



NORTH CAROLINA
Environmental Quality

September 23, 2019

ROY COOPER

Governor

MICHAEL S. REGAN

Secretary

LINDA CULPEPPER

Director

Christopher Boone
Boone Family Farms
2285 Cornwallis Rd
Rose Hill, NC 28458

Subject: Certificate of Coverage No. AWS310612
Boone Family Farms
Swine Waste Collection, Treatment,
Storage and Application System
Duplin County

Dear Christopher Boone:

In accordance with your renewal request, we are hereby forwarding to you this Certificate of Coverage (COC) issued to Christopher Boone, authorizing the operation of the subject animal waste management system in accordance with General Permit AWG100000. Please read this COC and the enclosed State General Permit carefully.

This approval shall consist of the operation of this system including, but not limited to, the management and land application of animal waste as specified in the facility's Certified Animal Waste Management Plan (CAWMP) for Boone Family Farms, located in Duplin County, with a swine animal capacity of no greater than the following annual averages:

Wean to Finish:	Feeder to Finish:	Boar/Stud:
Wean to Feeder:	Farrow to Wean: 1,200	Gilts:
Farrow to Finish:	Farrow to Feeder:	Other:

If this is a Farrow to Wean or Farrow to Feeder operation, there may be one boar for each 15 sows. Where boars are unnecessary, they may be replaced by an equivalent number of sows. Any of the sows may be replaced by gilts at a rate of 4 gilts for every 3 sows.

This COC shall be effective from October 1, 2019 until September 30, 2024 and shall hereby void Certificate of Coverage Number AWS310612 that was previously issued to this facility. Pursuant to this COC, you are authorized and required to operate the system in conformity with the conditions and limitations as specified in the General Permit, the facility's CAWMP, and this COC. An adequate system for collecting and maintaining the required monitoring data and operational information must be established for this facility. Any increase in waste production greater than the certified design capacity or increase in number of animals authorized by this COC (as provided above) will require a modification to the CAWMP and this COC and must be completed prior to actual increase in either wastewater flow or number of animals.

You are encouraged to update your Swine Odor Control Checklist using the enclosed form. If you do so, you must send a copy of the updated form to the Animal Feeding Operations Program at the address below.

Please pay careful attention to the record keeping and monitoring conditions in this permit. Stocking and Mortality Form (STOCK-1) has been updated; all other record keeping forms are unchanged with this General Permit. Please use the most current record keeping forms.



North Carolina Department of Environmental Quality | Division of Water Resources
512 North Salisbury Street | 1636 Mail Service Center | Raleigh, North Carolina 27699-1636
919.707.9000

If your Waste Utilization Plan (WUP) has been developed based on site-specific information, careful evaluation of future samples is necessary. Should your records show that the current WUP is inaccurate you will need to have a new WUP developed.

The issuance of this COC does not excuse the Permittee from the obligation to comply with all applicable laws, rules, standards, and ordinances (local, state, and federal), nor does issuance of a COC to operate under this permit convey any property rights in either real or personal property.

Per 15A NCAC 02T .1304 and NRCS standards a 100-foot separation shall be maintained between water supply wells and any lagoon, storage pond, or any land application of waste.

Please be advised that any violation of the terms and conditions specified in this COC, the General Permit or the CAWMP may result in the revocation of this COC, or penalties in accordance with NCGS 143-215.6A through 143-215.6C including civil penalties, criminal penalties, and injunctive relief.

If any parts, requirements, or limitations contained in this COC are unacceptable, you have the right to apply for an individual permit by contacting the Animal Feeding Operations Program for information on this process. Unless such a request is made within 30 days, this COC shall be final and binding.

In accordance with Condition II.23 of the General Permit, waste application shall cease within twelve (12) hours of the time that the National Weather Service issues a Hurricane Warning, Tropical Storm Warning, or a Flood Watch/Flash Flood Watch associated with a tropical system for the county in which the facility is located. You may find detailed watch/warning information for your county by calling the Newport/Morehead City, NC National Weather Service office at (252) 223-5737, or by visiting their website at: www.weather.gov/mhx/

This facility is located in a county covered by our Wilmington Regional Office. The Regional Office staff may be reached at 910-796-7215. If you need additional information concerning this COC or the General Permit, please contact the Animal Feeding Operations Program staff at (919) 707-9129.

