5. Compute the total width of pad (TW) by adding 2' on each side of pad. If windrows are side-by-side, put a minimum of 12' between them.

Step 5a. End-to-end windrow. TW = 2' + TWW + 2'

Step 5b. Side-by-side windrow. TW = 2' + TWW + <u>12</u>' + TWW + 2'

<u>Note:</u> To make the construction of the site more economical for side-by-side windrows, use Step 5a to compute the width of two individual pads and use gravel in the working space between the pads.

Step 6. Determine the length of the mortality in the windrow (LC). The amount of time that animals will be added to a windrow is one primary cycle (PCT-d) or six months, whichever is shorter.

- Divide the total number of expected mortalities (D) by the number of composting cycles in a year (C) to get the number of animals in a windrow (E). E = D/C

- If the windrow is two animals wide, divide the number of animals in a windrow (E) by 2 to get the number of animals along the length of the windrow (F). F = E/2

If the windrow is one animal wide, F=E.

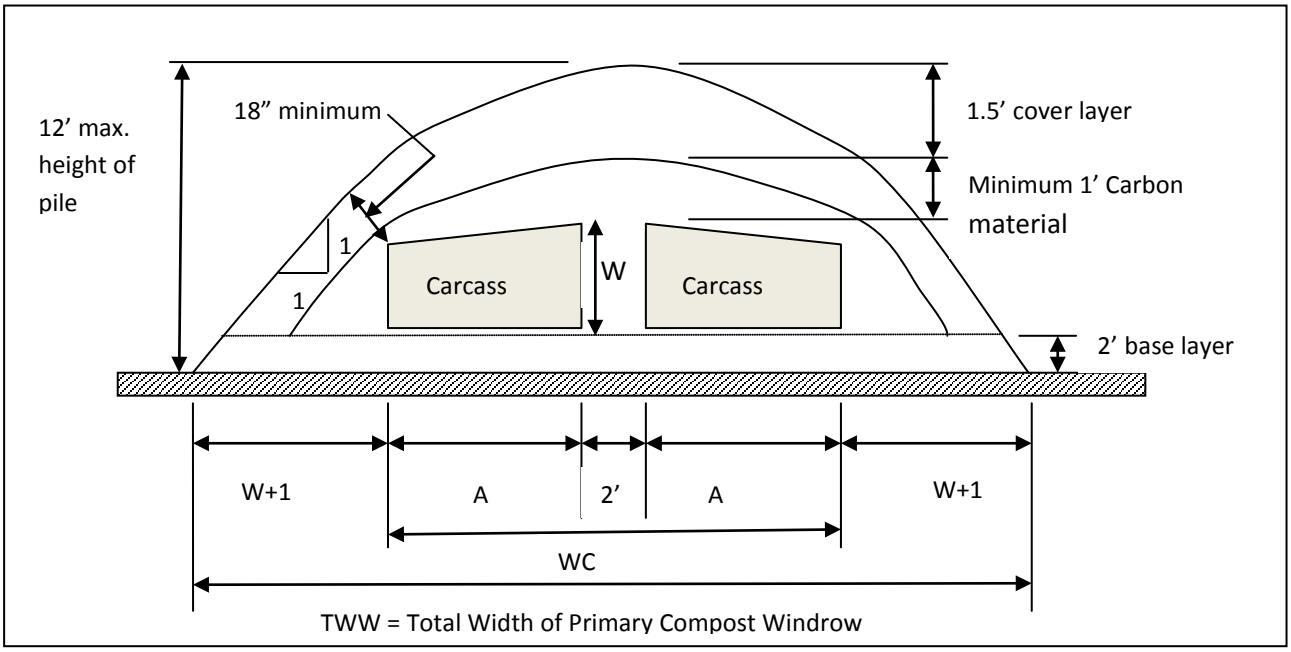
- Multiply F times the "B" dimension to get the length of carcasses in the windrow (G). The carcasses will be placed in the row in a way so that they overlap but are not actually touching. See Figure 3. (Because of the way the animals are "shingled," there is no need to add additional space between the animals in the lengthwise direction.) Orient the windrows so that the precipitation that falls on the pad will run off rather than soak into a windrow.

