

### Phosphorus Loss Assessment Tool Completion

Name of Facility: Farm 8531 Facility Number: 46-09  
Owner(s) Name: Murphy Brown, LLC Phone No: 910-293-5434  
Mailing Address: P.O. Box 856 Warsaw, NC 28398

Check the appropriate box below, and sign at the bottom:

- No fields received a high or very high rating.
- Yes, the fields listed below received a high or very high rating:

Field Number	Size (Acres)	Rating (High or Very High)

Please use as many additional attachment forms (PLAT-A-12-15-05) as needed for additional fields.

By completing the above section and any additional attachments and by signing this form, the facility owner and Technical Specialist acknowledge all application fields were evaluated using the Phosphorus Loss Assessment Tool. All necessary calculations were completed to conduct the Assessment. A copy will be kept on site with the Certified Animal Waste Management Plan. Any future modifications must be approved by a technical specialist and filed with the Soil and Water Conservation District prior to implementation. Waste plans with fields having a high or very high rating will have to be modified to address phosphorus loss by the next permit cycle beginning July, 2007.

Owner Name: Murphy Brown, LLC  
Owner Signature: [Signature] Date: 8-1-2011  
Technical Specialist Name: Toni W. King  
Technical Specialist Signature: [Signature] Date: 8-1-2011  
Affiliation: Murphy Brown, LLC Phone No: 910-293-5334

Submit this form to:  
NC Division of Water Quality  
Aquifer Protection Section  
Animal Feeding Operations Unit  
1636 Mail Service Center  
Raleigh, NC 27699-1636

PLAT Results For: Hertford 8/1/2011 2:40:54 PM

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F1-D  
Soil Series: CrA: CRAVEN FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES  
Crop: Corn (Grain) : Conservation Tillage - minimum residue  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P205: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: 0.293 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 64  
WV\_Factor (USER) 1.09  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 9  
LEACHATE P = 0  
SOURCE P = 27  
TOTAL P RATING = 36 (MEDIUM)

PLAT Results For: Hertford 8/1/2011 2:42:08 PM

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F1-Sub1  
Soil Series: CrA: CRAVEN FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES  
Crop: Corn (Grain) : Conservation Tillage - minimum residue  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P2O5: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: 0.293 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 64  
WV\_Factor (USER) 1.09  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 9  
LEACHATE P = 0  
SOURCE P = 27  
TOTAL P RATING = 36 (MEDIUM)

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F2&3-Pulls 9-12, Sub2&3  
Soil Series: Ln: LENOIR LOAM  
Crop: Fescue (Hay) :  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P2O5: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: 0.044 t/ac/yr  
Receiving Slope Distance: 0-9 ft  
Soil Test 0" - 4": 72  
WV\_Factor (USER): 1.09  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 9  
LEACHATE P = 0  
SOURCE P = 23  
TOTAL P RATING = 32 (MEDIUM)

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F4-Pulls 1-5, Sub4  
Soil Series: CrA: CRAVEN FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES  
Crop: Corn (Grain) : Conservation Tillage - minimum residue  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P205: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: 0.293 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 62  
WV\_Factor (USER) 1.06  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 9  
LEACHATE P = 0  
SOURCE P = 27  
TOTAL P RATING = 36 (MEDIUM)

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F5-Pull 6, Sub5  
Soil Series: CrA: CRAVEN FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES  
Crop: Corn (Grain) : Conservation Tillage - minimum residue  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P205: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: 0.293 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 62  
WV\_Factor (USER) 1.06  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 9  
LEACHATE P = 0  
SOURCE P = 27  
TOTAL P RATING = 36 (MEDIUM)

NCANAT Version: 1.00

PLAT Results For: Hertford 8/1/2011 2:50:13 PM

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F6-Pulls 7,8,Sub6  
Soil Series: CrA: CRAVEN FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES  
Crop: Fescue (Hay) :  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P2O5: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: .037 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 96  
WV\_Factor (USER) 1.12  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 7  
LEACHATE P = 0  
SOURCE P = 14  
TOTAL P RATING = 21 (LOW)

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: P2&3-Fulls 9-12, Sub2&3  
Soil Series: Ln: LENOIR LOAM  
Crop: Fescue (Hay) :  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P2O5: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: 0.044 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 72  
WV\_Factor (USER) 1.09  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 9  
LEACHATE P = 0  
SOURCE P = 23  
TOTAL P RATING = 32 (MEDIUM)

INPUTS

Calendar Year: 2011  
County: Hertford  
Producer Identifier: 46-09  
Tract Number: T3735  
Field Number: F6-Pulls 7, 8, Sub6  
Soil Series: CrA: CRAVEN FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES  
Crop: Fescue (Hay) :  
Fertilizers: Swine-Lagoon liquid  
Yearly Applied Amount: 4.77 ac in  
Lb P2O5: 53.4 lb  
Application Method: All other surface applications  
Soil Loss: .037 t/ac/yr  
Receiving Slope Distance 0-9 ft  
Soil Test 0" - 4" 96  
WV\_Factor (USER) 1.12  
Artificial Drainage System: NO  
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0  
SOLUBLE P = 7  
LEACHATE P = 0  
SOURCE P = 14  
TOTAL P RATING = 21 (LOW)

COUNTY	FACILITY	FARM NAME	Soil ID	Tract	Pull	Pull Ac	Plan Ac.	Crop	SOIL TYPE	P-Index	Thresh	Deep
Hertford	AWS4600	Farm 31	31-1	3735	F1 - D	18.88	81.12	C/W/B	Craven	64	225	
Hertford	AWS4600	Farm 31	31-1	3735	F1-Sub1	6.99	81.12	C/W/B	Craven	64	225	
Hertford	AWS4600	Farm 31	31-2	3735	F2&3 - 9-12, s	16.73	81.12	FH	Ln	72	208	
Hertford	AWS4600	Farm 31	31-3	3735	F4-1-5,sub4	24.29	81.12	C/W/B	Craven/Ln	62	225	
Hertford	AWS4600	Farm 31	31-3	3735	F5-6,sub5	6.29	81.12	C/W/B	Craven/Ln	62	225	
Hertford	AWS4600	Farm 31	31-4	3735	F6-7,8,sub6	7.94	81.12	FH	CrA	96	225	

81.12 Equals Total required plan acreage

Soil ID 31-2 represent fields 2&3 which are where hydrants (pulls) 9,10,11 &12 exist with a total of 16.73 acres  
soil ID 31-4 represent field 6 which are where hydrants 7 & 8 and subfield 6 exist with a total of 7.94 acres

Total field acreage matches plan with a total of 81.12 acres.





