Certification Training for Operators of Animal Waste Management Systems—Type B

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A proper waste management plan and waste application system are vital parts of a modern confined animal operation. If the waste from your animal operation is not properly managed, it can have many negative impacts on your overall farming operation as well as your community. The negative consequences of a poorly managed waste application system can cost in terms of dollars, loss of land values, impaired environmental quality, and loss of good standing in the community.

The North Carolina General Assembly passed legislation in 1995 and 1996 requiring certification of operators of animal waste management systems. The law requires a certified operator for animal waste management systems that serve over 250 swine, 100 confined cattle, 75 horses, 1000 sheep, or 30,000 poultry with a liquid animal waste management system. To become a certified operator, one must complete an approved training course on the operation of animal waste management systems, pass an appropriate examination, and pay the required fees. This training program is designed to provide operators of animal waste management systems the basic understanding needed to operate and maintain these systems in an efficient and environmentally sound manner. This manual is not intended to provide all of the technical details for the complete design of a waste management system or an approved animal waste management plan. There are many good reference materials that have been published on these subjects that can provide more detailed information if desired. Many of those materials will be referenced to in this manual for basic information. You are encouraged to make use of all appropriate materials in the operation of your animal waste management system.

This program is administered by the Water Pollution Control System Operators Certification Commission in conjunction with the North Carolina Department of Environment, Health, and Natural Resources and with the North Carolina Cooperative Extension Service.

This manual is a combination of guidance and reference materials gathered from various sources in conjunction with input and expertise from individuals with the following organizations:

- Carolina-Virginia Milk Producers Association
- Individual and Corporate Swine, Poultry, Dairy, and Egg Producers
- Natural Resources Conservation Service
- North Carolina Cooperative Extension Service
Introduction

- North Carolina Dairy Producers Association
- North Carolina Department of Agriculture
- North Carolina Department of Environment, Health, and Natural Resources
- North Carolina Egg Association
- North Carolina Farm Bureau Federation
- North Carolina Pork Producers Association
- North Carolina Poultry Federation
- North Carolina State University
- Water Pollution Control System Operators Certification Commission

This manual has been written based on the current laws, rules, and technical guidance available at the time. It is possible, indeed likely, that there will be changes in the laws and technical guidance that apply to animal waste management. You should keep yourself aware of these changes. The organizations and government agencies that are involved in animal waste management will make efforts to inform the individuals who own and operate animal waste management systems of these changes as they occur. However, you are ultimately responsible to ensure that you are operating in compliance with current laws and rules. If you have questions, you should contact the appropriate resource people listed in Appendix A for questions concerning these changes.

NOTES ABOUT THIS MANUAL

This manual is designed for individuals involved in animal production and the waste management systems that are associated with these operations. Therefore, it is assumed that the reader is at least generally familiar with the components of a waste management system and other basic farming practices.

HOW TO USE THIS MANUAL

There are two types of certification for animal waste management system operators: titled Type A and Type B. Type A is for systems that handle liquid, low fiber wastes (such as swine) and Type B is for systems that have high fiber wastes (such as cattle). A separate manual has been developed for each classification of operator. Your instructor will provide the appropriate manual for your training. Upon completion of the training and passing the appropriate examination, you will be eligible for the particular certification.
type for your interest. In order to be able to operate both types of systems, you must complete each class and pass each appropriate examination.

The following section is the Needs-To-Know document. It lists the abilities and skills that you, as an operator of an animal waste management system, should have in order to properly manage the waste management system on your farm.

As you proceed through each chapter, you will be alerted with an italicized note in the outside margin when you enter a section that gives you the information needed to answer a Needs-To-Know item.

At the completion of each chapter there will be review questions. These are used to emphasize important points and to generate discussion among the course participants. Your instructor may use these questions to review the material presented and to prepare you for the examination.

The focus of the training will be on the eight chapters presented. These chapters explain waste system components, waste utilization plans, proper waste application, regulations, record keeping, safety and emergency action plans, and consequences of improper management.