G = F * B

<u>Step 6a.</u> For a narrow site, put the windrows end-to-end. LC = 2 x G.

<u>Step 6b.</u> For a wide site, the windrows can be placed side-by-side. LC = G.

Figure 1. Width of primary compost windrow for two animals placed side-by-side.



A = dimension of animal measured along width of pad

W = width (thickness) of largest animal

B = the other dimension of animal, measured along length of pad

Taper = W + 1'

Step 7. Compute total length of the windrow. Add a length of W+1 to each end for the average end taper. Add 4' for the bedding.

TLW = (W+1) + LC + (W+1) + 4'

Step 8. Compute total length of pad (TL). Add 2' to each end of the pad.

TL = 2 + TLW + 2

Step 8a. Check total area of pad. By State Regulation, the composting area cannot exceed 1/3 acre (14,520 SF). Area = TW * TL

Step 9. Plan for 12'or 15' wide gravel HUAP around perimeter of pad.

These calculations may be adjusted to reflect site or time constraints or management requirements.

Figure 2. Placement of secondary compost pile in relation to primary pile.

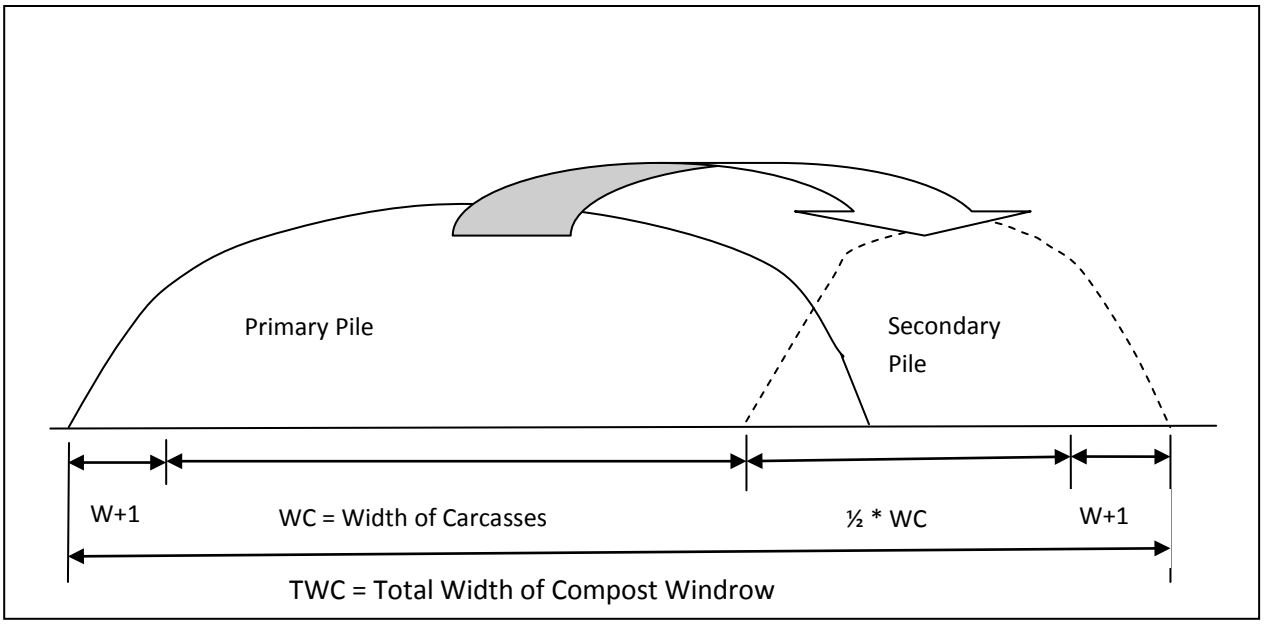
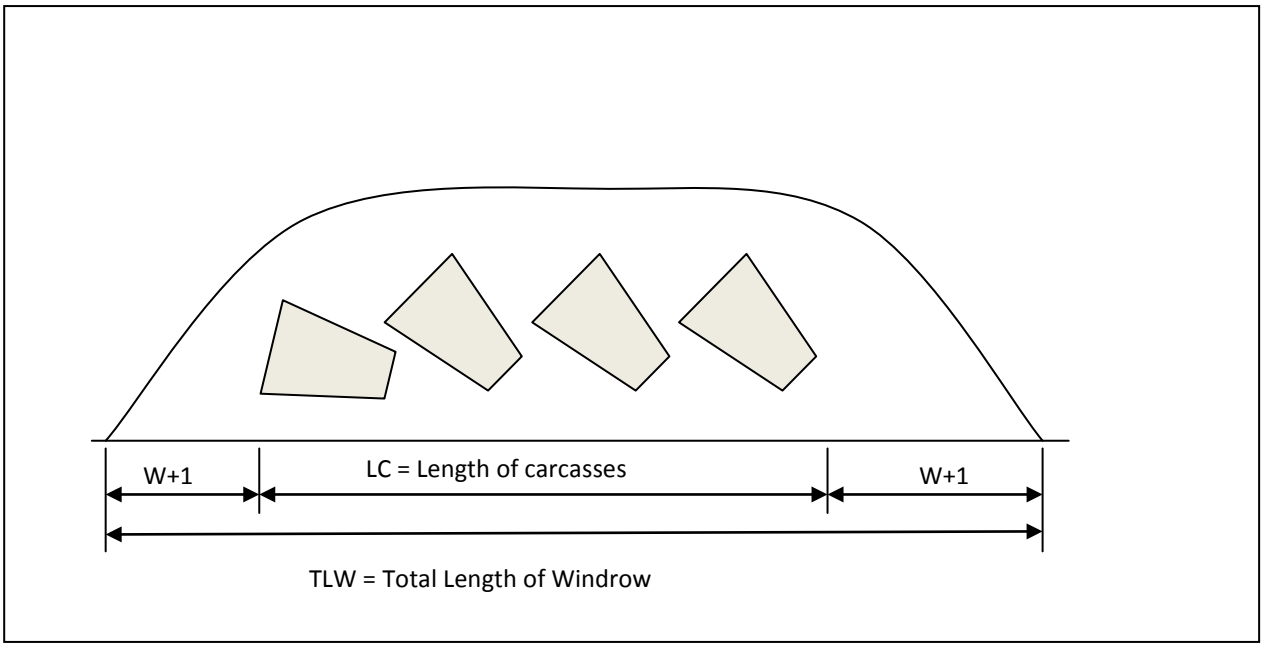