# Soil Test Report

SERVING N.C. RESIDENTS FOR OVER 60 YEARS

Grower: **Murphy Brown LLC**

c/o R O Britt\*  
PO Box 1240  
Waverly, VA 23890  
Farm: 85311

Copies To:

Received: 10/20/2010 Completed: 10/29/2010 Links to Helpful Information **Hertford County**

Agronomist Comments

3.3.12

Field Information		Applied Lime		Recommendations												
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year	Lime	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Mg	S	Cu	Zn	B	Mn	See Note
311	Field 1				1st Crop: Small Grains	0	80-100	0-20	0	0	0	0	0	0	0	3
					2nd Crop: Milo (Grain Sorg)	0	80-100	0-20	0	0	0	0	0	0	0	3

Test Results		CEC	BS%	W/V	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-Al(1)	Mn-Al(2)	Zn-I	Zn-Al	Cu-I	S-I	SS-I	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Na
MIN	0.22	4.8	100.0	1.09	0.0	7.3	64	297	53.0	16.0	432	249	256	52	52	56	41				0.4

Field Information		Applied Lime		Recommendations												
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year	Lime	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Mg	S	Cu	Zn	B	Mn	See Note
312	Field 2-43				1st Crop: Fes/OG/Tim,M	0	120-200	0	0	0	15-20	0	0	0	0	12
					2nd Crop: Fes/OG/Tim,M	0	120-200	0	0	0	15-20	0	0	0	0	12

Test Results		CEC	BS%	W/V	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-Al(1)	Mn-Al(2)	Zn-I	Zn-Al	Cu-I	S-I	SS-I	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Na
MIN	0.22	4.7	100.0	1.09	0.0	7.4	72	280	50.0	20.0	588	349	349	70	70	81	23				0.4

Field Information		Applied Lime		Recommendations												
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year	Lime	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Mg	S	Cu	Zn	B	Mn	See Note
313	Fields 45				1st Crop: Small Grains	0	80-100	0-20	0	0	0	0	0	0	0	3
					2nd Crop: Corn Grain	0	120-160	0-20	0	0	0	0	0	0	0	3

Test Results		CEC	BS%	W/V	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-Al(1)	Mn-Al(2)	Zn-I	Zn-Al	Cu-I	S-I	SS-I	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Na
MIN	0.22	6.3	100.0	1.06	0.0	7.4	62	459	48.0	16.0	710	415	422	82	82	103	64				0.6

Field Information		Applied Lime		Recommendations												
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year	Lime	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Mg	S	Cu	Zn	B	Mn	See Note
314	Field 6				1st Crop: Fes/OG/Tim,M	0	120-200	0	0	0	0	0	0	0	0	12
					2nd Crop: Fes/OG/Tim,M	0	120-200	0	0	0	0	0	0	0	0	12

Test Results		CEC	BS%	W/V	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-Al(1)	Mn-Al(2)	Zn-I	Zn-Al	Cu-I	S-I	SS-I	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Na
MIN	0.27	5.3	100.0	1.12	0.0	7.6	96	363	50.0	15.0	438	255	255	129	129	111	28				0.4

Grower: Carroll's Virginia Farm #8531  
 Address: PO Box 1240  
 Waverly, VA 23890  
 County: Hertford

Designed By: KBW  
 Checked By: DSE  
 Date: 01/13/11  
 Sheet 1 of 12

**ANAEROBIC WASTE LAGOON DESIGN 1st STAGE**

**FARM INFORMATION**

Farm Population:

Nursery:	-----	0
Wean to Finish:	-----	0
Finishing:	-----	0
Farrow to weanling:	-----	3272 Hd.
Farrow to feeder:	-----	0
Farrow to finish:	-----	0
Boars:	-----	0
Storage Period:	-----	180 Days
25 Yr. / 24 Hr Storm Event	-----	7.0 In.
"Heavy Rain" Factor	Not Applicable	
Rainfall in Excess of Evaporation	-----	7.0 In.
Additional Water Usage:	-----	0
Additional Drainage Area:	-----	0

**LAGOON INFORMATION**

Is Lagoon Designed as an Irregular Shape?	(Y/N) -----	Y
Does Operator Want Emergency Spillway?	(Y/N) -----	N
Was This Design Built Prior to 9/96?	(Y/N) -----	Y
Is Drain Tile Req'd to Lower SHWT?	(Y/N) -----	N
Seasonal High Water Table Elev:	-----	0.00
Freeboard:	-----	1.0 Ft.
Emergency Spillway Flow Depth:	Not Applicable	
Side Slopes:	-----	3 :1 (H:V)
	Press ALT-C to Download	0.0
	contour areas see sheet 2 of 7...	0.0
Top of Dike Elevation:	-----	Depth 99.25 Ft.
Finished Bottom Elevation:	BOTTOM E	9.25 Ft. 90.00 Ft.
Start Pump Elevation:	-----	19.44 In. 97.63 Ft.
Stop Pump Elevation:	-----	49.8 In. 95.10 Ft.

<u>LAGOON VOLUME</u>	<u>REQUIRED VOL.</u>	<u>DESIGN VOLUMES</u>	<u>% REQ'D.</u>
Storm Stor =	187683 (Cu.Ft.)	195,637 (Cu.Ft.)	104.24%
Temporary =	0 (Cu.Ft.)	770,775 (Cu.Ft.)	
Permanent =	1416776 (Cu.Ft.)	1,429,245 (Cu.Ft.)	100.88%
<b>Total Volume =</b>	<b>1,604,459 (Cu.Ft.)</b>	<b>2,395,657 (Cu.Ft.)</b>	<b>149.31%</b>

1/2 Treatment Volume =	708,388 (Cu.Ft.)
1/2 Treatment Volume Elevation =	93.57 Ft.

Min. Required Liner Thickness	-----	1.5 Ft.
Lagoon Surface Area: (Inside TOD)	-----	321,742 S.F.

RECEIVED / DENR / DWO  
 Aquifer Protection Section  
 JUL 12 2011

Grower: Carroll's Virginia Farm #8531  
 Address: PO Box 1240  
 Waverly, VA 23890  
 County: Hertford

Designed By: KBW  
 Checked By: DSE  
 Date: 01/13/11  
 Sheet 2 of 12

**ACTUAL DESIGN VOLUME CALCULATIONS**

**BASE VOLUME:** 280530 Cu. Ft.

**LAGOON STAGE-AREA VOLUMES**

<u>Elevation (FT.)</u>	<u>Contour Area (SF)</u>	<u>Incr. Vol. (Cu. FT)</u>	<u>Cumul. Vol. (Cu. FT)</u>
91.00	265,320		280,530
92.00	274,006	269,663	550,193
93.00	279,961	276,984	827,177
94.00	285,932	282,947	1,110,123
95.00	292,869	289,401	1,399,524
96.00	301,567	297,218	1,696,742
97.00	310,310	305,939	2,002,680
98.00	316,166	313,238	2,315,918
99.00	321,742	318,954	2,634,872

These volumes were calculated using the vertical average end area method.

TOTAL REQD VOL		CF	CUMULATIVE VOL.	ZONE VOL.	
END PUMP = = = =	95.10	FT	1,429,245 CF TR'MT	1,429,245	100.88%
START PUMP = = :	97.63	FT	2,200,020 CF TEMP	770,775	
MAX STORAGE =	98.25	FT	2,395,657 CF STORM	195,637	104.24%

Grower: Carroll's Virginia Farm #8531

Designed By: KBW

Address: PO Box 1240

Checked By: DSE

Waverly, VA 23890

Date:

01/13/11

County: Hertford

Sheet 3 of 12

### ANAEROBIC WASTE LAGOON DESIGN 2nd STAGE

#### FARM INFORMATION

##### Farm Population:

Nursery:	-----	0
Wean to Finish:	-----	0
Finishing:	-----	0
Farrow to weanling:	-----	3272 Hd.
Farrow to feeder:	-----	0
Farrow to finish:	-----	0
Boars:	-----	0
Storage Period:	-----	180 Days
25 Yr. / 24 Hr Storm Event	-----	7 In.
"Heavy Rain" Factor	Not Applicable	0
Rainfall in Excess of Evaporation	-----	7 In.
Additional Water Usage:	-----	0
Additional Drainage Area:	-----	321,742 S.F.