Sincerely,



for Linda Culpepper
Director, Division of Water Resources

Enclosures (General Permit AWG100000)

cc: (Certificate of Coverage only for all ccs)
Wilmington Regional Office, Water Quality Regional Operations Section
Duplin County Health Department
Duplin County Soil and Water Conservation District
Central Files (Permit No. AWS310612)
Murphy-Brown LLC

DATE 9/20/12

31-612

Producer: Boone Family Farms

Location: 2285 Cornwallis Road
ROSE HILL, NC 28458

Telephone: 910-289-2360

Type Operation: FARROW TO WEAN

Number of Animals: 1200

The waste from your animal facility must be land applied at a specified rate to prevent pollution of surface and/or groundwater. The plant nutrients in the animal waste should be used to reduce the amount of commercial fertilizer required for the crops in the fields where waste is to be applied. This waste utilization plan uses nitrogen as the limiting nutrient. Waste should be analyzed before each application cycle. Annual soil tests are strongly encouraged so that all plant nutrients can be balanced for realistic yields of the crop to be grown.

Several factors are important in implementing your waste utilization plan in order to maximize the fertilizer value of the waste and to ensure that it is applied in an environmentally safe manner. Always apply waste based on the needs of the crop to be grown and the nutrient content of the waste. Do not apply more nitrogen than the crop can utilize. Soil types are important as they have different infiltration rates, leaching potentials, cation exchange capacities, and available water holding capacities. Normally waste shall not be applied to land eroding at greater than 5 tons per acre per year. With special precautions, waste may be applied to land eroding at up to 10 tons per acre per year. Do not apply waste on saturated soils, when it is raining, or when the surface is frozen. Either of these conditions may result in runoff to surface waters which is not allowed under DWQ regulations. Wind conditions should also be considered to avoid drift and downwind odor problems. To maximize the value of the nutrients for crop production and to reduce the potential for pollution, the waste should be applied to a growing crop or applied to bare ground not more than 30 days prior to planting. Injecting the waste or disking will conserve nutrients and reduce odor problems. This plan is based on waste application through irrigation for this is the manner in which you have chosen to apply your waste. If you choose to inject the waste in the future, you need to revise this plan. Nutrient levels for injecting waste and irrigating waste are not the same.

The estimated acres needed to apply the animal waste is based on typical nutrient content for this type of facility. Acreage requirements should be based on the waste analysis report from your waste management facility. Attached you will find information on proper sampling techniques, preparation, and transfer of waste samples to the lab for analysis.

This waste utilization plan, if carried out, meets the requirements for compliance with 15A NCAC 2H.0217 adopted by the Environmental Management Commission.

TOTALS FROM TABLES 1 AND 2

	ACRES	LBS AW N USED
TABLE 1	29.94	8670.7
TABLE 2	0	0
TOTAL	29.94	8670.7
AMOUNT OF N PRODUCED		6480
*** BALANCE		-2190.7

*** This number must be less than or equal to 0 in order to fully utilize the animal waste N produced.

Acres shown in each of the preceding tables are considered to be the usable acres excluding required buffers, filter strips along ditches, odd areas unable to be irrigated, and perimeter areas not receiving full application rates due to equipment limitations. Actual total acres in the fields listed may, and most likely will be, more than the acres shown in the tables.

NOTE: The Waste Utilization Plan must contain provisions for periodic land application of sludge at agronomic rates. The sludge will be nutrient rich and will require precautionary measures to prevent over application of nutrients or other elements. Your production facility will produce approximately _____ pounds of plant available nitrogen (PAN) per year in the sludge that will need to be removed on a periodic basis. This figure is PAN when broadcasting the sludge equipment, may be needed when you remove this sludge.

See attached map showing the fields to be used for the utilization of waste water.

APPLICATION OF WASTE BY IRRIGATION

The irrigation application rate should not exceed the intake rate of the soil at the time of irrigation such that runoff or ponding occurs. This rate is limited by initial soil moisture content, soil structure, soil texture, water droplet size, and organic solids. The application amount should not exceed the available water holding capacity of the soil at the time of irrigation nor should the plant available nitrogen applied exceed the nitrogen needs of the crop.

Your facility is designed for 180 days of temporary storage and the temporary storage must be removed on the average of once every 6 months. In no instance should the volume of waste being stored in your structure be within _____ feet of the top of the dike.