Following these chapters are several appendices. They are used to provide information which is relevant and important to your operation, but does not directly deal with the land application of waste and the rules involved. There are some example questions which may help in your review process of the course materials.

To become certified to operate a Type A or Type B animal waste management system, you must first successfully complete the approved training program. Second, you must submit an application to the Water Pollution Control System Operators Certification Commission with the appropriate fee attached. Third, you must pass an examination administered by the Water Pollution Control System Operators Certification Commission with a score of 70 percent.

For more information on the certification process and duties of the owner and operator in charge, see Chapter 8. The examination dates and locations will be announced during the training programs.
This manual provides thorough explanations and calculations that will allow you to operate an animal waste management system under normal circumstances. However, there is a tremendous amount of technical assistance available for the planning, design, operation, and reporting that are all involved with animal waste management. This manual references those sources of technical assistance, and you are encouraged to utilize these resources.

The manual will also refer to an individual called a “technical specialist.” A technical specialist has expertise in one or more components of waste management and is certified as such by the North Carolina Division of Soil and Water Conservation. A technical specialist is the only individual who may legally sign the form that completes an approved animal waste management plan. To develop a waste management plan or have one modified, you must have approval from a technical specialist. Not all individuals referenced in Appendix A are technical specialists, but they are still available to offer guidance in waste management issues.

An operator of a Type B animal waste management system should be able to:

**CHAPTER 1: WHY ARE WE HERE?**

Explain the reasons for and requirements of certified operators for animal waste management systems. .................................................... see page 1-1
Define surface water, groundwater, and hydrologic cycle. ..... see page 1-2
Give examples of point source and nonpoint source pollution. see page 1-3
Define the eutrophication process and problems it causes in surface waters. .......................................................... see page 1-4
Explain the soil features that affect waste treatment. .............. see page 1-5
Describe what an aquifer is and how groundwater flows. ..... see page 1-7
Explain why animal waste is a resource. ............................... see page 1-7
List several nonproducer concerns (such as community and environmental) of livestock, egg, and milk production. ..................... see page 1-7
Explain several consequences of mismanagement of an animal waste management system. ........................................... see page 1-8
CHAPTER 2: SYSTEM COMPONENTS AND OPERATION—TYPE B

Describe the purpose and components of a Type B animal waste management system. .................................................................see page 2B-1

Describe which wastes are typically handled as a liquid, slurry, or solid. .................................................................see page 2B-1

Describe the need to manage lot/roof runoff and the appropriate runoff control measures. ...........................................see page 2B-2

Calculate the estimated parlor wastewater that is generated at a dairy facility. .................................................................see page 2B-3

Describe the purpose of the flush system. .............................see page 2B-3

Explain the need for proper pipe design, installation, and maintenance. .................................................................see page 2B-4

Describe the advantages and disadvantages of dry stack storage systems. .................................................................see page 2B-6

Explain the need for liners for earthen lagoons and waste storage structures, and what types are available. .........................see page 2B-8

Describe the function and importance of an animal waste storage pond. .................................................................see page 2B-8

Explain the need for proper waste storage pond sizing. .......see page 2B-8

Explain when runoff or wastewater may be added to slurry storage structures. .................................................................see page 2B-9

Explain the procedures for proper manure slurry storage. .....see page 2B-9

Describe how to properly mix and empty a slurry storage structure. .................................................................see page 2B-10

Explain the difference between slurry storage systems and anaerobic lagoons. .................................................................see page 2B-10

Describe the function and proper operation of an animal waste anaerobic lagoon. .................................................................see page 2B-10

Explain the need for proper lagoon sizing. ......................see page 2B-11

Describe the six specific volumes for an anaerobic lagoon. see page 2B-11

Explain the need and use of a gauging device. ......................see page 2B-12

Describe the proper start-up procedure for an anaerobic lagoon.
Describe the conditions in an anaerobic lagoon that indicate the lack of biological activity. See page 2B-13