#### LAGOON INFORMATION

Is Lagoon Designed as an Irregular Shape?	(Y/N) -----	Y
Does Operator Want Emergency Spillway?	(Y/N) -----	N
Was This Design Built Prior to 9/96?	(Y/N) -----	Y
Is Drain Tile Req'd to Lower SHWT?	(Y/N) -----	N
Seasonal High Water Table Elev:	-----	0.00
Freeboard:	-----	1.0 Ft.
Emergency Spillway Flow Depth:	Not Applicable	0.3 Ft.
Side Slopes:	-----	3 :1 (H:V)
	Press ALT-C to Download	0.0
	contour areas see sheet 2 of 7...	0.0
Top of Dike Elevation:	-----	99.25 Ft.
Finished Bottom Elevation:	-----	8.75 Ft. 90.50 Ft.
Start Pump Elevation:	-----	19.44 In. 97.63 Ft.
Stop Pump Elevation:	-----	108 In. 90.25 Ft.

<u>LAGOON VOLUME</u>	<u>REQUIRED VOL.</u>	<u>DESIGN VOLUMES</u>	<u>% REQ'D.</u>
Storm Stor =	69695 (Cu.Ft.)	70,039 (Cu.Ft.)	100.49%
Temporary =	603364 (Cu.Ft.)	688,919 (Cu.Ft.)	114.18%
Permanent =	0 (Cu.Ft.)	10,894 (Cu.Ft.)	
<b>Total Volume =</b>	<b>673,059 (Cu.Ft.)</b>	<b>769,852 (Cu.Ft.)</b>	<b>114.38%</b>

<b>90 Temporary Storage Volume Elevation =</b>	<b>93.51 Ft.</b>	68.89 In.
--	------------------	-----------

Min. Required Liner Thickness	-----	1.5 Ft.
Lagoon Surface Area: (Inside TOD)	-----	119,477 S.F.

Grower: Carroll's Virginia Farm #8531  
 Address: PO Box 1240  
 Waverly, VA 23890  
 County: Hertford

Designed By: KBW  
 Checked By: DSE  
 Date: 01/13/11  
 Sheet 4 of 12

**ACTUAL DESIGN VOLUME CALCULATIONS**

**BASE VOLUME:** 0 Cu. Ft.

**LAGOON STAGE-AREA VOLUMES**

<u>Elevation (FT.)</u>	<u>Contour Area (SF)</u>	<u>Incr. Vol. (Cu. FT)</u>	<u>Cumul. Vol. (Cu. FT)</u>
90.00	4,525		0
91.00	82,624	43,575	43,575
92.00	89,113	85,869	129,443
93.00	93,726	91,420	220,863
94.00	98,382	96,054	316,917
95.00	102,518	100,450	417,367
96.00	106,080	104,299	521,666
97.00	109,695	107,888	629,553
98.00	113,352	111,524	741,077
99.00	116,854	115,103	856,180
99.25	119,477	29,541	885,721

These volumes were calculated using the vertical average end area method.

TOTAL REQD VOL	2,366,468	CF	CUMULATIVE VOL.	ZONE VOL.	114.38%
END PUMP = = = =	90.25	FT	10,894 CF TR'MT	10,894	
START PUMP = = :	97.63	FT	699,813 CF TEMP	688,919	114.18%
MAX STORAGE =	98.25	FT	769,852 CF STORM	70,039	100.49%

Grower: Carroll's Virginia Farm #8531  
 Address: PO Box 1240  
 Waverly, VA 23890  
 County: Hertford

Designed By: KBW  
 Checked By: DSE  
 Date: 01/13/11  
 Sheet 5 of 12

**MINIMUM REQUIRED VOLUME CALCULATIONS 1st STAGE**

**Permanent Storage:**

Required Treatment Volume:

Animal Type	Capacity	* ALW	* (cu.ft./lb)	= Total
Nursery	0	30	1.00	0
Wean to Finish	0	115	1.00	0
Finishing	0	135	1.00	0
Farrow to weanling	3,272	433	1.00	1,416,776
Farrow to feeder	0	522	1.00	0
Farrow to finish	0	1,417	1.00	0
Boars	0	400	1.00	0
<b>Total Required Treatment Volume (cu. ft.)=</b>				<b>1,416,776</b>

Sludge Storage Volume:

Animal Type	Capacity	* ALW	* (cu.ft./lb)	= Total
Nursery	0	30	0.00	0
Wean to Finish	0	115	0.00	0
Finishing	0	135	0.00	0
Farrow to weanling	3,272	433	0.00	0
Farrow to feeder	0	522	0.00	0
Farrow to finish	0	1,417	0.00	0
Boars	0	400	0.00	0
<b>Total Required Sludge Storage Volume (cu. ft.)=</b>				<b>0</b>

Storm Storage:

$Vol. = (Lagoon Surf. Area + Add'l Drainage Area) * 25Yr./24Hr. Storm(in) / 12in./ft.$

$Vol. = (321742 sq.ft + 0 sq.ft.) * 7.0 in. / 12 in./ft.$

**Total Required Volume for 25Yr./24Hr. Storm Event (cu.ft.)= 187,683**

"Heavy Rain" Storage:

$Vol. = (Lagoon Surf. Area + Add'l Drainage Area) * "Heavy Rain" Factor (in) / 12in./ft.$

$Vol. = (321742 sq.ft + 0 sq.ft.) * 0.0 in. / 12 in./ft.$

**Total Required Volume for "Heavy Rain" (cu.ft.) = 0**

(for Extended Periods of Chronic Rainfall)

**Total Required Storm Storage**

(25Yr. / 24Hr. Storm + 'Heavy Rain')= **187,683 (CU.FT)**

**Total Required Permanent Storage**

(Treatment + Sludge) = **1,416,776 (CU.FT)**

**TOTAL REQUIRED 1st STAGE VOLUME = 1604459 (CU.FT.)**

Grower: Carroll's Virginia Farm #8531  
 Address: PO Box 1240  
 Waverly, VA 23890  
 County: Hertford

Designed By: KBW  
 Checked By: DSE  
 Date: 01/13/11  
 Sheet 6 of 12

**Temporary Storage Volume:**

Manure Production:

Animal Type	Capacity	*	Sto. Period	=	Total
Nursery	0		180	0.30	0
Wean to Finish	0		180	1.17	0
Finishing	0		180	1.37	0
Farrow to weanling	3,272		180	4.39	2,587,977
Farrow to feeder	0		180	5.30	0
Farrow to finish	0		180	14.38	0
Boars	0		180	4.06	0

**Total Manure Production (gals.)= 2,587,977**  
**Total Manure Production (cu.ft.)= 345,986**

Excess Fresh Water:

Animal Type	Capacity	*	Sto. Period	=	Total
Nursery	0		180	0.00	0
Nursery	0		180	0.00	0
Finishing	0		180	0.00	0
Farrow to weanling	3,272		180	0.00	0
Farrow to feeder	0		180	0.00	0
Farrow to finish	0		180	0.00	0
Boars	0		180	0.00	0

**Total Fresh Water Excess (gals.)= 0**  
**Total Fresh Water Excess (cu.ft.)= 0**

Grower: Carroll's Virginia Farm #8531  
Address: PO Box 1240  
Waverly, VA 23890  
County: Hertford

Designed By: KBW  
Checked By: DSE  
Date: 01/13/11  
Sheet 7 of 12

**Temporary Storage Volume: (Cont.)**

Rainfall in Excess of Evaporation:

Vol.=(Lagoon Surface Area 1st + Lagoon Area 2nd + Additional Drainage Area) \* Rainfall / 12in./ft

Vol.= (321742 sq.ft. + 119477 sq.ft. + 0 sq.ft.) \* 7.0 in. /12 in./ft.