1. Animal waste shall not reach surface waters of the state by runoff, drift, manmade conveyances, direct application, or direct discharge during operation or land application. Any discharge of waste which reaches surface water is prohibited. Illegal discharges are subject to assessment of civil penalties of \$10,000 per day by the Division of Water Quality for every day the discharge continues.
2. The Local NRCS office must have documentation in the design folder that the producer either owns or has long term access to adequate land to properly dispose of waste. If the producer does not own adequate land to properly dispose of waste, he shall provide NRCS with a copy of a written agreement with a landowner who is within a reasonable proximity, allowing him/her the use of the land for waste application for the life expectancy of the production facility. It is the responsibility of the owner of the facility to secure an updated Waste Utilization Plan when there is a change in the operation, increase in the number of animals, method of utilization, or available land.
3. Animal waste shall be applied to meet, but not exceed, the Nitrogen needs for realistic crop yields based on soil type, available moisture, historical data, climate conditions, and level of management, unless there are regulations that restrict the rate of application for other nutrients.
4. Animal waste may be applied to land that has a Resource Management System (RMS) or an Alternative Conservation System (ACS). If an ACS is used the soil loss shall be no greater than 10 tons per acre per year and appropriate filter strips will be used where runoff leaves the field. These filter strips will be in addition to "Buffers" required by DEM. (See FOTG Standard 393-Filter Strips and Standard 390 Interim Riparian Forest Buffers).
5. Odors can be reduced by injecting the waste or disking after waste application. Waste should not be applied when the wind is blowing.
6. When animal waste is to be applied on acres subject to flooding, it will be soil incorporated on conventionally tilled cropland. When applied to conservation tilled crops or grassland, the waste may be broadcast provided the application does not occur during a season prone to flooding. (See "Weather and Climate in North Carolina" in the NRCS Technical Reference - Environment file for guidance.
7. Liquid waste shall be applied at rates not to exceed the soil infiltration rate such that runoff does not occur off-site or to surface waters and in a method which does not cause drift from the site during application. No ponding should occur in order to control conditions conducive to odor or flies and to provide uniformity of application.
8. Animal waste shall not be applied to saturated soils, during rainfall event, or when the surface is frozen.
9. Animal waste shall be applied on actively growing crops in such a manner that the crop is not covered with waste to a depth that would inhibit growth. The potential for salt damage from animal waste should also be considered.

10. Waste nutrients shall not be applied in fall or winter for spring planted crops on soils with a high potential for leaching. Waste nutrient loading rates on these soils should be held to a minimum and a suitable winter cover crop planted to take up released nutrients. Waste shall not be applied more than 30 days prior to planting of a crop on bare soil.
11. Animal waste shall not be applied closer than 25 feet to surface water. This distance may be reduced for waters that are not perennial provided adequate vegetative filter strips are present. (See standard 393 - Filter Strips)
12. Animal waste shall not be applied closer than 100 feet to wells.
13. Animal waste shall not be applied closer than 200 feet of dwellings other than those owned by the landowner.
14. Waste shall be applied in a manner not to reach other property and public right-of ways.
15. Animal waste shall not be discharged into surface waters, drainage ways, or wetlands by discharge or by over-spraying. Animal waste may be applied to prior converted wetlands provided they have been approved as a land application site by a "technical specialist". Animal waste should not be applied on grassed waterways that discharge into water courses, except when applied at agronomic rates and the application causes no runoff or drift from the site.
16. Domestic and industrial waste from wash down facilities, showers, toilets, sinks, etc., shall not be discharged into the animal waste management system.
17. Lagoons and other uncovered waste containment structures must maintain a maximum operating level to provide adequate storage for a 25-year, 24-hour storm event in addition to one (1) foot mandatory freeboard.
18. A protective cover of appropriate vegetation will be established on all disturbed areas (lagoon embankments, berms, pipe runs, etc.). If needed, special vegetation shall be provided for these areas and shall be fenced, as necessary to protect the vegetation. Vegetation such as trees, shrubs, and other woody species, etc. are limited to areas where considered appropriate. Lagoon areas should be kept mowed and accessible. Lagoon berms and structures should be inspected regularly for evidence of erosion, leakage or discharge.
19. If animal production at the facility is to be suspended or terminated, the owner is responsible for obtaining and implementing a "closure plan" which will eliminate the possibility of an illegal discharge, pollution and erosion.
20. Waste handling structures, piping, pumps, reels, etc., should be inspected on a regular basis to prevent breakdowns, leaks, and spills. A regular maintenance checklist should be kept on site.

21. Animal waste can be used in a rotation that includes vegetables and other crops for direct human consumption. However, if animal waste is used on crops for direct human consumption it should only be applied pre plant with no further applications of animal waste during the crop season.
22. Highly visible markers shall be installed to mark the top and bottom elevations of the temporary storage (pumping volume) of all waste treatment lagoons. Pumping shall be managed to maintain the liquid level between the markers. A marker will be required to mark the maximum storage volume for waste storage ponds.
23. Waste shall be tested within sixty days of utilization and soil shall be tested at least annually at crop sites where waste products are applied. Nitrogen shall be the rate - determining element. Zinc and copper levels in the soils shall be monitored and alternative crop sites shall be used when these metals approach excessive levels. pH and waste analysis records shall be kept for five years. Poultry dry waste application records shall be maintained for three years. Waste application records for all other waste shall be maintained for five years.
24. Dead animals will be disposed of in a manner that meets North Carolina State regulations or other States' regulations.

