

Phosphorus Loss Assessment Tool Completion

Name of Facility: PM Farm Facility Number: 82-143
Owner(s) Name: Dixie Chops Phone No: 910-271-1192
Mailing Address: 187 Dixie Chops Ln. Clinton, NC 28328

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)
<u>1, 2, 3, 4</u>	<u>10.94</u>	<u>38 (High)</u>
<u>5, 6, 7</u>	<u>4.89</u>	<u>68 (High)</u>

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: Dixie Chops, Inc.
Owner Signature: [Signature] Date: 8-24-12

Technical Specialist Name: Toni W. King
Technical Specialist Signature: [Signature] Date: 8-24-12
Affiliation: Murphy Brown, LLC Phone No: 910-293-3434

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

RECEIVED/DENR/DWQ

AUG 30 2012

Aquifer Protection Section

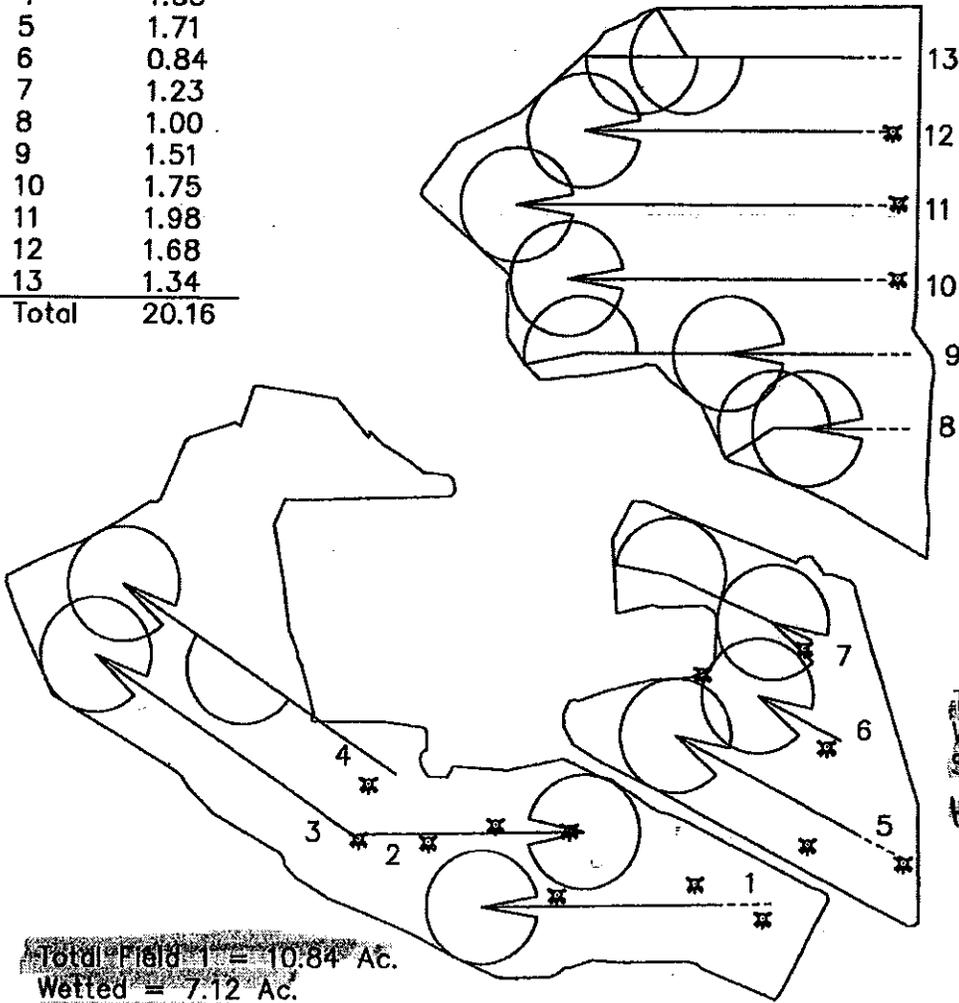
Dixie Chops, Inc. PM Farm

Fac. No. 82-143

Scale: 1"=300'

Pull#	Acres
1	1.89
2	1.58
3	2.12
4	1.53
5	1.71
6	0.84
7	1.23
8	1.00
9	1.51
10	1.75
11	1.98
12	1.68
13	1.34
Total	20.16

Total Field 3 = 10.91 Ac.
 Wetted = 9.26 Ac.
 Sub = 1.65 Ac.