**Total Required Volume for Rainfall in Excess of Evap. (cu.ft.)= 257,378**

Storm Storage:

Vol.=(Lagoon Area 2nd + Additional Drainage Area) \* 25Yr./24Hr Storm(in.)/12in./

Vol.= (119477 sq.ft. + 0 sq.ft.) \* 0.0 in. /12 in./ft.

**Total Required Volume for 25Yr./24Hr. Storm Event (cu.ft)= 69,695**

"Heavy Rain" Storage:

Vol.=(Lagoon Area 2nd + Additional Drainage Area) \* = Heavy Rain Factor(in) / 12in./ft.

Vol.= (119477 sq.ft. + 0 sq.ft.) \* 0.0 in. /12 in./ft.

**Total Required Volume for "Heavy Rain" (cu.ft.) = 0**  
**(for Extended Periods of Chronic Rainfall)**

Additional Water Storage:

No Additional Water Storage is Required

**0 0**

**Total Required Storm Storage**

(25Yr. / 24Hr. Storm + 'Heavy Rain')= **69,695 (CU.FT)**

**Total Required Temporary Storage**

(Manure Prod. + Excess Fr. Water + Rainfall Excess + Additional Water Storage) = **603,364 (CU.FT)**

**Total Required Permanent Storage**

(Treatment + Sludge) = **0 (CU.FT)**

**TOTAL REQUIRED 2nd STAGE VOLUME = 673059 (CU.FT.)**

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 Checked By: DSE  
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**LAGOON DESIGN SUMMARY 1st STAGE**

Top of Dike Elevation	-----	99.25 FT.
Emergency Spillway Crest Elevation	-----	Not Applicable
Top of 25Yr. / 24Hr. Storm Storage	-----	98.25 FT.
Top of "Heavy Rain" Storage	-----	Not Applicable
Start Pump Elevation	-----	97.63 FT.
End Pump Elevation	-----	95.10 FT.
Top of Sludge Storage	-----	Not Applicable
Seasonal High Watertable Elev.	-----	0.00
Finished Bottom Elevation	-----	90.00 FT.
Inside Top Length	-----	Not Applicable
Inside Top Width	-----	Not Applicable
Side Slopes	-----	3.0:1 H:V
Lagoon Surface Area	-----	321,742 SF
Min. Liner Thickness (if required)	-----	1.5 FT.
Freeboard Depth	-----	1.00 FT.
Temporary Storage Period	-----	180 Days

**TOTAL DESIGN VOLUME = 2395657 (CU.FT.)**

**Zone Depths:**

Treatment / Sludge Storage Zone Depth	-----	5.1 FT.
Temporary Storage Zone Depth	-----	2.5 FT.
Freeboard / Storm Storage Zone Depth	-----	1.6 FT.
Total Lagoon Depth	-----	9.3 FT.

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 County: Hertford

Designed By: KBW  
 Checked By: DSE  
 Date: 01/13/11  
 Sheet 9 of 12

**LAGOON DESIGN SUMMARY 2nd STAGE**

Top of Dike Elevation	-----	99.25 FT.
Emergency Spillway Crest Elevation	-----	Not Applicable
Top of 25Yr. / 24Hr. Storm Storage	-----	98.25 FT.
Top of "Heavy Rain" Storage	-----	Not Applicable
Start Pump Elevation	-----	97.63 FT.
End Pump Elevation	-----	90.25 FT.
Top of Sludge Storage	-----	Not Applicable
Seasonal High Watertable Elev.	-----	0.00
Finished Bottom Elevation	-----	90.50 FT.
Inside Top Length	-----	Not Applicable
Inside Top Width	-----	Not Applicable
Side Slopes	-----	3.0:1 H:V
Lagoon Surface Area	-----	119,477 SF
Min. Liner Thickness (if required)	-----	1.5 FT.
Freeboard Depth	-----	1.00 FT.
Temporary Storage Period	-----	180 Days

**TOTAL DESIGN VOLUME = 769852 (CU.FT.)**

**Zone Depths:**

Treatment / Sludge Storage Zone Depth	-----	-0.3 FT.
Temporary Storage Zone Depth	-----	7.4 FT.
Freeboard / Storm Storage Zone Depth	-----	1.6 FT.
<b>Total Lagoon Depth</b>	<b>-----</b>	<b>8.8 FT.</b>

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County: Hertford

Designer KBW  
Checker DSE  
Date: 01/13/11  
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**ZONE ELEVATIONS 1st STAGE**

TOP OF DIKE ELEV = 99.25

TOP OF STORM ELEV = 98.25

STRT PMP EL. = 97.63

TOP OF TEMP STORAGE ELEV = 97.63

END PMP EL. = 95.10

TOP OF TREAT ELEV = 95.10

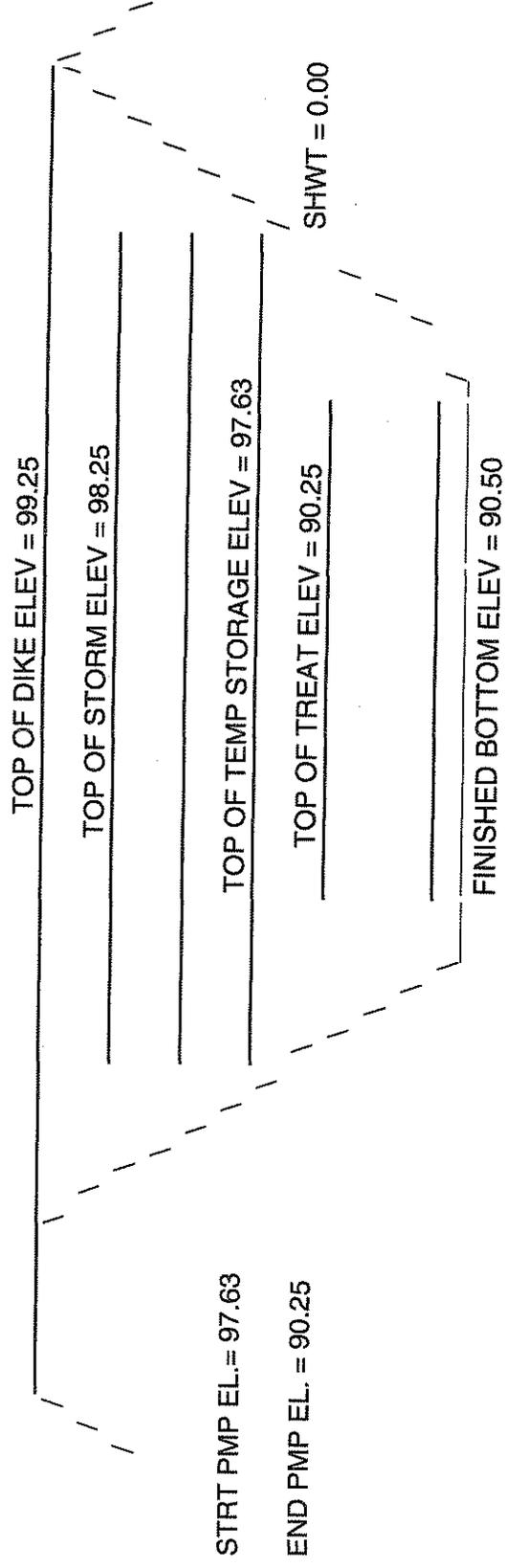
SHWT = 0.00

FINISHED BOTTOM ELEV = 90.00

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Designer KBW  
Checker DSE  
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**ZONE ELEVATIONS 2nd STAGE**