NAME OF FARM: Boone Family Farms

OWNER / MANAGER AGREEMENT

I (we) understand and will follow and implement the specifications and the operation and maintenance procedures established in the approved animal waste utilization plan for the farm named above. I (we) know that an expansion to the existing design capacity of the waste treatment and storage system or construction of new facilities will require a new certification to be submitted to the Division of Water Quality (DWQ) before the new animals are stocked. I (we) also understand that there be no discharge of animal waste from this system to surface waters of the state from a storm event less severe than the 25 year, 24 hour storm. The approved plan will be filed on-site at the farm office and at the office of the local Soil and Water Conservation District and will be available for review by DWQ upon request.

I (we) understand that I must own or have access to equipment, primarily irrigation equipment, to land apply the animal waste described in this waste utilization plan. This equipment must be available at the appropriate pumping time such that no discharge occurs from the lagoon in a 25-year 1-day storm event. I also certify that the waste will be applied on the land according to this plan at the appropriate times and at rate that no runoff occurs.

NAME OF FACILITY OWNER: Boone Family Farms

SIGNATURE: Christopher Boone DATE: 9/20/12

NAME OF MANAGER (if different from owner): _____

SIGNATURE: _____ DATE: _____

NAME OF TECHNICAL SPECIALIST: RONNIE G. KENNEDY JR.

AFFILIATION: Agriment Services Inc.
PO Box 1096
Beulaville NC 28518

SIGNATURE: [Signature] DATE: 9/20/12

Agriment Services Inc.

Irrigation Equipment Calibration

DATE	10/31/2022
TIME	2:30 PM
WEATHER CONDITIONS	CLEAR
FLOW METER SN	DYNASONICS ULTRASONIC FLOW METER 18197

FARM INFO.	
FACILITY #	31-612
IRR. SYS. #	SYS. #1 & #2
OWNER	CHRIS BOONE
ADDRESS	2285 CORNWALLIS RD. ROSE HILL, NC 28458
PHONE	(910) 284 - 9175

REEL INFO. AND/OR PIPE INFO.			
MAKE	ABI (SYS #1)	REEL RAIN (SYS #2)	
MODEL	708TE820	1025	
TYPE	POLYETHYLENE	POLYETHYLENE	6" SCH 80 PVC
LENGTH	850 FT.	820 FT.	
INSIDE DIA	2.50 IN.	2.50 IN.	5.761 IN.
OUTSIDE DIA	2.875 IN.	2.875 IN.	6.625 IN.
WALL THICKNESS	0.188 IN.	0.188 IN.	0.432 IN.
TRANSDUCER SPACING	4.32 IN.(W)	4.32 IN. (W)	5.39 IN. (W)

GUN/SPRINKLER INFO.		
MAKE	NELSON SERIES (SYS #1)	NELSON SERIES (SYS #2)
MODEL	100 BIG GUN	100 BIG GUN
NOZZLE TYPE	RING	RING
MFR NOZZLE SIZE	0.96 IN.	0.96 IN.
MSR NOZZLE SIZE	0.96 IN.	0.96 IN.
SIZE VARIANCE	0.00 IN.	0.00 IN.

PUMP INFO.	
MAKE	PIVOT POWER
MODEL	1900 RPM

TEST INFO.									
Scenario	Pump PSI	Reel PSI	Gun PSI	Expected GPM	Measured GPM	GPM Variance	Expected Wetted Dia.	Measured Wetted Dia.	Wetted Dia. Variance
SYS #1	-	-	30 PSI	122 GPM	119 GPM	5 %	206 FT.	195 FT.	5 %
SYS #2	-	-	30 PSI	122 GPM	119 GPM	5 %	206 FT.	198 FT.	4 %
BOTH				244 GPM	238 GPM				

*If GPM variance is greater than 10% and/or wetted dia. variance is greater the 15%, then contact a technical specialist or irrigation specialist for assistance.

Calibrator: _____

Jonathan Miller
(Print)


(Signature)


Agriment Services, Inc.