Figure 3. Length of windrow



Composting in Bins

Although bins can be used to compost large animals, there is a point where it will not be economically feasible for most producers. Use the method described in Chapter 10 of the Agricultural Waste Management Field Handbook or Chapter 2 of NEH 637 to calculate the needed bin size and quantity. Assume a life cycle of one year unless other information is available.

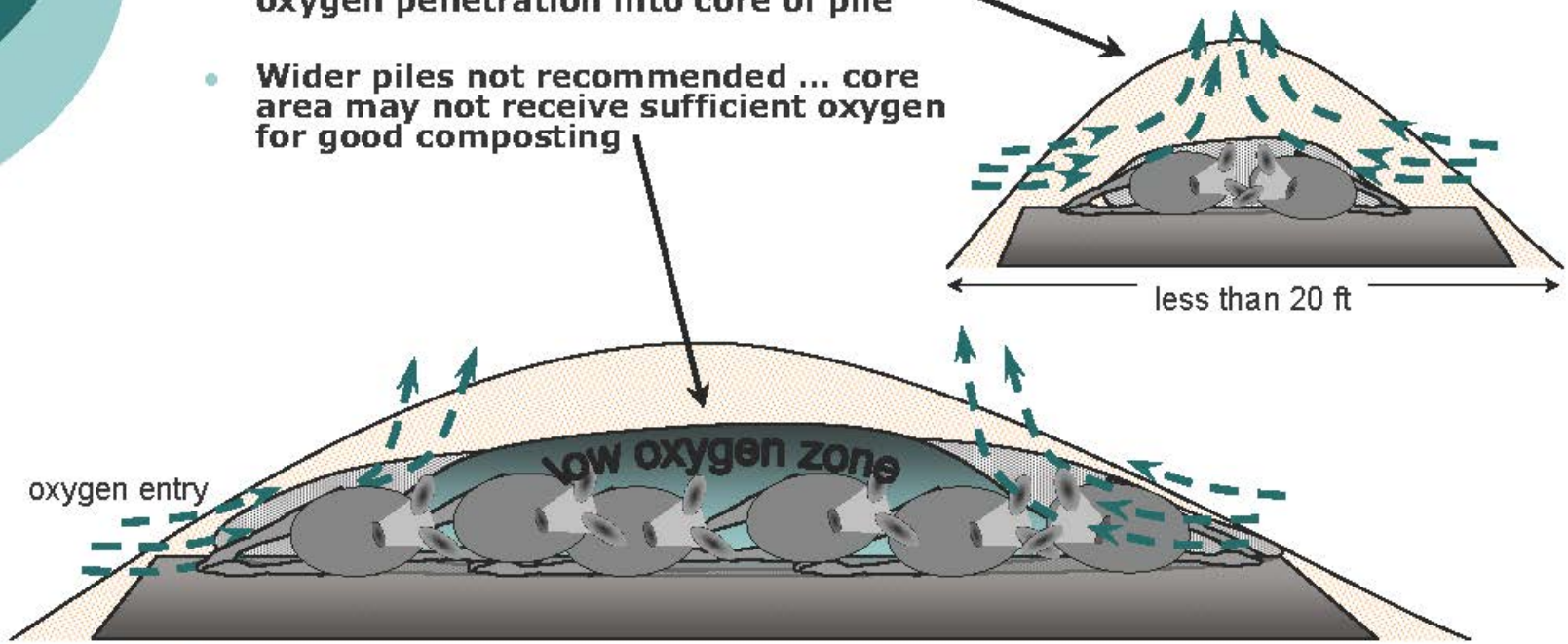
References

Keener, H.M. and D.L. Elwell. 2000. Dead Animal Composting. http://www.dep.state.pa.us/dep/deputate/watermgt/WSM/WSM_TAO/InnovTechForum/InnovTechForum-IIC-Keener.pdf

Morse, D.E., K. Friendshuh, M. Hanks, R. Iwan, and D. Schmidt. 2001. Composting Animal Mortalities. Agricultural Development Division. Minnesota Department of Agriculture. St. Paul, MN. http://www.mda.state.mn.us/composting/compostguide.pdf

Figure 4. Requirements for good oxygen flow

- **Windrow base width**
  - **Less than 20 ft .... for acceptable oxygen penetration into core of pile**
  - **Wider piles not recommended ... core area may not receive sufficient oxygen for good composting**



IOWA STATE UNIVERSITY

Developed by Dr. Tom Glanville and Dr. Jay Harmon, Department of Agricultural & Biosystems Engineering, Iowa State University, for ISU outreach program on *Poultry & Livestock Disposal in Iowa*, sponsored by Iowa Department of Natural Resources.

Design Example for a composting pad: Swine operation

1. Yearly mortality of 150 sows/finishers with an average weight of 250 pounds.
2. Approximate dimensions of mortality from Table 2 – 4.4'L x 1.0'W x 2.6'H. Use 5'L x 1'W x 3'H.
3. Concrete pad.
4. There is sufficient space meeting the required separation distances.

Step 1. PCT-d = [(250-220)/(350-220)] * (95-75) +75 = 80 days (PCT-m = 3 months)

C = 365/80 = 4.56 There will be four primary cycles during the year.