Grower: Carroll's Virginia Farm #8531  
Address: PO Box 1240  
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Date: 01/13/11  
Sheet 12 of 12

This livestock waste treatment lagoon is designed in accordance with the North Carolina Natural Resources Conservation Service PRACTICE STANDARD 359- WASTE TREATMENT LAGOON, revised prior to June, 1996.

Emergency Spillway:  
An Emergency Spillway is not required.

NOTE: See attached Waste Utilization Plan

DESIGNED: David S. Elkin  
DATE: 1/13/11



COMMENTS: The lagoon has been designed as an irregular shape.  
This design is update of start and stop pump elevations and to show the 1/2  
treatment volume level for sludge storage. This design does not supercede the  
original certification of the farm.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## System Calibration

Information presented in manufacturer's charts are based on average operation conditions with relatively new equipment. Discharge rates and application rates change over time as equipment gets older and components wear. In particular, pump wear tends to reduce operating pressure and flow. With continued use, nozzle wear results in an increase in the nozzle opening which will increase the discharge rate while decreasing the wetted diameter.

You should be aware that operating the system differently than assumed in the design will alter the application rate, diameter of coverage, and subsequently the application uniformity. For example, operating the system with excessive pressure results in smaller droplets, greater potential for drift, and accelerates wear of the sprinkler nozzle. Clogging of nozzles can result in pressure increase. Plugged intakes or crystallization of mainlines will reduce operating pressure. Operating below design pressure greatly reduces the coverage diameter and application uniformity.

For the above reason, you should calibrate your equipment on a regular basis to ensure proper application rates and uniformity. Calibration at least once every three years is recommended. Calibration involves collecting and measuring flow at several locations in the application area. Any number of containers can be used to collect flow and determine the application rate. Rain gauges work best because they already have a graduated scale from which to read the application amount without having to perform additional calculations. However, pans, plastic buckets, jars, or anything with a uniform opening and cross-section can be used provided the liquid collected can be easily transferred to a scaled container for measuring.

For stationary sprinklers, collection containers should be located randomly throughout the application area at several distances from sprinklers. For traveling guns, sprinklers should be located along a transect perpendicular to the direction of pull. Set out collection containers 25 feet apart along the transect on both sides of the gun cart. You should compute the average application rate for all nonuniformity of the application. On a windless day, variation between containers of more than 30 percent is cause for concern. You should contact your irrigation dealer or technical specialist for assistance.

*\*Reprinted for Certification Training for Operations of Animal Waste Management Systems Manual*

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Aquifer Protection Section  
JUL 12 2011

## OPERATION & MAINTENANCE PLAN

Proper lagoon management should be a year-round priority. It is especially important to manage levels so that you do not have problems during extended rainy and wet periods.

Maximum storage capacity should be available in the lagoon for periods when the receiving crop is dormant (such as wintertime for bermudagrass) or when there are extended rainy spells such as a thunderstorm season in the summertime. This means that at the first sign of plant growth in the later winter / early spring, irrigation according to a farm waste management plan should be done whenever the land is dry enough to receive lagoon liquid. This will make storage space available in the lagoon for future wet periods. In the late summer / early fall the lagoon should be pumped down to the low marker (see Figure 2-1) to allow for winter storage. Every effort should be made to *maintain* the lagoon close to the minimum liquid level as long as the weather and waste utilization plan will allow it.

Waiting until the lagoon has reached its maximum storage capacity before starting to irrigate does not leave room for storing excess water during extended wet periods. Overflow from the lagoon for any reason except a 25-year, 24-hour storm is a violation of state law and subject to penalty action.

The routine maintenance of a lagoon involves the following:

- Maintenance of a vegetative cover for the dam. Fescue or common bermudagrass are the most common vegetative covers. The vegetation should be fertilized each year, if needed, to maintain a vigorous stand. The amount of fertilizer applied should be based on a soils test, but in the event that it is not practical to obtain a soils test each year, the lagoon embankment and surrounding areas should be fertilized with 800 pounds per acre of 10-10-10, or equivalent.
- Brush and trees on the embankment must be controlled. This may be done by mowing, spraying, grazing, chopping, or a combination of these practices. This should be done at least once a year and possibly twice in years that weather conditions are favorable for heavy vegetative growth.

NOTE: If vegetation is controlled by spraying, the herbicide must not be allowed to enter the lagoon water. Such chemicals could harm the bacteria in the lagoon that are treating the waste.

Maintenance inspections of the entire lagoon should be made during the initial filling of the lagoon and at least monthly and after major rainfall and storm events. Items to be checked should include, as a minimum, the following:

### **Waste Inlet Pipes, Recycling Pipes, and Overflow Pipes -- look for:**

1. separation of joints
2. cracks or breaks
3. accumulation of salts or minerals
4. overall condition of pipes

**Lagoon surface -- look for:**

1. undesirable vegetative growth
2. floating or lodged debris

**Embankment -- look for:**

1. settlement, cracking, or "jug" holes
2. side slope stability -- slumps or bulges
3. wet or damp areas on the back slope
4. erosion due to lack of vegetation or as a result of wave action
5. rodent damage

Larger lagoons may be subject to liner damage due to wave action caused by strong winds. These waves can erode the lagoon sidewalls, thereby weakening the lagoon dam. A good stand of vegetation will reduce the potential damage caused by wave action. If wave action causes serious damage to a lagoon sidewall, baffles in the lagoon may be used to reduce the wave impacts.

Any of these features could lead to erosion and weakening of the dam. If your lagoon has any of these features, you should call an appropriate expert familiar with design and construction of waste lagoons. You may need to provide a temporary fix if there is a threat of a waste discharge. However, a permanent solution should be reviewed by the technical expert. Any digging into a lagoon dam with heavy equipment is a serious undertaking with potentially serious consequences and should not be conducted unless recommended by an appropriate technical expert.

**Transfer Pumps -- check for proper operation of:**

1. recycling pumps
2. irrigation pumps

Check for leaks, loose fittings, and overall pump operation. An unusually loud or grinding noise, or a large amount of vibration, may indicate that the pump is in need of repair or replacement.