Appendix 1. Lagoon Sludge Survey Form

Revised August 2008

- A. Farm Permitter DWQ Identification Number: _____ → 31-612
- B. Lagoon Identification: _____ → Chris Boone 1
- C. Person(s) taking Measurements: _____ → Brent Rhodes
- D. Date of Measurements: _____ → 3/27/2024
- E. Methods/Devices Used for Measurement of:
- a. Distance from the lagoon liquid surface to the top of the sludge layer: _____ → Sonar Boat
- b. Distance from the lagoon liquid surface to the bottom soil of lagoon: _____ → Range Pole
- c. Thickness of the sludge layer if making a direct measurement with "core sampler": _____ → n/a
- F. Lagoon Surface Area (using dimensions at inside to of bank): _____ → 0.30
 (Draw a sketch of the lagoon on separate sheet, list dimensions and calculate surface area. **The lagoon may have been built different than designed, so measurements should be made.**)
- G. Estimate number of sampling points:
- a. Less than 1.33 acre, use 8 points: _____ → 8
- b. If more than 1.33 acre, surface area acres x 6 = sampling points, with a maximum of 24: _____ → _____
- (Using sketch and dimensions, develop a uniform grid that has the same number of intersection as the estimated number of sampling points needed. Number the intersection points on the lagoon grid so that data recorded at each can be easily matched.)
- H. Conduct sludge survey and record data on "Sludge Survey Data Sheet" (Appendix 2). **Also, at the location of the pump intake, take measurement of distance from liquid surface to top of sludge layer and record it on the Data Sheet (last row); this must be at least 2.5 ft. when irrigating.**
- I. At time of sludge survey, also measure the distance from the Maximum Liquid Level to the Present Liquid Level (measure at the lagoon gage pole): _____ → 1.97
- J. Determine distance from top of bank to the Maximum Liquid Level (use lagoon management plan or other lagoon records): _____ → 1.70
- K. Determine distance from Maximum Liquid Level to Minimum Liquid Level (use lagoon management plan or other lagoon records): _____ → 1.80
- L. Calculate distance from present liquid surface level to Minimum Liquid Level (**Item K - Item I**, assuming present liquid level is below Max. Liq. Level): _____ → -0.17
- M. Record from sludge survey data sheet the distance from the present liquid surface level to the lagoon bottom (average for all the measurement points): _____ → 7.52
- N. Record from sludge survey data sheet the distance from the present liquid surface level to the top of the sludge layer (average for all the measurement points): _____ → 4.41
- O. Record from sludge survey data sheet the average thickness of the Sludge Layer: _____ → 3.11
- P. Calculate the thickness of the existing Liquid Treatment Zone (**Item N - Item L**): _____ → 4.58
- Q. **If Item O is greater than Item P, proceed to the Worksheet for Sludge Volume and Treatment Volume. If Item O is equal to or less than Item P, you do not have to determine volumes.**

Completed by: Ronnie G. Kennedy
 Print Name


 Signature

Agriment Services, Inc.

Appendix 2. Sludge Survey Data Sheet

Revised August 2008

Lagoon Identification: Chris Boone 1

Date: 3/27/2024

Completed by: Ronnie G. Kennedy
Print Name


Signature

(A) Grid Point No.	(B) Distance from liquid surface to top of sludge Feet (tenths)	(C) Distance from liquid surface to lagoon bottom (soil) Feet (tenths)	(C) - (B) Thickness of sludge layer Feet (tenths)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
# of points with readings	1384	x	x
Average of points	4.41	7.52	3.11
At pump intake	4.00	x	x

*All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey Data Sheet.

Agriment Services, Inc.

Appendix 3. Worksheet for sludge volume and treatment volume

Revised August 2008

The average thickness of the sludge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information on the Lagoon Sludge Survey Form (Item O and P, respectively). **If the lagoon has a designed sludge storage volume, see notes at end of the worksheet.** The dimensions of the lagoon as measured and the side slope are needed for calculations of sludge volume and of total treatment volume. If the lagoon is a standard geometric shape, the sludge volume and treatment volume in the lagoon can be estimated by using standard equations. For approximate volumes of rectangular lagoons with constant side slope, calculate length and width at the midpoint of the layer, and multiply by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with constant side slope, the "Prismoidal Equations" may be used.

	Lagoon
1 Average Sludge Layer Thickness (T):	3.11 ft.
2 Depth of lagoon from top of bank to bottom soil surface (D):	12.00 ft.
3 Slope = horizontal/vertical side slope (S):	2.50
4 Length at top inside bank (L):	192.00 ft.
5 Width at top inside bank (W):	69.00 ft.
6 Length at midpoint of sludge layer (L_m) = $L - 2 S (D - (T/2))$:	139.78 ft.
7 Width at midpoint of sludge layer (W_m) = $W - 2 S (D - (T/2))$:	16.78 ft.
8 Volume of sludge (V_s) = $L_m W_m T$:	7,292.10 ft ³
9 Volume in gallons $V_{sg} = V (7.5 \text{ gal./ft}^3)$:	54,690.73 gal.
10 Thickness of existing liquid tmt. zone (Y)	4.58 ft.
11 Thickness of total treatment zone (Z) = $T + Y$	7.69 ft.
12 Length at midpoint of total tmt. zone $L_z = L - 2(S)(D-(Z/2))$	151.22 ft.
13 Width at midpoint of total tmt. Zone $W_z = W - 2(S) (D -(Z/2))$	28.22 ft.
14 Volume of total treatment zone (V_z) = $L_z W_z Z$	32,797.70 ft ³
15 Ratio (R) of sludge layer volume to total Treatment volume $R = V_s/V_z$	0.22

If the ratio exceeds 50%, than a sludge Plan of Action may be required. Check with DWQ for information on filing the Plan of Action.