Step 2. SCT-d = [(250-220)/(350-220)] * (30-25) +25 = 26 days (SCT-m = 1 month)

Step 3. Pile will be two animals wide oriented spine to spine. A = 3', B = 5', W = 1.0'

WC = A + 2 + A = 3' + 2' + 3' = 8'

Step 3a. WPC = (W+1) + WC + (W+1) = (1+1) + 8 + (1+1) = 12' < 20' Okay

Step 4. TWW = (W +1) + WC + (1/2 * WC) + (W + 1) + 4'

= (1.0 + 1) + 8 + (1/2 * 8) + (1.0 + 1) + 4' = 20'

Step 5. Side by side windrows, 12' apart.

Total width of pad (TW) = 2 + TWW + 12 + TWW + 2 = 2 + 20 + 12 + 20 + 2 = 56'

Step 6. Number of animals in a windrow (E) = (D)/(C) = 150/4 = 37.5 Use 38 mortalities/windrow.

Number of animals along length of windrow (F) = (E)/2 = 38/2 = 17

Length of carcasses in windrow (G) = (F)*(B) = 17 * 5 = 85'

Side-by-side windrow: LC = G = 85'

Step 7. Total Length of Windrow (TLW) = (W + 1) + LC + (W+1) + 4'

= (1.0 + 1) + 85' + (1.0 + 1) + 4' = 93'

Step 8. Total Length of Pad (TL) = 2' + TLW + 2' = 2' + 93' + 2' = 97'

Total dimensions of pad: 56' wide x 97' long

Total area of pad: 5,432 SF < 14,520 SF Okay

Note: If the working area in the center is gravel rather than concrete, the individual pads would be 24' wide and 97' long for a total composting area of 4,656 SF.

Management Worksheet

The Management Worksheet is used to show how the compost pad can be managed. The first two examples are for ideal situations where there is mortality every month and every management activity is done at the scheduled time. The third example shows what is more likely to happen in real life. The Management Worksheet has one chart that deals with the time required for each composting cycle and one chart that shows the location of the compost on the pad at any given time in the compost cycle.

Location Chart ("Address" on pad)

The shaded portion of the Location Chart represents the pad and the two windrows used for active composting.

There is one column for each month of the two active composting cycles. These columns are labeled with lower-case letters beginning with "a" for Windrow 1. If the animals are added to Windrow 1 for six months, Windrow 2 will begin with the letter "g" as shown in the example for a dairy operation. If the animals are added to Windrow 1 for less than six months, the number of columns used for each windrow will be the same as the number of months of primary composting. Windrow 2 will start with the next consecutive letter. A three-month primary composting cycle will use letters "a", "b", and "c" for Windrow 1 and letters "d", "e", and "f" for Windrow 2 as shown in the example for a swine operation.

There is one row for each of the three stages of composting: Primary, Secondary, and Finishing. Each block of the pad has a label that designates the stage and month of the composting cycle. This label is the "pad address." The first mortality will be placed in pad address "P-a." All of the mortalities for that first month will also be placed in this space. At the end of the first month and each succeeding month, put a mark on the pad at the end of the windrow. The mortalities for the second month will be placed in pad address "P-b." Because the number of mortalities will vary from month to month, the length of the windrow at a pad address will be different for each month. Regardless of the number of mortalities in a given month, the animals will be placed in the windrow in a continuous manner as shown in Figure 3.

When the mortality at "P-a" has completed the time required for the primary cycle, the windrow will be transferred to pad address "S-a" for the secondary compost cycle. At the end of each subsequent month, one section of the windrow will be transferred from the primary windrow to the secondary windrow.

After the time for the secondary compost has been achieved, the composted material needs to "finish" for 30 days before it can be spread. The compost may be moved off the pad for the finishing stage. If it is left on the pad, it will need to be stirred. The finished material must be moved off the pad by the time the space is needed for a new primary windrow. The "F-a" address for the finished compost from Month 1 could be on or off the pad. For the purposes of this worksheet, the address is used to designate time rather than a specific location.

By state regulation, 75% of the finished compost must be utilized within one year. If the material is land-applied on the farm where it was generated, no permit is required. Off-site use of the compost may require a permit. Spreading the compost must be done in accordance with the Nutrient Management Plan.

Time Chart

Note: The number of months that animals are added to a windrow may be different from the number of months that are needed to complete the composting.

Year: Two years are shown.