NOTE: Pumping systems should be inspected and operated frequently enough so that you are not completely "surprised" by equipment failure. You should perform your pumping system maintenance at a time when your lagoon is at its low level. This will allow some safety time should major repairs be required. Having a nearly full lagoon is not the time to think about switching, repairing, or borrowing pumps. Probably, if your lagoon is full, your neighbor's lagoon is full also. You should consider maintaining an inventory of spare parts or pumps.

- Surface water diversion features are designed to carry *all* surface drainage waters (such as rainfall runoff, roof drainage, gutter outlets, and parking lot runoff) away from your lagoon and other waste treatment or storage structures. The only water that should be coming from your lagoon is that which comes from your flushing (washing) system pipes and the rainfall that hits the lagoon directly. You should inspect your diversion system for the following:
  1. adequate vegetation
  2. diversion capacity
  3. ridge berm height

Identified problems should be corrected promptly. It is advisable to inspect your system during or immediately following a heavy rain. If technical assistance is needed to determine proper solutions, consult with appropriate experts.

You should record the level of the lagoon just prior to when rain is predicted, and then record the level again 4 to 6 hours after the rain (assumes there is no pumping). This will give you an idea of how much your lagoon level will rise with a certain rainfall amount (you must also be recording your rainfall for this to work). Knowing this should help in planning irrigation applications and storage. If your lagoon rises excessively, you may have an overflow problem from a surface water diversion or there may be seepage into the lagoon from the surrounding land.

## **Lagoon Operation**

### **Startup:**

1. Immediately after construction establish a complete sod cover on bare soil surfaces to avoid erosion.
2. Fill new lagoon design treatment volume at least half full of water before waste loading begins, taking care not to erode lining or bank slopes.
3. Drainpipes into the lagoon should have a flexible pipe extender on the end of the pipe to discharge near the bottom of the lagoon during initial filling or another means of slowing the incoming water to avoid erosion of the lining.
4. When possible, begin loading new lagoons in the spring to maximize bacterial establishment (due to warmer weather).
5. It is recommended that a new lagoon be seeded with sludge from a healthy working swine lagoon in the amount of 0.25 percent of the full lagoon liquid volume. This seeding should occur at least two weeks prior to the addition of wastewater.
6. Maintain a periodic check on the lagoon liquid pH. If the pH falls below 7.0, add agricultural lime at the rate of 1 pound per 1000 cubic feet of lagoon liquid volume until the pH rises above 7.0. Optimum lagoon liquid pH is between 7.5 and 8.0.
7. A dark color, lack of bubbling, and excessive odor signals inadequate biological activity. Consultation with a technical specialist is recommended if these conditions occur for prolonged periods, especially during the warm season.

### **Loading:**

The more frequently and regularly that wastewater is added to a lagoon, the better the lagoon will function. Flush systems that wash waste into the lagoon several times daily are optimum for treatment. Pit recharge systems, in which one or more buildings are drained and recharged each day, also work well.

- Practice water conservation --- minimize building water usage and spillage from leaking waterers, broken pipes and washdown through proper maintenance and water conservation.
- Minimize feed wastage and spillage by keeping feeders adjusted. This will reduce the amount of solids entering the lagoon.

### **Management:**

- Maintain lagoon liquid level between the permanent storage level and the full temporary storage level.
- Place visible markers or stakes on the lagoon bank to show the minimum liquid level and the maximum liquid level. (Figure 2-1).
- Start irrigating at the earliest possible date in the spring based on nutrient requirements and soil moisture so that temporary storage will be maximized for the summer thunderstorm season. Similarly, irrigate in the late summer / early fall to provide maximum lagoon storage for the winter.
- The lagoon liquid level *should never* be closer than 1 foot to the lowest point of the dam or embankment.
- Do not pump the lagoon liquid level lower than the permanent storage level unless you are removing sludge.
- Locate float pump intakes approximately 18 inches underneath the liquid surface and as far away from the drainpipe inlets as possible.
- Prevent additions of bedding materials, long-stemmed forage or vegetation, molded feed, plastic syringes, or other foreign materials into the lagoon.
- Frequently remove solids from catch basins at end of confinement houses or wherever they are installed.
- Maintain strict vegetation, rodent, and varmint control near lagoon edges.
- Do not allow trees or large bushes to grow on lagoon dam or embankment.
- Remove sludge from the lagoon either when the sludge storage capacity is full or before it fills 50 percent of the permanent storage volume.
- If animal production is to be terminated, the owner is responsible for obtaining and implementing a closure plan to eliminate the possibility of a pollutant discharge.

### **Sludge Removal:**

Rate of lagoon sludge buildup can be reduced by:

- proper lagoon sizing,
- mechanical solids separation of flushed waste,
- gravity settling of flushed waste solids in an appropriately designed basin, or
- minimizing feed wastage and spillage.

Lagoon sludge that is removed annually rather than stored long term will:

- have more nutrients,
- have more odor, and
- require more land to properly use the nutrients.

Removal techniques:

- Hire a custom applicator.
- Mix the sludge and lagoon liquid with a chopper - agitator impeller pump through large - bore sprinkler irrigation system onto nearby cropland; and soil incorporate.
- Dewater the upper part of lagoon by irrigation onto nearby cropland or forageland; mix remaining sludge; pump into liquid sludge applicator; haul and spread onto cropland or forageland; and soil incorporate.
- Dewater the upper part of lagoon by irrigation onto nearby cropland or forageland; dredge sludge from lagoon with dragline or sludge barge; berm an area beside lagoon to receive the sludge so that liquids can drain back into lagoon; allow sludge to dewater; haul and spread with manure spreader onto cropland or forageland; and soil incorporate.

Regardless of the method, you must have the sludge material analyzed for waste constituents just as you would your lagoon water. The sludge will contain different nutrient and metal values from the liquid. The application of the sludge to fields will be limited by these nutrients as well as any previous waste applications to that field and crop requirement. Waste application rates will be discussed in detail in Chapter 3.

When removing sludge, you must also pay attention to the liner to prevent damage. Close attention by the pumper or drag-line operator will ensure that the lagoon liner remains intact. If you see soil material or the synthetic liner material being disturbed, you should stop the activity immediately and not resume until you are sure that the sludge can be removed without liner injury. If the liner is damaged it must be repaired as soon as possible.

Sludge removed from the lagoon has a much higher phosphorus and heavy metal content than liquid. Because of this it should probably be applied to land with low phosphorus and metal levels, as indicated by a soil test, and incorporated to reduce the chance of erosion. Note that if the sludge is applied to fields with very high soil-test phosphors, it should be applied only at rates equal to the crop removal of phosphorus. As with other wastes, always have your lagoon sludge analyzed for its nutrient value.

The application of sludge will increase the amount of odor at the waste application site. Extra precaution should be used to observe the wind direction and other conditions which could increase the concern of neighbors.

### **Possible Causes of Lagoon Failure**

Lagoon failures result in the unplanned discharge of wastewater from the structure. Types of failures include leakage through the bottom or sides, overtopping, and breach of the dam. Assuming proper design and construction, the owner has the responsibility for ensuring structure safety. Items which may lead to lagoon failures include:

- Modification of the lagoon structure -- an example is the placement of a pipe in the dam without proper design and construction. (Consult an expert in lagoon design before placing any pipes in dams.)
- Lagoon liquid levels -- high levels are a safety risk.
- Failure to inspect and maintain the dam.
- Excess surface water flowing into the lagoon.
- Liner integrity -- protect from inlet pipe scouring, damage during sludge removal, or rupture from lowering lagoon liquid level below groundwater table.

NOTE: If lagoon water is allowed to overtop the dam, the moving water will soon cause gullies to form in the dam. Once this damage starts, it can quickly cause a large discharge of wastewater and possible dam failure.

# EMERGENCY ACTION PLAN ✓

## PHONE NUMBERS

DIVISION OF WATER QUALITY (DWQ)  
EMERGENCY MANAGEMENT SERVICES (EMS)  
SOIL AND WATER CONSERVATION DISTRICT (SWCD)  
NATURAL RESOURCES CONSERVATION SERVICE (NRCS)  
COOPERATIVE EXTENSION SERVICE (CES)

(252) 946-6481  
(252) 358-1621  
(252) 358-7846  
(252) 358-7846  
(252) 358-7822

This plan will be implemented in the event that wastes from your operation are leaking, overflowing or running off site. You should not wait until wastes reach surface waters or leave your property to consider that you have a problem. You should make every effort to ensure that this does not happen. This plan should be posted in an accessible location for all employees at the facility. The following are some action items you should take.

1. Stop the release of wastes. Depending on the situation, this may or may not be possible. Suggested responses to some possible problems are listed below.
  - A. Lagoon overflow - possible solutions are:
    - a) Add soil to berm to increase elevation of dam.
    - b) Pump wastes to fields at an acceptable rate.
    - c) Stop all flow to the lagoon immediately.
    - d) Call a pumping contractor.
    - e) Make sure no surface water is entering lagoon.
  - B. Runoff from waste application field-actions include:
    - a) Immediately stop waste application.
    - b) Create a temporary diversion to contain waste.
    - c) Incorporate waste to reduce runoff.
    - d) Evaluate and eliminate the reason(s) that cause the runoff.
    - e) Evaluate the application rates for the fields where runoff occurred.
  - C. Leakage from the waste pipes and sprinklers - action include:
    - a) Stop recycle pump.
    - b) Stop irrigation pump.
    - c) Close valves to eliminate further discharge.
    - d) Repair all leaks prior to restarting pumps.
  - D. Leakage from flush systems, houses, solid separators - action include:
    - a) Stop recycle pump.
    - b) Stop irrigation pump.
    - c) Make sure siphon occurs.
    - d) Stop all flow in the house, flush systems, or solid separators.
  - E. Leakage from base or sidewall of lagoon. Often this is seepage as opposed to flowing leaks - possible action:
    - a) Dig a small sump or ditch from the embankment to catch all seepage, put in a submersible pump, and pump back to lagoon.
    - b) If holes are caused by burrowing animals, trap or remove animals and fill holes and compact with a clay type soil.
    - c) Have a professional evaluate the condition of the side walls and the lagoon bottom as soon as possible.

2. Assess the extent of the spill and note any obvious damages.
  - a. Did the waste reach surface waters?
  - b. Approximately how much was released and for what duration?
  - c. Any damage notes, such as employee injury, fish kills, or property damage?
  - d. Did the spill leave the property?
  - e. Does the spill have the potential to reach surface waters?
  - f. Could a future rain event cause the spill to reach surface waters?
  - g. Are potable water wells in danger (either on or off the property)?
  - h. How much reached surface waters?
3. Contact appropriate agencies.
  - a. During normal business hours call your DWQ regional office; Phone #, After hours, emergency number: (919) 733-3942. Your phone call should include: your name, facility number, telephone number, the details of the incident from item 2 above, the exact location of the facility, the location or direction of the movement of the spill, weather and wind conditions. The corrective measures that have been under taken, and the seriousness of the situation.
  - b. If the spill leaves property or enters surface waters, call local EMS phone number.
  - c. Instruct EMS to contact local Health Department.
  - d. Contact CE's phone number, local SWCD office phone number and the local NRCS office for advice / technical assistance phone number.
4. If none of the above works call 911 or the Sheriff's Department and explain your problem to them and ask the person to contact the proper agencies for you.
5. Contact the contractor of your choice to begin repair or problem to minimize offsite damage.
  - a. Contractors Name: Murphy Brown, LLC
  - b. Contractors Address: P.O. Box 856, Warsaw, NC 28398
  - c. Contractors Phone: (910)293-3434
6. Contact the technical specialist who certified the lagoon (NRCS, Consulting Engineer, etc.)
  - a. Name: Kraig Westerbeek
  - b. Phone: (910) 293 - 5330
7. Implement procedures as advised by DWQ and technical assistance agencies to rectify the damage, repair the system, and reassess the waste management plan to keep problems with release of wastes from happening again.

## INSECT CONTROL CHECKLIST FOR ANIMAL OPERATIONS ✓

Source	Cause	BMP's to Minimize Odor	Site Specific Practices
(Liquid Systems)			
Flush Gutters	Accumulation of solids	<ul style="list-style-type: none"> <li>(✓) Flush system is designed and operated sufficiently to remove accumulated solids from gutters as designed.</li> <li>( ) Remove bridging of accumulated solids at discharge</li> </ul>	
Lagoons and Pits	Crusted Solids	<ul style="list-style-type: none"> <li>(✓) Maintain lagoons, settling basins and pits where pest breeding is apparent to minimize the crusting of solids to a depth of no more than 6-8 inches over more than 30% of surface.</li> </ul>	
Excessive Vegetative Growth	Decaying vegetation	<ul style="list-style-type: none"> <li>(✓) Maintain vegetative control along banks of lagoons and other impoundment's to prevent accumulation of decaying vegetative matter along water's edge on impoundment's perimeter.</li> </ul>	
(Dry Systems)			
Feeders	Feed Spillage	<ul style="list-style-type: none"> <li>( ) Design, operate and maintain feed systems (e.g., bunkers and troughs) to minimize the accumulation of decaying wastage.</li> <li>( ) Clean up spillage on a routine basis (e.g. 7-10 day interval during summer; 15-30 day interval during winter).</li> </ul>	
Feed Storage	Accumulation of feed residues	<ul style="list-style-type: none"> <li>( ) Reduce moisture accumulation within and around immediate perimeter of feed storage areas by insuring drainage away from site and/or providing adequate containment (e.g., covered bin for brewer's grain and similar high moisture grain products).</li> <li>( ) Inspect for and remove or break up accumulated solids in filter strips around feed storage as needed.</li> </ul>	
Animal Holding Areas	Accumulation of animal wastes and feed wastage	<ul style="list-style-type: none"> <li>( ) Eliminate low area that trap moisture along fences and other locations where waste accumulates and disturbance by animals is minimal.</li> <li>( ) Maintain fence rows and filter strips around animal holding areas to minimize accumulations of wastes (i.e. inspect for and remove or break up accumulated solids as needed).</li> </ul>	

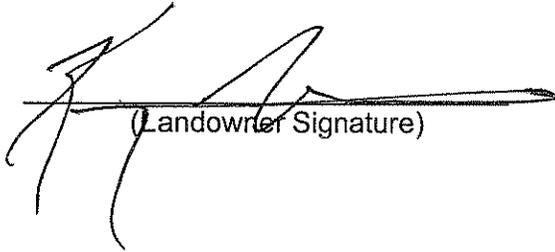
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Dry Manure Handling Systems	Accumulations of animal wastes	<input type="checkbox"/> Remove spillage on a routine basis (e.g. 7-10 day interval during summer; 15-30 days interval during winter) where manure is loaded for land application or disposal. <input type="checkbox"/> Provide for adequate drainage around manure stockpiles <input type="checkbox"/> Inspect for and remove or break up accumulated wastes in filter strips around stockpiles and manure handling areas as needed.
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The issues checked ( ) pertain to this operation. The landowner / integrator agrees to use sound judgment in applying insect control measures as practical.