Total Field 2 = 4.89 Ac.
 Wetted = 3.78 Ac.
 Sub = 1.11 Ac.

High P. Rating

Total Field 1 = 10.84 Ac.
 Wetted = 7.12 Ac.
 Sub = 3.72 Ac.

High P. Rating

Specifications:

- Ag Rain w/Nelson 100
- w/0.80TR nozzle @30 PSI
- 185' WD & 96 GPM (measured)
- 120' Lane Spacings



INPUTS

Calendar Year: 2012
County: Sampson
Producer Identifier: 82-143
Tract Number: C&D
Field Number: Leased F1
Soil Series: BoB: BLANTON SAND, 0 TO 6 PERCENT SLOPES
Crop: Tobacco (Flue Cured) : Conventional Tillage
Fertilizers: Layer-Lagoon liquid
Yearly Applied Amount: 2.04 ac in
Lb P2O5: 46.34 lb
Application Method: All other surface applications
Soil Loss: 0.488 t/ac/yr
Receiving Slope Distance 0-9 ft
Soil Test 0" - 8" 171
WV_Factor (USER) 1.38
Soil Test 28" - 32" 10
WV_Factor (USER) 1.15
Artificial Drainage System: NO
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 1
SOLUBLE P = 16
LEACHATE P = 4
SOURCE P = 4
TOTAL P RATING = 25 (LOW)

INPUTS

Calendar Year: 2012
County: Sampson
Producer Identifier: 82-143
Fract Number: C&D
Field Number: Leased F2
Soil Series: WaB: WAGRAM LOAMY SAND, 0 TO 6 PERCENT SLOPES
Crop: Corn (Grain) : Conventional Tillage
Fertilizers: Swine-Lagoon liquid
Yearly Applied Amount: 2.04 ac in
Lb P2O5: 53.4 lb
Application Method: All other surface applications
Soil Loss: 0.499 t/ac/yr
Receiving Slope Distance 0-9 ft
Soil Test 0" - 8" 196
WV_Factor (USER) 1.41
Soil Test 28" - 32" 0
WV_Factor (USER) 1.06
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 1
SOLUBLE P = 17
LEACHATE P = 0
SOURCE P = 4
TOTAL P RATING = 22 (LOW)

INPUTS

Calendar Year: 2012
County: Sampson
Producer Identifier: 82-143
Tract Number: C&D
Field Number: CD02
Soil Series: BoB: BLANTON SAND, 0 TO 6 PERCENT SLOPES
Crop: Hybrid Bermudagrass (Pasture)** :
Fertilizers: Layer-Lagoon liquid
Yearly Applied Amount: 2.04 ac in
Lb P2O5: 46.34 lb
Application Method: All other surface applications
Soil Loss: 0.042 t/ac/yr
Receiving Slope Distance 0-9 ft
Soil Test 0" - 4" 150
WV_Factor (USER) 1.25
Soil Test 28" - 32" 29
WV_Factor (USER) 1.08
Artificial Drainage System: NO
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0
SOLUBLE P = 2
LEACHATE P = 12
SOURCE P = 1
TOTAL P RATING = 15 (LOW)

INPUTS

Calendar Year: 2012
County: Sampson
Producer Identifier: 82-143
Tract Number: C&D
Field Number: CD03
Soil Series: BoB: BLANTON SAND, 0 TO 6 PERCENT SLOPES
Crop: Hybrid Bermudagrass (Pasture)** :
Fertilizers: Layer-Lagoon liquid
 Yearly Applied Amount: 2.04 ac in
 Lb P2O5: 46.34 lb
 Application Method: All other surface applications
Soil Loss: 0.042 t/ac/yr
Receiving Slope Distance 0-9 ft
Soil Test 0" - 4" 160
 WV_Factor (USER) 1.25
Soil Test 28" - 32" 17
 WV_Factor (USER) 1.3
Artificial Drainage System: NO
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0
SOLUBLE P = 3
LEACHATE P = 6
SOURCE P = 1
TOTAL P RATING = 10 (LOW)

INPUTS

Calendar Year: 2012
County: Sampson
Producer Identifier: 82-143
Fract Number: C&D
Field Number: CD01
Soil Series: BoB: BLANTON SAND, 0 TO 6 PERCENT SLOPES
Crop: Hybrid Bermudagrass (Pasture)** :
Fertilizers: Layer-Lagoon liquid
Yearly Applied Amount: 2.04 ac in
Lb P2O5: 46.34 lb
Application Method: All other surface applications
Soil Loss: 0.042 t/ac/yr
Receiving Slope Distance 0-9 ft
Soil Test 0" - 4" 321
WV_Factor (USER) 1.3
Soil Test 28" - 32" 85
WV_Factor (USER) 1.19
Artificial Drainage System: NO
Hydrologic Condition: GOOD

OUTPUTS

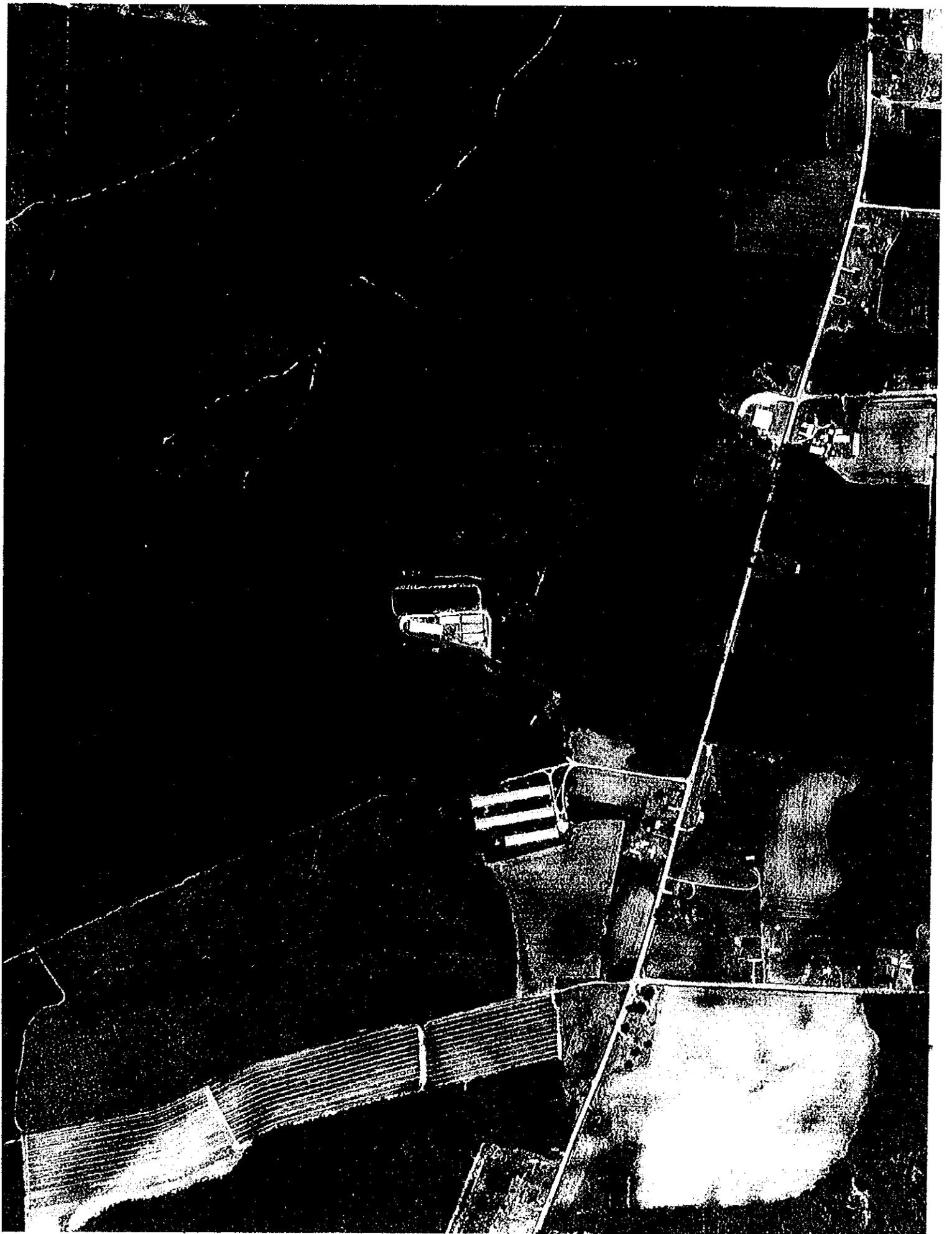
PARTICULATE P = 0
SOLUBLE P = 5
LEACHATE P = 32
SOURCE P = 1
TOTAL P RATING = 38 (HIGH)

INPUTS

Calendar Year: 2012
County: Sampson
Producer Identifier: 82-143
Tract Number: C&D
Field Number: CD04
Soil Series: BoB: BLANTON SAND, 0 TO 6 PERCENT SLOPES
Crop: Hybrid Bermudagrass (Pasture)** :
Fertilizers: Layer-Lagoon liquid
Yearly Applied Amount: 2.04 ac in
Lb P2O5: 46.34 lb
Application Method: All other surface applications
Soil Loss: 0.042 t/ac/yr
Receiving Slope Distance 0-9 ft
Soil Test 0" - 4" 332
WV_Factor (USER) 1.31
Soil Test 28" - 32" 205
WV_Factor (USER) 1.46
Artificial Drainage System: NO
Hydrologic Condition: GOOD

OUTPUTS

PARTICULATE P = 0
SOLUBLE P = 5
LEACHATE P = 62
SOURCE P = 1
TOTAL P RATING = 68 (HIGH)







Soil Test Report

SERVING N.C. RESIDENTS FOR OVER 60 YEARS

Grower: Dixie Chops Inc
 Attn: Richard Edwards
 187 Dixie Chops Ln
 Clinton, NC 28328

Copies To: Barwick, Curtis

Farm:

Received: 11/30/2011 **Completed:** 12/28/2011 **Links to Helpful Information** **Sampson County**

Agronomist Comments

Field Information		Recommendations													
Sample No.	Last Crop	Mo	Yr	T/A	Lime	N	P2O5	K2O	Mg	S	Cu	Zn	B	Mn	See Note
AM1					.5T	180-220	0	150-170	0	20-25	0	0	0	0	12
	1st Crop: Berm Hay/Pas,M														
	2nd Crop: Berm Hay/Pas,M				0	180-220	0	150-170	0	20-25	0	0	0	0	12

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.71	1.30	5.1	73.0	1.4	5.7	180	29	52.0	17.0	52	48	48	392	392	123	24					0.1

Field Information

Sample No.	Last Crop	Mo	Yr	T/A	Lime	N	P2O5	K2O	Mg	S	Cu	Zn	B	Mn	See Note
AM3					.8T	180-220	0	0	0	0	0	0	0	0	12
	1st Crop: Berm Hay/Pas,M														
	2nd Crop: Berm Hay/Pas,M				0	180-220	0	0	0	0	0	0	0	0	12

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.60	1.24	6.7	75.0	1.7	5.5	311	148	51.0	13.0	66	57	57	908	908	225	30					0.1

Field Information

Sample No.	Last Crop	Mo	Yr	T/A	Lime	N	P2O5	K2O	Mg	S	Cu	Zn	B	Mn	See Note
AM4					1T	180-220	0	0-20	0	0	0	0	0	0	12
	1st Crop: Berm Hay/Pas,M														
	2nd Crop: Berm Hay/Pas,M				0	180-220	0	0-20	0	0	0	0	0	0	12

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.66	1.24	5.6	66.0	1.9	5.3	237	110	43.0	13.0	78	64	64	560	560	191	30					0.1

Field Information

Sample No.	Last Crop	Mo	Yr	T/A	Lime	N	P2O5	K2O	Mg	S	Cu	Zn	B	Mn	See Note
AM5					0	180-220	0	30-50	0	20-25	0	0	0	0	12
	1st Crop: Berm Hay/Pas,M														
	2nd Crop: Berm Hay/Pas,M				0	180-220	0	30-50	0	20-25	0	0	0	0	12

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.66	1.32	5.0	78.0	1.1	5.9	162	89	52.0	18.0	48	47	47	365	365	88	25					0.1

Field Information		Recommendations																
Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Crop or Year	Lime	N	P2O5	K2O	Mg	S	Cu	Zn	B	Mn	See Note	
PM1						1st Crop: Berm Hay/Pas,M	11	180-220	0	0	0	0	0	0	0	0		12
						2nd Crop: Berm Hay/Pas,M	0	180-220	0	0	0	0	0	0	0	0		12

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.81	1.30	7.4	74.0	1.9	5.3	321	135	52.0	14.0	98	76	76	1397	1397	564	34				0.2

Field Information

Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations
PM2						1st Crop: Berm Hay/Pas,M
						2nd Crop: Berm Hay/Pas,M

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.76	1.25	6.1	75.0	1.5	6.1	150	106	51.0	15.0	39	39	39	714	714	212	27				0.1

Field Information

Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations
PM3						1st Crop: Berm Hay/Pas,M
						2nd Crop: Berm Hay/Pas,M

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.76	1.25	6.3	78.0	1.4	6.0	160	106	53.0	16.0	43	43	43	768	768	225	24				0.1

Field Information

Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations
PM4						1st Crop: Berm Hay/Pas,M
						2nd Crop: Berm Hay/Pas,M

Test Results

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.76	1.31	7.4	86.0	1.0	6.4	332	64	63.0	19.0	74	55	55	1319	1319	488	25				0.1



Reprogramming of the laboratory-information-management system that makes this report possible is being funded through a grant from the North Carolina Tobacco Trust Fund Commission.

Thank you for using agronomic services to manage nutrients and safeguard environmental quality.

- Steve Troxler, Commissioner of Agriculture

Copies To:
 Murphy-Brown, LLC
 PO Box 856
 Warsaw, NC 28398

Grower:
 Farm: LINDELL C+D
 Greene County

Received: 02/15/2012 Completed: 03/23/2012 Links to Helpful Information
 Farm: LINDELL C+D
 Deep core 32"

12.3.12

Soil Test Report

SERVING N.C. RESIDENTS FOR OVER 60 YEARS



Field Information		Applied Lime		Recommendations	
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year
DS01					
					1st Crop: Berm Hay/Pas,M
					2nd Crop: Small Grains

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.36	1.32	3.1	61.0	1.2	5.0	25	75	34.0	14.0	23	31	24	43	43	65	205				0.1

Field Information		Applied Lime		Recommendations	
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year
DS02					
					1st Crop: Berm Hay/Pas,M
					2nd Crop: Small Grains

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.41	1.13	4.4	75.0	1.1	5.2	62	253	31.0	16.0	9	22	15	33	33	55	287				0.3

Field Information		Applied Lime		Recommendations	
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year
DS03					
					1st Crop: Berm Hay/Pas,M
					2nd Crop: Small Grains

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.41	1.17	4.1	63.0	1.5	4.8	19	210	24.0	14.0	12	24	17	48	48	45	378				0.2

Field Information		Applied Lime		Recommendations	
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year
DS04					
					1st Crop: Berm Hay/Pas,M
					2nd Crop: Small Grains

Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na
MIN	0.36	1.21	4.2	95.0	0.2	6.6	33	441	30.0	12.0	8	13	6	30	30	65	76				0.4

Field Information		Applied Lime		Recommendations	
Sample No.	Last Crop	Mo	Yr	T/A	Crop or Year
DS05					

Test Results																						
Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.41	1.22	4.3	77.0	1.0	5.3	17	179	36.0	20.0	11	24	17	45	45	50	268					0.1

Field Information													
Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations							
CD01													

Test Results																						
Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.46	1.19	4.4	50.0	2.2	4.7	85	137	21.0	14.0	9	22	15	28	28	50	136					0.1

Field Information													
Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations							
CD02													

Test Results																						
Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.41	1.08	5.9	42.0	3.4	4.6	29	102	16.0	17.0	6	21	14	23	23	35	103					0.1

Field Information													
Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations							
CD03													

Test Results																						
Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.46	1.30	1.7	53.0	0.8	4.9	17	40	26.0	15.0	3	19	12	20	20	30	43					0.1

Field Information													
Sample No.	Last Crop	Mo	Yr	T/A	Applied Lime	Recommendations							
CD04													

Test Results																						
Soil Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	Mn-I	Mn-AI(1)	Mn-AI(2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO3-N	NH4-N	Na	
MIN	0.41	1.46	1.5	53.0	0.7	5.2	205	25	31.0	15.0	5	20	13	28	28	65	14					0.0

Operator: Dixie Chops PM Farm County: Sampson Date: 03/15/12

Distance to nearest residence (other than owner): 1500.0 feet

1. AVERAGE LIVE WEIGHT (ALW)

0 sows (farrow to finish)	x	1417 lbs.	=	0 lbs
0 sows (farrow to feeder)	x	522 lbs.	=	0 lbs
2950 head (finishing only)	x	135 lbs.	=	398250 lbs
0 sows (farrow to wean)	x	433 lbs.	=	0 lbs
0 head (wean to feeder)	x	30 lbs.	=	0 lbs
Describe other :				0

Total Average Live Weight = 398250 lbs

2. MINIMUM REQUIRED TREATMENT VOLUME OF LAGOON

Volume = 398250 lbs. ALW x Treatment Volume(CF)/lb. ALW
 Treatment Volume(CF)/lb. ALW = 1 CF/lb. ALW
 Volume = 398250 cubic feet

3. STORAGE VOLUME FOR SLUDGE ACCUMULATION

Volume = 0.0 cubic feet

4. TOTAL DESIGNED VOLUME

Inside top length (feet)----- 506.0
 Inside top width (feet)----- 125.0
 Top of dike elevation (feet)----- 52.0
 Bottom of lagoon elevation (feet)----- 36.4
 Freeboard (feet)----- 1.0
 Side slopes (inside lagoon)----- 2.5 : 1

Total design volume using prismatic formula

SS/END1	SS/END2	SS/SIDE1	SS/SIDE2	LENGTH	WIDTH	DEPTH
2.5	2.5	2.5	2.5	501.0	120.0	14.6

AREA OF TOP

LENGTH * WIDTH =
 501.0 120.0 60120 (AREA OF TOP)

AREA OF BOTTOM

LENGTH * WIDTH =
 428.0 47.0 20116 (AREA OF BOTTOM)

AREA OF MIDSECTION

LENGTH * WIDTH * 4
 464.5 83.5 155143 (AREA OF MIDSECTION * 4)

CU. FT. = [AREA TOP + (4*AREA MIDSECTION) + AREA BOTTOM] * DEPTH/6
 60120.0 155143.0 20116.0 2.4

Total Designed Volume Available = 572756 CU. FT.

5. TEMPORARY STORAGE REQUIRED

DRAINAGE AREA:

Lagoon (top of dike)

Length * Width =

506.0 125.0 63250.0 square feet

Buildings (roof and lot water)

0.0 square feet

Describe this area.

TOTAL DA 63250.0 square feet

Design temporary storage period to be

175 days.

5A. Volume of waste produced

Feces & urine production in gal./day per 135 lb. ALW 1.37

Volume = 398250 lbs. ALW/135 lbs. ALW * 1.37 gal/day 175 days

Volume = 707263 gals. or 94553.8 cubic feet

5B. Volume of wash water

This is the amount of fresh water used for washing floors or volume of fresh water used for a flush system. Flush systems that recirculate the lagoon water are accounted for in 5A.

Volume = 0.0 gallons/day * 175 days storage/7.48 gallons per CF

Volume = 0.0 cubic feet

5C. Volume of rainfall in excess of evaporation

Use period of time when rainfall exceeds evaporation by largest amount.

175 days excess rainfall = 7.0 inches

Volume = 7.0 in * DA / 12 inches per foot

Volume = 36895.8 cubic feet

5D. Volume of 25 year - 24 hour storm

Volume = 7.0 inches / 12 inches per foot * DA

Volume = 36895.8 cubic feet

TOTAL REQUIRED TEMPORARY STORAGE

5A. 94554 cubic feet

5B. 0 cubic feet

5C. 36896 cubic feet

5D. 36896 cubic feet

TOTAL 168345 cubic feet

6. SUMMARY:

Temporary storage period=====>	175 days	
Rainfall in excess of evaporation=====>	7.0 inches	
25 year - 24 hour rainfall=====>	7.0 inches	
Freeboard=====>	1.0 feet	
Side slopes=====>	2.5 : 1	
Inside top length=====>	506.0 feet	
Inside top width=====>	125.0 feet	
Top of dike elevation=====>	52.0 feet	
Bottom of lagoon elevation=====>	36.4 feet	
Total required volume=====>	566595 cu. ft.	*
Actual design volume=====>	572756 cu. ft.	*
Seasonal high watertable elevation (SHWT)===>	42.4 feet	
Stop pumping elev.=====>	47.9 feet	*
Must be > or = to the SHWT elev.=====>	42.4 feet	
Must be > or = to min. req. treatment el.=>	42.4 feet	
Required minimum treatment volume=====>	398250 cu. ft.	
Volume at stop pumping elevation=====>	401055 cu. ft.	
Start pumping elev.=====>	50.4 feet	*
Must be at bottom of freeboard & 25 yr. rainfall		
Actual volume less 25 yr.- 24 hr. rainfall==>	535860 cu. ft.	
Volume at start pumping elevation=====>	534331 cu. ft.	
Required volume to be pumped=====>	131450 cu. ft.	*
Actual volume planned to be pumped=====>	133276 cu. ft.	*
Min. thickness of soil liner when required==>	2.3 feet	

7. DESIGNED BY:

APPROVED BY:

Art Burt

DATE:

DATE:

3-15-72

NOTE: SEE ATTACHED WASTE UTILIZATION PLAN

COMMENTS:

*As built
1996 info used*

OPERATION & MAINTENANCE PLAN

Proper lagoon liquid 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 the thunderstorm season in the summertime. This means that at the first signs 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 inflow 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.

- 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 phosphores, 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.

- 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:

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

DWQ 910 433-3300
EMERGENCY MANAGEMENT SYSTEM 910 592-8996
SWCD 910 592-4791
NRCS 910 592-7963

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 flows 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 caused 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 no siphon occurs.
- d. Stop all flows in the house, flush systems, or solid separators.

e. Repair all leaks prior to restarting pumps.

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 away 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 lagoon bottom as soon as possible.

2. Assess the extent of the spill and note any obvious damages.

- a. Did the waste reach any surface waters?
- b. Approximately how much was released and for what duration?
- c. Any damage noted, 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 of the property)?
- h. How much reached surface waters?

3: Contact appropriate agencies.

- a. During normal business hours, call your DWQ (Division of Water Quality) regional office; Phone - - - . After hours, emergency number: 919-733-3942. Your phone call should include: your name, facility, telephone number, the details of the incident from item 2 above, the exact location of the facility, the location or direction of movement of the spill, weather and wind conditions. The corrective measures that have been under taken, and the seriousness of the situation.
- b. If spill leaves property or enters surface waters, call local EMS Phone number - - - .
- c. Instruct EMS to contact local Health Department.
- d. Contact CES, phone number - - - , local SWCD office phone number - - - , and 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 that person to contact the proper agencies for you.

5: Contact the contractor of your choice to begin repair of problem to minimize off-site damage.

- a. Contractors Name: Mark Rayner Wade Blackburn
- b. Contractors Address: Cl. 126 Harrells
- c. Contractors Phone: 910 590-4513 910 590-8202

6: Contact the technical specialist who certified the lagoon (NRCS, Consulting Engineer, etc.) N/A

a. Name: Greg Swan PE
b. Phone: 910 590-5179

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.

SEP 07 2012

INSECT CONTROL CHECKLIST FOR ANIMAL OPERATIONS *Over Insects* Aquifer Protection Section

Source	Cause	BMP's to Minimize <i>Over Insects</i>	Site Specific Practices
(Liquid Systems)			
Flush Gutters	Accumulation of solids	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Flush system is designed and operated sufficiently to remove accumulated solids from gutters as designed. <input checked="" type="checkbox"/> Remove bridging of accumulated solids at discharge 	
Lagoons and Pits	Crusted Solids	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> 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. 	
Excessive Vegetative Growth	Decaying vegetation	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Maintain vegetative control along banks of lagoons and other impoundments to prevent accumulation of decaying vegetative matter along water's edge on impoundment's perimeter. 	
(Dry Systems)			
Feeders	Feed Spillage	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Design, operate and maintain feed systems (e.g., bunkers and troughs) to minimize the accumulation of decaying wastage. <input checked="" type="checkbox"/> Clean up spillage on a routine basis (e.g. 7-10 day interval during summer; 15-30 day interval during winter). 	
Feed Storage	Accumulations of feed residues	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> 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). <input checked="" type="checkbox"/> Inspect for and remove or break up accumulated solids in filter strips around feed storage as needed. 	
Animal Holding Areas	Accumulations of animal wastes and feed wastage	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Eliminate low area that trap moisture along fences and other locations where waste accumulates and disturbance by animals is minimal. <input type="checkbox"/> 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). 	

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	<input checked="" type="checkbox"/> 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; () Scrape manure buildup from floors; () Underfloor ventilation for drying	
Manure collection pits	Urine	<input checked="" type="checkbox"/> Frequent manure removal by flush, pit recharge, or scrape () Underfloor ventilation	
	Partial microbial decomposition	() Underfloor ventilation	
Ventilation exhaust fans	Volatile gases; Dust	() Fan maintenance; () Efficient air movement	
Indoor surfaces	Dust	<input checked="" type="checkbox"/> Washdown between groups of animals <input checked="" type="checkbox"/> Feed additives; () Feeder covers; <input checked="" type="checkbox"/> 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 wastewater 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 wastewater conveyance	() Box covers	
End of drainpipes at lagoon	Agitation during wastewater	() 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 () Correct lagoon startup procedures () Minimum surface area-to-volume ratio <input checked="" type="checkbox"/> Minimum agitation when pumping () Mechanical aeration <input checked="" type="checkbox"/> 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	

Storage tank or basin surface	Partial microbial decomposition Mixing while filling Agitation when emptying	<input type="checkbox"/> Bottom or midlevel loading <input type="checkbox"/> Tank covers <input type="checkbox"/> Basin surface mats of solids <input type="checkbox"/> Proven biological additives or oxidants
Settling basin surface	Partial microbial decomposition Mixing while filling Agitation when emptying	<input type="checkbox"/> Extend drainpipe outlets underneath liquid level <input type="checkbox"/> Remove settled solids regularly
Manure, slurry or sludge spreader outlets	Agitation when spreading Volatile gas emissions	<input type="checkbox"/> Soil injection of slurry/sludges <input type="checkbox"/> Wash residual manure from spreader after use <input type="checkbox"/> Proven biological additives or oxidants
Uncovered manure, slurry or sludge on field surfaces	Volatile gas emissions while drying	<input type="checkbox"/> Soil infection of slurry/sludges <input checked="" type="checkbox"/> Soil incorporation within 48 hours <input checked="" type="checkbox"/> Spread in thin uniform layers for rapid drying <input checked="" type="checkbox"/> Proven biological additives or oxidants
Dead animals	Carcass decomposition	<input checked="" type="checkbox"/> Proper disposition of carcasses
Dead animal disposal pits	Carcass decomposition	<input type="checkbox"/> Complete covering of carcasses in burial pits <input type="checkbox"/> Proper location/construction of disposal pits
Incinerators	Incomplete combustion	<input type="checkbox"/> Secondary stack burners
Standing water around facilities	Improper drainage Microbial decomposition of organic matter	<input checked="" type="checkbox"/> Grade and landscape such that water drains away from facilities
Manure tracked onto public roads from farm access	Poorly maintained access roads	<input checked="" type="checkbox"/> Farm access road maintenance

Additional Information:

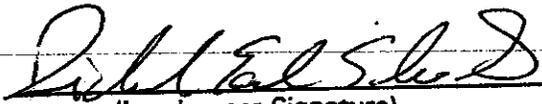
- Swine Manure Management; 0200 Rule/BMP Packet
- Swine Production Farm Potential Odor Sources and Remedies, EBAE Fact Sheet
- Swine Production Facility Manure Management: Pit Recharge-Lagoon Treatment; EBAE 128-88
- Swine Production Facility Manure Management: Underfloor Fluo-Lagoon Treatment; EBAE 129-88
- Lagoon Desig and Management for Livestock Manure Treatment and Storage; EBAE 103-83
- Calibration of Manure and Wastewater Application Equipment; EBAE Fact Sheet
- Controlling Odors from Swine Buildings; PIH-33
- Environmental Assuranc Program: NPPC Manual
- Options for Managing Odor; a report from the Swine Odor Task Force
- Nuisance Concerns in Animal Manure Management: Odors and Flies; PRO107, 1995 Conference Proceedings

- Available From:**
- NCSU-County Extension Center
 - NCSU-BAE
 - NCSU-BAE
 - NCSU-BAE
 - NCSU-BAE
 - NCSU-BAE
 - NCSU-Swine Extension
 - NC Pork Produccs Assoc
 - NCSU Agri Communications
 - 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.

DIXIE CHOPS PM FARM 82-143

 9-4-12
(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 must 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)