Month: The month column contains a number and a blank space. Composting of the first mortality will begin in Year 1/Month 1. The producer will fill in the first letter of the month in which that occurs in the Month 1 blank and then fill in the succeeding months.

Windrow 1 – Primary: The pad address for the compost will be placed in the block for each month of the windrow cycle. The mortality generated in Year 1/Month 1 will be placed in pad address 'P-a." At the end of the windrow cycle time, start Windrow 2. If there is more mortality than planned for a side-by-side windrow system, start the other windrow to accommodate the additional carcasses. For an end-to-end windrow system, continue into the space for Windrow 2.

Windrow 1 – Secondary: The Primary Compost Time (PCT-d) identified in Step 1 of the Design process does not begin for a pad address until the end of that month. Using a 30-day month, convert the PCT-d to months and round up to the nearest number of months to get PCT-m. In the Secondary column, start at the end of Year 1/Month 1 and mark off the number of months before secondary composting can begin. Put the pad address of the compost in the first month after the PCT-m is complete.

Windrow 1 – Finishing: The Secondary Compost Time (SCT-d) identified in Step 2 of the Design process for a pad address starts at the beginning of the month. Using a 30-day month, convert the SCT-d to months and round up to the nearest number of months to get SCT-m. In the Finished column, start at the beginning of the secondary compost period and mark off the time needed for secondary composting. Put the pad address of the compost in the first month after the SCT-m is complete. Compost that has completed the secondary time needs to "finish" for a minimum of 30 days before it is utilized. Finished composted may be left on the pad until the pad space is needed but should be turned again.

Windrow 2 – Primary: At the end of the primary cycle time for Windrow 1, begin the process again with Windrow 2.

Windrow Management Worksheet

The O&M Plan has spaces for the required composting times.

Management Example for composting pad: Swine operation.

PCT-d = 80 days PCT-m = 3 months

SCT-d = 26 days SCT-m = 1 month

Animals will be added to Windrow 1 for 3 months. The second windrow will be used for the second three months of the year.

In this example, the number of months that animals are added to the windrow is the **same** as the number of months needed to complete the primary composting cycle. The compost placed in pad address "P-a" will need to compost for 3 months after the end of the month of mortality placement. If the first mortality is put in the windrow in January, the primary composting time begins on February 1 and extends until the end of April. Secondary composting would occur in May. The finishing period is the month of June. The finished compost must be removed from the pad at the end of June to make room for Windrow 1.

Windrow 1 would receive mortality from January through March and again from July through September. Windrow 2 would receive mortality from April through June and again from October through December.

Management Example for composting pad: Dairy operation.

PCT-d = 195 days PCT-m = 7 months

SCT-d = 65 days SCT-m = 3 months

Animals will be added to Windrow 1 for 6 months before beginning Windrow 2. At the end of the second 6-month period, Windrow 1 will be started again.

In this example, the number of months that animals are added to the windrow is **different** from the number of months needed to complete the primary composting cycle. The compost placed in pad address "P-a" will need to compost for 7 months after the end of the month of mortality placement. If the first mortality is put in the windrow in January, the primary composting time begins on February 1 and extends until the end of August. Secondary composting would occur in September, October, and November. The finishing period is the month of December. The finished compost must be removed from the pad at the end of December to make room for Windrow 1.

Windrow 1 would receive mortality from January through June. Windrow 2 would receive mortality from July through December.

Windrow Management Worksheet

Management Example 1 for a swine operation.

Time		Windrow 1			Windrow 2		
Year	Month	Primary	Secondary	Finished	Primary	Secondary	Finished
1	1 _J_	P-a					
	2 _F_	P-b	PCT				
	3 _M_	P-c					
	4 _A_				P-d		
	5 _M_		S-a	SCT	P-e	PCT	
	6 _J_		S-b	Finishing	P-f		
	7 _J_	P-a	S-c	F-a (moved off pad)			
	8 _A_	P-b		F-b (moved off pad)		S-d	SCT
	9 _S_	P-c		F-c (moved off pad)		S-e	Finishing
	10 _O				P-d	S-f	F-d (moved off pad)
	11 _N		S-a		P-e		F-e (moved off pad)
	12 _D		S-b	Finishing	P-f		F-f (moved off pad)
2	1 _J_	P-a	S-c	F-a (moved off pad)			
	2 _F_	P-b		F-b (moved off pad)		S-d	
	3 _M_	P-c		F-c (moved off pad)		S-e	Finishing
	4 _A_				P-d	S-f	F-d (moved off pad)
	5 _M_		S-a		P-e		F-e (moved off pad)
	6 _J_		S-b	Finishing	P-f		F-f (moved off pad)
	7 _J_	P-a	S-c	F-a (moved off pad)			
	8 _A_	P-b		F-b (moved off pad)		S-d	
	9 _S_	P-c		F-c (moved off pad)		S-e	Finishing
	10 _O				P-d	S-f	F-d (moved off pad)
	11 _N		S-a		P-e		F-e (moved off pad)
	12 _D		S-b	Finishing	P-f		F-f (moved off pad)

"Address" on pad	Windrow 1						Windrow 2					
Location on Pad / Composting stage	a	b	c				d	e	f			
P (Primary)	P-a	P-b	P-c				P-d	P-e	P-f			
S (Secondary)	S-a	S-b	S-c				S-d	S-e	S-f			
F (Finished) – move off pad	F-a	F-b	F-c				F-d	F-e	F-f			

Windrow Management Worksheet

Management Example 2 for a dairy operation.

Time		Windrow 1			Windrow 2		
Year	Month	Primary	Secondary	Finished (spread/hold)	Primary	Secondary	Finished (spread/hold)
1	1 _J_	P-a					
	2 _F_	P-b					
	3 _M_	P-c					
	4 _A_	P-d					
	5 _M_	P-e					
	6 _J_	P-f					
	7 _J_				P-g		
	8 _A_				P-h		
	9 _S_		S-a		P-i		
	10 _O		S-b		P-j		
	11 _N		S-c		P-k		
	12 _D		S-d	Finishing	P-l		
2	1 _J_	P-a	S-e	F-a (move off)			
	2 _F_	P-b	S-f	F-b (move off)			
	3 _M_	P-c		F-c (move off)		S-g	
	4 _A_	P-d		F-d (move off)		S-h	
	5 _M_	P-e		F-e (move off)		S-i	
	6 _J_	P-f		F-f (move off)		S-j	Finishing
	7 _J_				P-g	S-k	F-g (move off)
	8 _A_				P-h	S-l	F-h (move off)
	9 _S_		S-a		P-i		F-i (move off)
	10 _O		S-b		P-j		F-j (move off)
	11 _N		S-c		P-k		F-k (move off)
	12 _D		S-d	Finishing	P-l		F-l (move off)

"Address" on pad	Windrow 1						Windrow 2					
Location on Pad / Composting stage	a	b	c	d	e	f	g	h	i	j	k	l
P (Primary)	P-a	P-b	P-c	P-d	P-e	P-f	P-g	P-h	P-i	P-j	P-k	P-l
S (Secondary)	S-a	S-b	S-c	S-d	S-e	S-f	S-g	S-h	S-i	S-j	S-k	S-l
F (Finished) – move off pad	F-a	F-b	F-c	F-d	F-e	F-f	F-g	F-h	F-i	F-j	F-k	F-l

Example 3. “Real-life” scenario.

Scenario: a cow-calf operation with an annual mortality of 20 animals.

The average animal weight is about 1000 pounds (for an adult animal). Animals will be placed with two carcasses per row. The windrows will be placed end-to-end.

The primary compost time is 4 months and the secondary compost time is 2 months.

In January of Year 1, one cow dies on January 15 and is placed on the pad in location P-a. When the second one dies on January 30, she is placed next to the first one, also in location P-a. Put a mark on the pad next to the row of carcasses. The mark is placed beside the carcass rather than at the end of the windrow because the cover material will be scraped away and the next carcass will be placed close to the last one before the cover material is replaced. Since the pad was designed to have two carcasses in each row, it will be necessary to keep track of the number of animals in the row for the pad location. The primary composting period for location P-a starts on February 1.

There is not another death until April. One cow and 3 calves die. All of the carcasses are placed on the pad in location P-b which begins at the mark on the pad. The 3 calves are placed in the same row because they aren’t very big. There is two feet of material between each of them. Two feet of bedding are put down before placing the carcasses. A new mark is made on the pad. The composting time for location P-b begins on May 1.

In May, the bull, two cows, and two calves die. All of these animals go in location P-c. Starting at the mark on the pad, place the bull in a row by himself because he is bigger than the average animal size. The cows each died with their calf. Put each pair in a different row. Put a new mark on the pad each time the animals are added. The composting period for location P-c begins on June 1. Location P-a has completed the primary composting cycle. Move the material in location P-a to location S-a.

The next animal dies in July. The carcass goes in pad location P-d and the mark is made on the pad. The compost time begins August 1. Location S-a has completed the secondary composting period. This material can be stirred and left on the pad for the 30-day finishing period or it can be moved off the pad. During the active composting processes in the primary and secondary stages, the weed seeds in the compost will be destroyed by the heat. Since the finished compost will not heat up much, it will not destroy any seeds that are blown onto the material. If re-contamination by weed seeds will cause a problem on the land where the compost will be spread, cover the compost during the finishing and storage stages.

The next animal that dies will go in Windrow 2 at location P-e. Each pad location will be managed in the same way as in Windrow 1. The primary compost period starts at the beginning of the month after the carcass placement. After the 4 month primary composting period is complete, a 2 month secondary period begins with moving the compost to a new location. The compost will finish for 1 month and then will be stored or spread.

Windrow Management Worksheet

Example 3. “Real-life” scenario.

Time		Windrow 1			Windrow 2		
Year	Month	Primary	Secondary	Finished (spread/hold)	Primary	Secondary	Finished (spread/hold)
1	1 _J_	P-a					
	2 _F_						
	3 _M_						
	4 _A_	P-b					
	5 _M_	P-c					
	6 _J_		S-a				
	7 _J_	P-d					
	8 _A_			Finishing			
	9 _S_		S-b	F-a (move off)	P-e		
	10 _O		S-c		P-f		
	11 _N				P-g		
	12 _D		S-d	F-b (move off)			
2	1 _J_			F-c (move off)			
	2 _F_				P-h	S-e	
	3 _M_	P-a		F-d		S-f	
	4 _A_					S-g	Finishing
	5 _M_						F-e (move off)
	6 _J_	P-b					F-f (move off)
	7 _J_					S-h	F-g (move off)
	8 _A_	P-c	S-a				
	9 _S_	P-d					
	10 _O			Finishing			F-h (move off)
	11 _N		S-b	F-a (move off)	P-e		
	12 _D						

“Address” on pad	Windrow 1						Windrow 2					
Location on Pad / Composting stage	a	b	c	d	e	f	g	h	i	j	k	l
P (Primary)	P-a	P-b	P-c	P-d			P-e	P-f	P-g	P-h		
S (Secondary)	S-a	S-b	S-c	S-d			S-e	S-f	S-g	S-h		
F (Finished) – move off pad	F-a											

Windrow Management Worksheet

Time		Windrow 1			Windrow 2		
Year	Month	Primary	Secondary	Finished (spread/hold)	Primary	Secondary	Finished (spread/hold)
1	1 ___						
	2 ___						
	3 ___						
	4 ___						
	5 ___						
	6 ___						
	7 ___						
	8 ___						
	9 ___						
	10 ___						
	11 ___						
	12 ___						
2	1 ___						
	2 ___						
	3 ___						
	4 ___						
	5 ___						
	6 ___						
	7 ___						
	8 ___						
	9 ___						
	10 ___						
	11 ___						
	12 ___						

"Address" on pad	Windrow 1						Windrow 2					
Location on Pad / Composting stage	a	b	c	d	e	f	g	h	i	j	k	l
P (Primary)	P-a											
S (Secondary)	S-a											
F (Finished) – move off pad	F-a											