I certify the aforementioned insect control Best Management Practices have been reviewed with me.

  
(Landowner Signature)

For more information contact the Cooperative Extension Service, Department of Entomology, Box 7613, North Carolina State University, Raleigh, NC 27695-7613.

AMIC -- November 11, 1996

## SWINE FARM WASTE MANAGEMENT ODOR CONTROL CHECKLIST

Source	Cause	BMP's to Minimize Odor	Site Specific Practices
Farmstead	Swine production	( <input checked="" type="checkbox"/> )Vegetative or wooded buffers; ( <input checked="" type="checkbox"/> )Recommended best management practices; ( <input checked="" type="checkbox"/> )Good judgment and common sense	
Animal body surfaces	Dirty manure covered animals	( )Dry floors	
Floor surfaces	Wet manure-covered floors	( <input checked="" type="checkbox"/> )Slotted floors; ( <input checked="" type="checkbox"/> )Waterers located over slotted floors; ( <input checked="" type="checkbox"/> )Feeders at high end of solid floors; ( <input checked="" type="checkbox"/> )Scrape manure buildup from floors; ( )Underfloor ventilation for drying	
Manure collection pits	Urine  Partial microbial decomposition	( <input checked="" type="checkbox"/> )Frequent manure removal by flush, pit recharge or scrape ( )Underfloor ventilation	
Ventilation exhaust fans	Volatile gases Dust	( <input checked="" type="checkbox"/> )Fan maintenance; ( <input checked="" type="checkbox"/> )Efficient air movement	
Indoor surfaces	Dust	( <input checked="" type="checkbox"/> )Washdown between groups of animals ( )Feed additives; ( )Feeder covers; ( )Feed delivery downspout extenders to feeder covers	
Flush Tanks	Agitation of recycled lagoon liquid while tanks are filling	( )Flush tank covers ( )Extend fill lines to near bottom of tanks with anti-siphon vents	
Flush alleys	Agitation during waste water conveyance	( )Underfloor flush with underfloor ventilation	
Pit recharge points	Agitation of recycled lagoon liquid while pits are filling	( )Extend recharge lines to near bottom of pits with anti-siphon vents	
Lift stations	Agitation during sump tank filling and drawdown	( )Sump tank covers	
Outside drain collection or junction boxes	Agitation during waste water conveyance	( )Box Covers	
End of drain pipes at lagoon	Agitation during waste water	( )Extend discharge point of pipes underneath lagoon liquid level	
Lagoon surfaces	Volatile gas emissions Biological mixing Agitation	( <input checked="" type="checkbox"/> )Proper lagoon liquid capacity ( <input checked="" type="checkbox"/> )Correct lagoon startup procedures ( )Minimum surface area-to-volume ratio ( <input checked="" type="checkbox"/> )Minimum agitation when pumping ( )Mechanical aeration ( )Proven biological additives	
Irrigation sprinkler nozzles	High pressure agitation Wind draft	( <input checked="" type="checkbox"/> )Irrigate on dry days with little or no wind ( <input checked="" type="checkbox"/> )Minimum recommended operation pressure ( <input checked="" type="checkbox"/> )Pump intake near lagoon liquid surface ( )Pump from second-stage lagoon	

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Storage tank or basin surface	Partial microbial decomposition Mixing while filling Agitation when emptying	( ) Bottom or midlevel loading ( ) Tank covers ( ) Basin surface mats of solids ( ) Proven biological additives or oxidants
Settling basin surface	Partial microbial decomposition Mixing while filling Agitation when emptying	( ) Extend drainpipe outlets underneath liquid level ( ) Remove settled solids regularly
Manure, slurry or sludge spreader outlets	Agitation when spreading Volatile gas emissions	( ) Soil injection of slurry/sludges ( ) Wash residual manure from spreader after use ( ) Proven biological additives or oxidants
Dead animals	Carcass decomposition	( ) Proper disposition of carcasses
Dead animal disposal pits	Carcass decomposition	( ) Complete covering of carcasses in burial pits ( ) Proper location / construction of disposal pits
Incinerators	Incomplete combustion	( ) Secondary stack burners
Standing water around facilities	improper drainage Microbial decomposition of organic matter	(✓) Farm access road maintenance away from facilities
Manure tracked onto public roads from farm access	Poorly maintained access roads	(✓) Farm access road maintenance

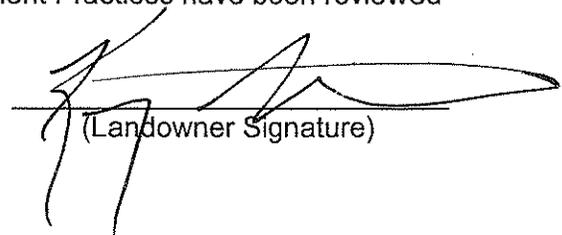
Additional Information:

Available From:

Swine Manure Management 0200 Rule / BMP Packet	NCSU-County Extension Center
Swine Production Farm Potential Odor Sources and Remedies, EBAE Fact Sheet	NCSU-BAE
Swine Production Facility Manure Management:Pit Recharge--Lagoon Treatment:EBAE128-88NCSU-BAE	NCSU-BAE
Swine Production Facility Manure Management:Underfloor Fluse-Lagoon Treatment 129-88NCSU-BAE	NCSU-BAE
Lagoon Design and Management for Livestock Manure Treatment and Storage; EBAE103-83NCSU-BAE	NCSU-BAE
Calibration of Manure and Wastewater Application Equipment EBAE Fact Sheet	NCSU-BAE
Controlling Odors from Swine Buildings; PIH-33	NCSU-Swine Extension
Environmental Assurance Program: NPPC Manual Assoc	NC Pork Producers
Options for Managing Odor; a report from the Swine Odor Task Force	NCSU Agri Communication
Nuisance Concerns in Animal Manure Management: Odors and Flies; PR0101, 1995 Conference Proceedings	Florida Cooperative Extension

The issues checked ( ) pertain to this operation. The landowner / integrator agrees to use sound judgment in applying odor control measures as practical.

I certify the aforementioned odor control Best Management Practices have been reviewed with me.

  
(Landowner Signature)

**MORTALITY MANAGEMENT METHODS**  
(Check which method(s) are being implemented)



- Burial three feet beneath the surface of the ground within 24 hours after knowledge of the death. The burial will be at least 300 feet from any flowing stream or public body of water.
- Rendering at a rendering plant licensed under G. S. 106 - 168.7
- Complete incineration
- In the case of dead poultry only, placing in a disposal pit of a size and design approved by the Department of Agriculture.
- Any method which in the professional opinion of the State Veterinarian would make possible the salvage of part of a dead animal's value without endangering human or animal health. (Written approval of the State Veterinarian must be attached)