chapter

four

Developing a Nutrient Management Plan

Mike Daniels, Melony Wilson, Karl VanDevender, Adrian Baber, Helen Denniston, and Wavy Austin

A nutrient management plan is a legal document that should be written by a certified planner and be in the format specified by the regulations that require it. In this manual, the specified plan format that is utilized has evolved from the Arkansas Soil and Water Conservation Comission's (ASWCC) Title 22. It serves as documentation of:

- description of the operation including natural resource concerns
- appropriate nutrient application rates on a field by field basis
- proper storage and handling recommendations
- documentation of nutrient handling and land application.

Under ASWCC's Title 22, nutrient management plans should be written in accordance with NRCS' Conservation Standard 590: Nutrient Management. This chapter explains the process and provides the format of writing a State-certified plan that adheres to Standard 590 (Appendix A).

General Elements and Format of a Plan

Each and every nutrient plan will be different because the natural resource concerns and farm characteristics will be different. However, each plan should contain the same general elements and be in the same general format. These elements should be divided into well identified and easy to find sections so that the plan is easily usable (Table 4-1). An example of each of these sections can be found in the sample plan in Appendix B.

Section 1 – Description of Operation

Title Page

The title page should contain the following information:

- A title or statement about the nature of this document such as "Nutrient Management Plan" or "Poultry Litter Management Plan" should be placed at the top of the title page.

Table 4-1. The sections of a nutrient management plan as specified in Title XXII.

Section	Description of Elements in Section
1	**Operation Description** • Title Page / Signature Page • Farm Location and Contact Information • Farm Description • Production and Environmental Goals
2	**Summary of Management Plan Actions** • Field-by-field management actions
3	**Legal and Compliance Requirements**
4	**Collected Information** • Maps and Photographs • Field Identification Scheme • Soils – Description, Sample Results • Litter Analysis (if applicable)
5	**Nutrient Application Calculations and Analysis** • Crop Nutrient Needs • Soil Loss Estimates • P-Index Calculations • Nutrient Balance
6	**Recommendations** • Field-by-field Nutrient Application Allocation • Excess Nutrient Alternatives (if necessary) • Setback Distances • Conservation Practices
7	**Record Keeping** • Nutrient Application Information • Nutrient Export Information • Conservation Practices

- Farm name and address as well as owner and/or primary operator name.
- Preparation Date
- Planner name, qualifications, and contact information (address and phone number)
- Extent of time that the plan will be in effect. For example: "This plan is applicable effective from January 1, 2004 to December 31, 2009."
- Purpose of Plan – For example, if it is to comply with Title 22, utilize a statement such as "In partial fulfillment of complying with Title XXII of the State of Arkansas' Nutrient Management laws as administered by the Arkansas Soil and Water Conservation Commission."

Signature Page

The signature page should contain the following:

- A statement on the nature of plan preparation to include: preparation date, the planning guidelines used, and name and qualifications of planner
- Signature of the planner
- Signature of the Owner/Operator

Farm Location and Contact Information

This section should clearly identify the location of the operation and all land managed or leased by the operation. This information can be provided as a written description in paragraph form to include driving directions to the operation and all associated land. This information can be presented visually with a farm sketch on an aerial photograph or a map of the farm location.

Contact information should include farm name, address, etc. as well as owner or primary operator information.

Farm Operation Description

This section should provide an overview of the operation including characteristics of animal production, forage (or crop) production, and manure handling system. This section should include a sketch or a map depicting the animal production structures, lagoons, and all field boundaries that are utilized by the operation. The description should also include a field identification scheme co-developed and agreed upon with the producer.

Section 2 – Summary of Management Actions

An effective way to highlight the end results of a plan is to use the BLUF principle: Bottom Line Up Front. To do so, the planner will provide a summary of necessary management actions on a year-by-year basis for each individual field. This can be in a tabular format or in bullet format. This provides the user quick reference for management actions without having to search throughout the document.

Section 3 – Legal and Compliance Requirements

This section should include documentation of the fulfillment of compliance requirements along with future actions necessary to fulfill requirements. Such requirements include Regulation 5, Regulation 6 (AFO/CAFO Regulations), the State of Arkansas' Title 22, etc. In cases where a CNMP is required, then it should be stated that plans developed from this manual are in partial fulfillment of a CNMP.

Section 4 – Collected Information

This section should include a list of soil mapping units and a general description of the soil series as well as information on any natural resource features such as streams, sinkholes, springs, unique wildlife habitat, etc.

This section should include all collected data such as soil test, forage test, manure test information, ground cover inventory, etc., for each field. The section should include a summary table of the information as well as a copy of all original result sheets. The collected information that is needed can be found in Chapter 5 of this manual.

Section 5 – Nutrient Application Calculations and Analysis

Calculations should be shown for each field if applicable for the following:

- Total manure production and total nutrient production from estimated or measured nutrient content of manure or litter
- Soil nutrient needs for N-P_2O_5-K_2O for each field based on soil test recommendations
- Soil loss for each field using the RUSLE
- P-Index rating and associated manure or litter application rates for each field
- Whole farm nutrient balance and manure or litter needs/excesses

All aspects of calculations should be documented including:

- Any and all assumptions
- All input data including the source of data
- Method of calculation (i.e., manual, software, spreadsheet)
- Results

Chapters 6, 7, and 8 of this manual outline how to properly make these recommendations.

The purpose of this documentation is to clearly demonstrate how the results were achieved so that the results can easily be duplicated or verified.

Section 6 – Field Management Recommendations

Once the calculations and data analyses are completed, then the management actions needed for each field should be documented in this section. The actions should be documented for each field on a yearly basis. At a minimum, this should include manure and fertilizer recommendations along with application setback differences from water, sinkholes, etc. It should also include any suggested or recommended conservation practices. However recommended conservation practices should adhere to NRCS conservation standards. These are described in Chapter 9 of this manual.

Section 7 - Record Keeping

This section should include the items needing records and recommendations on how to keep them. A nutrient management plan is not complete unless records documenting on-going farm practices are included. It is the responsibility of the land owner to supply the record section of the plan. For additional information on record keeping, refer to Chapter 10.

The Process of Writing a Plan

There are eight basic steps to developing the elements of a nutrient management plan (Figure 4-1).

Step 1

The collection of information about the nature of the operation is the first step of writing a plan. The best way to initiate this is to visit the operation and interview the operator. Visiting with the operator allows you to obtain the information needed to satisfy the plan, but also allows you to foster a relationship with the operator. This relationship is important because ultimately this is the operator's plan. The certified plan writer's role is to ensure the proper information is contained in the proper format for the plan.

To ensure that you get the information needed for the plan, you can use the operator questionnaire that is provided (Appendix 1). Chapter 5 covers the details of the information that needs to be collected. Much of this information will go into Section 1 of the plan and the format is described below in this chapter.

Step 2

Collecting the appropriate maps and photographs is the logical second step. A good aerial photograph can serve as a nice base map for showing the layout of the farm. Aerial photographs may be available from local USDA Service Centers. They may also be available via the internet. If aerial photographs are not available, then sketches of the layout are acceptable. Topographic maps are also important and can be obtained from the United States Geological Survey (USGS) either by order or downloading from their website. All maps and sketches should be clearly labeled with their source documented and should be placed in Section 3 of the plan. This information should be placed in Section 4 of the plan. