Produced by:

IOWA STATE UNIVERSITY
University Extension

In cooperation with:

Written by:

Jeff Lorimor . . . . . extension agricultural and biosystems engineer
Kris Kohl . . . . . extension agricultural and biosystems field engineer
Randy Killorn . . . . . extension agronomist
Bill Lotz . . . . . extension crop field specialist
Paul Miller . . . . . Natural Resource Conservation Service

Edited by:

Tracy Peterson
Elaine Edwards . . . . . ISU Extension Communication Systems
Bonnie Harmon

Designed by:

Julie Mangels . . . . . Juls Design, Ankeny, Iowa

A special thanks to:

North Carolina State University and the University of Illinois. Some of the materials in this manual were adopted from *Certification Training for Operators of Animal Waste Management Systems Manual,* published by North Carolina State University and *Certified Livestock Managers' Manual,* published by the University of Illinois. Reviewed by Ubbo Agena and field staff, Iowa Department of Natural Resources, and Gerald Miller and Jim Johnson, Iowa State University Extension.

. . . and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

December 1999
File: Environmental Quality 1-4
[E]

table of contents

INTRODUCTION

introduction page

WATER QUALITY

water quality page

STORAGE

storage and handling page

table of contents

NUTRIENT MANAGEMENT

nutrient management page

Managing manure nutrients for crop production

LAND APPLICATION

land application page

table of contents

table of contents

RECORD KEEPING

record keeping page

OTHER RESOURCES

other resources page

table of contents

TABLES AND FIGURES

table of contents

TABLES AND FIGURES CONT.

page

table of contents

TABLES AND FIGURES CONT.

page

Iowa's manure law requires manure applicators to become certified by March 1, 1999. The 1998 Iowa Legislature included the certification provisions as part of House File 2494. As Livestock facilities become larger, there may be increasing pressure to apply manure faster, under poorer weather conditions, and at higher rates than are environmentally friendly. Manure applicator certification is designed to help you use manure as an asset and avoid water quality problems due to improper application. Reported releases and discharges to the state's rivers, stream, and lakes have increased since 1992.

MANURE—AN ASSET

Manure has been applied to agricultural land for many years. People discovered long ago that manure makes crops grow better and produce more. Long-term research on manure application (dating back more than 100 years) clearly shows that manure applications at the right rates are good for the soil. Manure increases organic matter, helps develop better soil structure, increases cation exchange capacity, promotes better drainage, increases the number of microorganisms, and generally improves the "tilth" of the soil. Soils with a long-term history of being manured have been shown to be superior to soils that were not manured, or were fertilized with commercial fertilizers.

Manure nutrients from liquid swine pits may be worth $20 per 1,000 gallons or more. By replacing commercial fertilizer with manure, producers can save up to $40 to $60 per acre.

In recent years we have become increasingly aware that manure also can have negative effects on the environment. Uncontrolled releases of liquid manure from pits or lagoons can cause immediate fish kills and loss of other aquatic life. And long-term, over-application of manure can cause buildups of nutrients in the soil, particularly phosphorus, that can ultimately cause surface water quality problems.

The key to maintaining manure as an asset and a valuable resource is careful handling and applying at proper rates. That's what manure applicator certification is about—helping you, as a manure manager, do a better job so the manure you manage remains an asset, rather than becoming a liability.

MANURE RISKS

IDNR records show approximately 86 uncontrolled discharges to surface waters were reported between February 1992 and May 1998. That's an average of 14 per year, and the trend is increasing *(see Figure 1 on introduction page 3)*.

This may reflect a greater number of uncontrolled releases and discharges or it may simply reflect greater public scrutiny or reporting. During those six years, 32 fish kills occurred. Not all releases resulted in pollution of state waters, but all were significant enough to require IDNR investigation and follow-up. Of course, unreported discharges are not shown. The reported discharges occurred from the following types of facilities: earthen storage structures, 42; formed pits, 20; open feedlots, 24.

Sixteen discharges were due to poor construction, such as failing to remove existing field tiles, leaking or plugged lines or valves, or leaving organic matter in earthen berms during construction. Twenty-six releases were caused by poor management or lack of attention, such as leaking waterers or ruptured water lines that caused pits to fill and overtop, running out of storage capacity in pits or lagoons, or even intentional dumping. Overtopping of earthen basins, formed pits, and lagoons all occurred, as did discharges from open feedlots due to precipitation events.

LAND APPLICATION ERRORS

Land application errors caused 30 releases, more than either construction or management errors. Releases during land application resulted from applying manure to frozen soils, irrigation line separations during pumping, pumps being left on too long, simply applying more manure than the soil could hold, and precipitation immediately after manure application. While the number of releases during land application is not high on a statewide basis, the records confirm these releases often reach streams or rivers, causing fish kills and other environmental damage. The number of releases during land application each year also has been rising *(See Table 1 on introduction page 3.)*

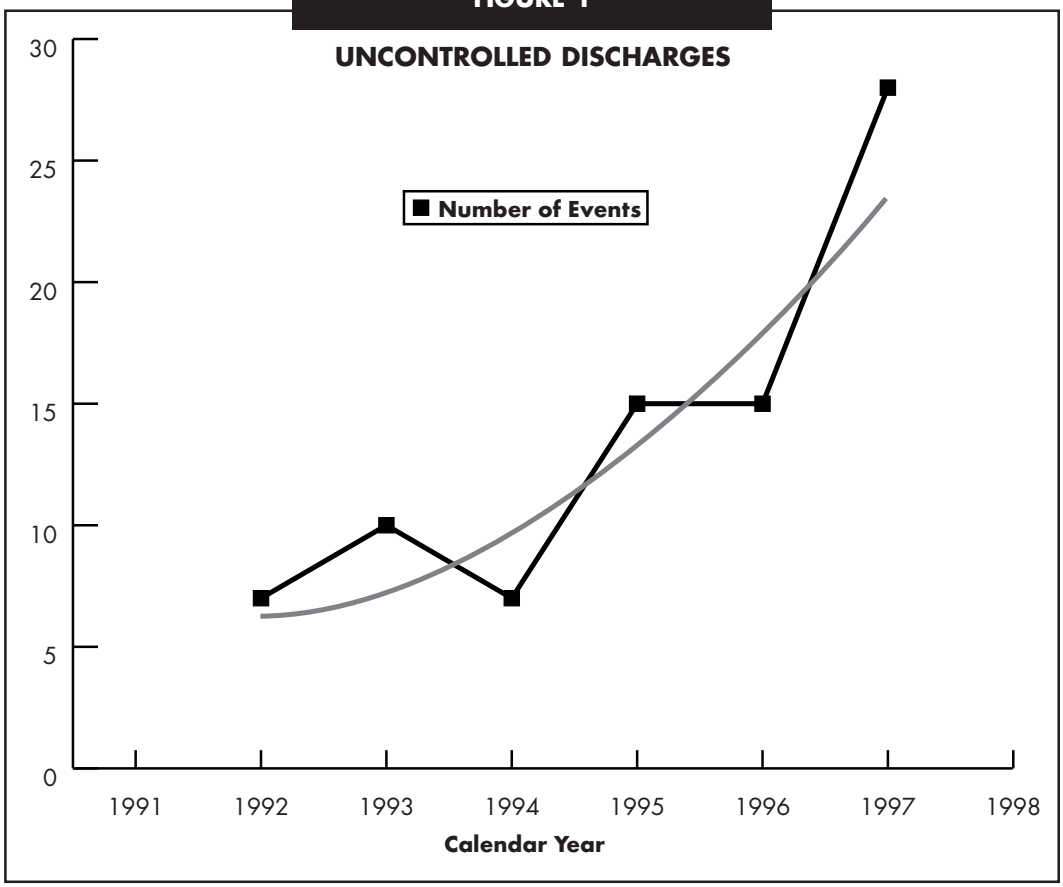
ENVIRONMENTAL AND FINANCIAL BENEFITS

Manure can be managed to minimize environmental impacts while optimizing economic
benefits for all parties. Longtime research clearly shows that properly applying manure to land is beneficial to the soil and water in both the short and long term.

The following material is presented to help you become legally certified to apply manure in Iowa and help you understand how to manage manure correctly so that it is an asset, rather than a liability.

introduction

FIGURE 1



IDNR-recorded uncontrolled manure and lagoon effluent releases.

TABLE 1

NUMBER OF UNCONTROLLED RELEASES EACH YEAR CAUSED BY LAND APPLICATION ERRORS

YEAR	NUMBER OF RELEASES
1992	2
1993	5
1994	1
1995	5
1996	5
1997	12