Describe the proper management of an anaerobic lagoon. See page 2B-14

Describe methods to reduce sludge buildup. See page 2B-15

Describe the proper methods of sludge removal from both a lagoon and storage pond. See page 2B-16

Explain the benefits of soil incorporation of animal waste and lagoon sludges. See page 2B-17

Explain methods to minimize crystal buildup in recycle pipes. See page 2B-17

Explain the need for year-round liquid/slurry waste management. See page 2B-18

Describe proper lagoon, storage pond, and dam maintenance. See page 2B-19

Describe the proper operation and maintenance of pumps. See page 2B-21

Describe the purpose of surface water diversions. See page 2B-21

Describe possible causes of failures of earthen lagoons and waste storage structures. See page 2B-22

Describe some methods that could be used to enhance waste treatment. See page 2B-23

List several advantages of solids separation. See page 2B-23

Explain the use and maintenance of solids settling basins, traps, and mechanical separation devices. See page 2B-23

Explain the benefits of composting separated manure solids. See page 2B-25

Describe the advantages and disadvantages of a multistage lagoon. See page 2B-27

Describe the methods that can be used to minimize odors. See page 2B-28

Describe the advantages and disadvantages of land application using manure spreaders. See page 2B-28

Describe the need for a properly designed irrigation system. See page 2B-29
Describe the different components of stationary and traveling sprinkler systems. ................................................................. see page 2B-30

Describe the advantages and disadvantages of stationary and traveling sprinkler systems. ................................................................. see page 2B-34

Describe the proper location of the intake pipe in the lagoon or pond leading to an irrigation system. ................................................................. see page 2B-34

Explain the proper procedures for waste slurry irrigation. ... see page 2B-35

Explain BMPs typically used for holding lots, pastures, and loafing areas. ........................................................................................................ see page 2B-36

CHAPTER 3: WASTE MANAGEMENT PLANS

Describe the primary goal of the waste utilization plan. ........ see page 3-4

List the four components of nutrient management in a waste utilization plan. ........................................................................................................ see page 3-5

List ways in which best management practices protect water quality. ........................................................................................................ see page 3-7

Calculate the amount of animal waste produced on your farm annually. ........................................................................................................ see page 3-9

Describe how you can determine nutrient content of liquids, slurries, and sludges. ........ see page 3-10

Define agronomic rate. ........................................................ see page 3-13

Describe the priority nutrient concept. ........................................................ see page 3-13

Describe the role of vegetation in waste management. ........ see page 3-13

List factors to consider in crop selection. ........................................................ see page 3-14

Define realistic yield expectation (R.Y.E.). ........................................................ see page 3-15

List the sources for realistic yield expectations for specific soil series. ........................................................................................................ see page 3-16

List cropping systems suitable for waste utilization in North Carolina. ........................................................................................................ see page 3-18

Describe why timing of waste applications is important. ... see page 3-22

Identify factors affecting the timing of waste applications. ... see page 3-22
Describe the importance of BMP maintenance and describe what to do if a BMP fails. ................................................................. see page 3-25

CHAPTER 4: TOOLS FOR THE PLAN

Describe why the proper collection of waste samples is important. ........................................................................................................... see page 4-1

Describe why you should use actual data from a waste analysis instead of average estimates when determining waste application rates. . see page 4-1

Explain how often waste samples must be taken. ......................... see page 4-1

Describe how to take a waste sample of a lagoon, waste slurry, or dry waste and submit it for nutrient analysis. ................................. see page 4-2

Describe information available on a Waste Analysis Report. . see page 4-7

Interpret the waste analysis report and know if lab results are reasonable. .............................................................................................. see page 4-7

Describe how to take a soil sample and submit for analysis. see page 4-10

Describe information available on a Soil Test Report. .......... see page 4-12

Describe how soil test information can be used to select a site and determine the sustainability of long-term waste applications. see page 4-16

Describe the role of plant tissue analysis in managing and monitoring forage quality. ................................................................. see page 4-19