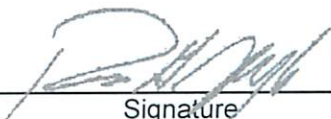
Note: If the lagoon has a designed sludge storage volume (DSSV), subtract that volume from both the volume of sludge (V_s) (Item 8) and from the volume of total treatment zone (V_z) (Item 14), and take the ratio:

16 Design sludge storage volume (DSSV)	ft ³
17 Ratio (R) of sludge layer volume to treatment volume adjusted for (DSSV).	0.22

Lagoon Identification: Chris Boone 1

Date: 3/27/2024

Completed by: Ronnie G. Kennedy
Print Name


Signature


Agriment Services, Inc.

Appendix 1. Lagoon Sludge Survey Form

Revised August 2008

- A. Farm Permitter DWQ Identification Number: _____ → 31-612
- B. Lagoon Identification: _____ → Chris Boone 3 (2)
- C. Person(s) taking Measurements: _____ → Brent Rhodes
- D. Date of Measurements: _____ → 3/27/2024
- E. Methods/Devices Used for Measurement of:
- a. Distance from the lagoon liquid surface to the top of the sludge layer: _____ → Sonar Boat
- b. Distance from the lagoon liquid surface to the bottom soil of lagoon: _____ → Range Pole
- c. Thickness of the sludge layer if making a direct measurement with "core sampler": _____ → n/a
- F. Lagoon Surface Area (using dimensions at inside to of bank): _____ → 1.21
 (Draw a sketch of the lagoon on separate sheet, list dimensions and calculate surface area. **The lagoon may have been built different than designed, so measurements should be made.**)
- G. Estimate number of sampling points:
- a. Less than 1.33 acre, use 8 points: _____ → 8
- b. If more than 1.33 acre, surface area acres x 6 = sampling points, with a maximum of 24: _____ → _____
- (Using sketch and dimensions, develop a uniform grid that has the same number of intersection as the estimated number of sampling points needed. Number the intersection points on the lagoon grid so that data recorded at each can be easily matched.)
- H. Conduct sludge survey and record data on "Sludge Survey Data Sheet" (Appendix 2). **Also, at the location of the pump intake, take measurement of distance from liquid surface to top of sludge layer and record it on the Data Sheet (last row); this must be at least 2.5 ft. when irrigating.**
- I. At time of sludge survey, also measure the distance from the Maximum Liquid Level to the Present Liquid Level (measure at the lagoon gage pole): _____ → 0.32
- J. Determine distance from top of bank to the Maximum Liquid Level (use lagoon management plan or other lagoon records): _____ → 1.60
- K. Determine distance from Maximum Liquid Level to Minimum Liquid Level (use lagoon management plan or other lagoon records): _____ → 2.30
- L. Calculate distance from present liquid surface level to Minimum Liquid Level (**Item K - Item I**, assuming present liquid level is below Max. Liq. Level): _____ → 1.98
- M. Record from sludge survey data sheet the distance from the present liquid surface level to the lagoon bottom (average for all the measurement points): _____ → 10.08
- N. Record from sludge survey data sheet the distance from the present liquid surface level to the top of the sludge layer (average for all the measurement points): _____ → 5.52
- O. Record from sludge survey data sheet the average thickness of the Sludge Layer: _____ → 4.56
- P. Calculate the thickness of the existing Liquid Treatment Zone (**Item N - Item L**): _____ → 3.54
- Q. **If Item O is greater than Item P, proceed to the Worksheet for Sludge Volume and Treatment Volume. If Item O is equal to or less than Item P, you do not have to determine volumes.**

Completed by: Ronnie G. Kennedy
 Print Name


 Signature

Agriment Services, Inc.


Appendix 2. Sludge Survey Data Sheet

Revised August 2008

Lagoon Identification: Chris Boone 3 (2)

Date: 3/27/2024

Completed by: Ronnie G. Kennedy
Print Name


Signature

(A) Grid Point No.	(B) Distance from liquid surface to top of sludge Feet (tenths)	(C) Distance from liquid surface to lagoon bottom (soil) Feet (tenths)	(C) - (B) Thickness of sludge layer Feet (tenths)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
# of points with readings	2724	x	x
Average of points	5.52	10.08	4.56
At pump intake	4.50	x	x

*All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey Data Sheet.