CHAPTER 5: PROPER APPLICATION OF WASTE PRODUCTS—TYPE B

List the necessary buffers for waste application. ...............see page 5B-1

Describe why wind speed and direction should be considered when applying waste. .................................................................see page 5B-1

List the five factors that must be addressed before irrigating animal waste. .................................................................see page 5B-4

Explain the importance of soil water terms: saturation, field capacity, permanent wilting point, gravitational water, and plant-available water relative to irrigation scheduling. .................................see page 5B-4
Describe techniques for determining the amount of water present in the soil and when to irrigate. ........................................................see page 5B-7

List five factors that may influence the amount of wastewater that can be irrigated. ...............................................................see page 5B-13

Explain the relevance of irrigation precipitation rate to soil infiltration capacity. ..............................................................see page 5B-14

Explain how to determine how much water to irrigate. .......see page 5B-15

Explain how/why irrigation amounts need to be adjusted seasonally. ..................................................................................see page 5B-15

Define precipitation rate, discharge rate, and application volume. ..........................................................................................see page 5B-16

Explain how to obtain sprinkler discharge rates. ...............see page 5B-16

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Compute the application volume for a stationary sprinkler irrigation system. ...............................................................see page 5B-21

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Compute the precipitation rate and application volume for a traveling gun sprinkler. ..........................................................see page 5B-23

Compute the required travel speed for a traveling gun sprinkler to apply the desired application volume. ................................see page 5B-24

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Explain the effects of changing pressure on droplet size, drift, precipitation rate, and wetted sprinkler diameter. ..................see page 5B-26

Explain why sprinkler systems should be field calibrated. ..see page 5B-26

Explain calibration procedures for stationary and traveling sprinklers. ..................................................................................see page 5B-26

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spreader or tanker equipment. .............................................. see page 5B-27
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Describe what records need to be maintained to show compliance with environmental regulations. ................................ see page 6-2
Describe what is to be done with records. ............................... see page 6-2
Calculate and verify application rates through the use of waste application records. .......................................................... see page 6-3

CHAPTER 7: SAFETY AND EMERGENCY ACTION PLANS
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Describe the steps for first aid to victims of asphyxiation. .... see page 7-3
Explain the safety precautions for manure storage. ..................... see page 7-5
Describe several safety precautions in regards to vehicle operation, heavy equipment, PTOs, and hydraulic systems. .............. see page 7-6
Describe the responsibilities of the site supervisor. ................. see page 7-8
List the items that a safety program should include. ............... see page 7-9
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Describe the responsibilities of the owner or employer. ..... see page 7-10
Describe the responsibilities of the employee. ..................... see page 7-10
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Describe the correct way to lift and carry objects. ............... see page 7-12
Explain why personal hygiene is important. ..................... see page 7-12
CHAPTER 8: CONSEQUENCES OF IMPROPER MANAGEMENT

Define “discharge” of animal waste. ........................................... see page 8-1
Define a 25-year, 24-hour storm.............................................. see page 8-1
Describe the various types of regulatory action that can result from mismanagement. .......................................................... see page 8-1
Describe the rules and laws that apply to animal waste management. .................................................................................. see page 8-3
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Describe the violations that require mandatory reporting. ...... see page 8-7
Know which commission is responsible for the certification of animal waste management system operators. ........................ see page 8-9
Describe the necessary steps required to renew your animal waste management system operator certification. ................ see page 8-10
Describe what enforcement actions can be taken against an operator by the commission. .................................................. see page 8-10
Describe why the commission may take an enforcement action against an operator. .............................................................. see page 8-10

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Describe the duties and requirements of an operator in charge of an animal waste management system. .................................................... see page 8-11

Explain why improper management can affect the owner and/or operator financially, with community relations, and with media coverage.
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Explain why excessive application of waste lowers land values, harms crops, and reduces fertilizer dollars. .............................. see page 8-15

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Explain why it is important to maintain a “good neighbor policy.”
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