Agriment Services, Inc.

Appendix 3. Worksheet for sludge volume and treatment volume

Revised August 2008

The average thickness of the sludge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information on the Lagoon Sludge Survey Form (Item O and P, respectively). **If the lagoon has a designed sludge storage volume, see notes at end of the worksheet.** The dimensions of the lagoon as measured and the side slope are needed for calculations of sludge volume and of total treatment volume. If the lagoon is a standard geometric shape, the sludge volume and treatment volume in the lagoon can be estimated by using standard equations. For approximate volumes of rectangular lagoons with constant side slope, calculate length and width at the midpoint of the layer, and multiply by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with constant side slope, the "Prismoidal Equations" may be used.

	Lagoon
1 Average Sludge Layer Thickness (T):	4.56 ft.
2 Depth of lagoon from top of bank to bottom soil surface (D):	13.00 ft.
3 Slope = horizontal/vertical side slope (S):	3.00
4 Length at top inside bank (L):	350.00 ft.
5 Width at top inside bank (W):	150.00 ft.
6 Length at midpoint of sludge layer (L_m) = $L - 2 S (D - (T/2))$:	285.68 ft.
7 Width at midpoint of sludge layer (W_m) = $W - 2 S (D - (T/2))$:	85.68 ft.
8 Volume of sludge (V_s) = $L_m W_m T$:	111,615.40 ft ³
9 Volume in gallons $V_{sg} = V (7.5 \text{ gal./ft}^3)$:	837,115.53 gal.
10 Thickness of existing liquid tmt. zone (Y)	3.54 ft.
11 Thickness of total treatment zone (Z) = $T + Y$	8.10 ft.
12 Length at midpoint of total tmt. zone $L_z = L - 2(S)(D-(Z/2))$	296.29 ft.
13 Width at midpoint of total tmt. Zone $W_z = W - 2(S) (D -(Z/2))$	96.29 ft.
14 Volume of total treatment zone (V_z) = $L_z W_z Z$	230,995.99 ft ³
15 Ratio (R) of sludge layer volume to total Treatment volume $R = V_s/V_z$	0.48

If the ratio exceeds 50%, than a sludge Plan of Action may be required. Check with DWQ for information on filing the Plan of Action.

Note: If the lagoon has a designed sludge storage volume (DSSV), subtract that volume from both the volume of sludge (V_s) (Item 8) and from the volume of total treatment zone (V_z) (Item 14), and take the ratio:

16 Design sludge storage volume (DSSV)	ft ³
17 Ratio (R) of sludge layer volume to treatment volume adjusted for (DSSV).	0.48

Lagoon Identification: Chris Boone 3 (2)

Date: 3/27/2024

Completed by: Ronnie G. Kennedy
Print Name


Signature

Agriment Services, Inc.

Appendix 1. Lagoon Sludge Survey Form

Revised August 2008

- A. Farm Permitter DWQ Identification Number: _____ → 31-612
- B. Lagoon Identification: _____ → Chris Boone 4 (3)
- C. Person(s) taking Measurements: _____ → Brent Rhodes
- D. Date of Measurements: _____ → 3/27/2024
- E. Methods/Devices Used for Measurement of:
- a. Distance from the lagoon liquid surface to the top of the sludge layer: _____ → Sonar Boat
- b. Distance from the lagoon liquid surface to the bottom soil of lagoon: _____ → Range Pole
- c. Thickness of the sludge layer if making a direct measurement with "core sampler": _____ → n/a
- F. Lagoon Surface Area (using dimensions at inside to of bank): _____ → 0.94
 (Draw a sketch of the lagoon on separate sheet, list dimensions and calculate surface area. **The lagoon may have been built different than designed, so measurements should be made.**)
- G. Estimate number of sampling points:
- a. Less than 1.33 acre, use 8 points: _____ → 8
- b. If more than 1.33 acre, surface area acres x 6 = sampling points, with a maximum of 24: _____ → _____
- (Using sketch and dimensions, develop a uniform grid that has the same number of intersection as the estimated number of sampling points needed. Number the intersection points on the lagoon grid so that data recorded at each can be easily matched.)
- H. Conduct sludge survey and record data on "Sludge Survey Data Sheet" (Appendix 2). **Also, at the location of the pump intake, take measurement of distance from liquid surface to top of sludge layer and record it on the Data Sheet (last row); this must be at least 2.5 ft. when irrigating.**
- I. At time of sludge survey, also measure the distance from the Maximum Liquid Level to the Present Liquid Level (measure at the lagoon gage pole): _____ → 0.23
- J. Determine distance from top of bank to the Maximum Liquid Level (use lagoon management plan or other lagoon records): _____ → 1.60
- K. Determine distance from Maximum Liquid Level to Minimum Liquid Level (use lagoon management plan or other lagoon records): _____ → 4.10
- L. Calculate distance from present liquid surface level to Minimum Liquid Level (**Item K - Item I**, assuming present liquid level is below Max. Liq. Level): _____ → 3.87
- M. Record from sludge survey data sheet the distance from the present liquid surface level to the lagoon bottom (average for all the measurement points): _____ → 10.63
- N. Record from sludge survey data sheet the distance from the present liquid surface level to the top of the sludge layer (average for all the measurement points): _____ → 6.79
- O. Record from sludge survey data sheet the average thickness of the Sludge Layer: _____ → 3.84
- P. Calculate the thickness of the existing Liquid Treatment Zone (**Item N - Item L**): _____ → 2.92
- Q. **If Item O is greater than Item P, proceed to the Worksheet for Sludge Volume and Treatment Volume. If Item O is equal to or less than Item P, you do not have to determine volumes.**

Completed by: Ronnie G. Kennedy
 Print Name


 Signature

Agriment Services, Inc.

Appendix 2. Sludge Survey Data Sheet

Revised August 2008

Lagoon Identification: Chris Boone 4 (3)

Date: 3/27/2024

Completed by: Ronnie G. Kennedy
Print Name


Signature

(A) Grid Point No.	(B) Distance from liquid surface to top of sludge	(C) Distance from liquid surface to lagoon bottom (soil)	(C) - (B) Thickness of sludge layer
	Feet (tenths)	Feet (tenths)	Feet (tenths)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
# of points with readings	2881	x	x
Average of points	6.79	10.63	3.84
At pump intake	6.00	x	x

*All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey Data Sheet.

Agriment Services, Inc.

Appendix 3. Worksheet for sludge volume and treatment volume

Revised August 2008

The average thickness of the sludge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information on the Lagoon Sludge Survey Form (Item O and P, respectively). **If the lagoon has a designed sludge storage volume, see notes at end of the worksheet.** The dimensions of the lagoon as measured and the side slope are needed for calculations of sludge volume and of total treatment volume. If the lagoon is a standard geometric shape, the sludge volume and treatment volume in the lagoon can be estimated by using standard equations. For approximate volumes of rectangular lagoons with constant side slope, calculate length and width at the midpoint of the layer, and multiply by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with constant side slope, the "Prismoidal Equations" may be used.

	Lagoon
1 Average Sludge Layer Thickness (T):	3.84 ft.
2 Depth of lagoon from top of bank to bottom soil surface (D):	13.00 ft.
3 Slope = horizontal/vertical side slope (S):	3.00
4 Length at top inside bank (L):	235.00 ft.
5 Width at top inside bank (W):	175.00 ft.
6 Length at midpoint of sludge layer (L_m) = $L - 2 S (D - (T/2))$:	168.52 ft.
7 Width at midpoint of sludge layer (W_m) = $W - 2 S (D - (T/2))$:	108.52 ft.
8 Volume of sludge (V_s) = $L_m W_m T$:	70,225.12 ft ³
9 Volume in gallons $V_{sg} = V (7.5 \text{ gal./ft}^3)$:	526,688.36 gal.
10 Thickness of existing liquid tmt. zone (Y)	2.92 ft.
11 Thickness of total treatment zone (Z) = $T + Y$	6.76 ft.
12 Length at midpoint of total tmt. zone $L_z = L - 2(S)(D-(Z/2))$	177.29 ft.
13 Width at midpoint of total tmt. Zone $W_z = W - 2(S) (D -(Z/2))$	117.29 ft.
14 Volume of total treatment zone (V_z) = $L_z W_z Z$	140,639.08 ft ³
15 Ratio (R) of sludge layer volume to total Treatment volume $R = V_s/V_z$	0.50

If the ratio exceeds 50%, than a sludge Plan of Action may be required. Check with DWQ for information on filing the Plan of Action.


Note: If the lagoon has a designed sludge storage volume (DSSV), subtract that volume from both the volume of sludge (V_s) (Item 8) and from the volume of total treatment zone (V_z) (Item 14), and take the ratio:

16 Design sludge storage volume (DSSV)	ft ³
17 Ratio (R) of sludge layer volume to treatment volume adjusted for (DSSV).	0.50

Lagoon Identification: Chris Boone 4 (3)

Date: 3/27/2024

Completed by: Ronnie G. Kennedy
Print Name


Signature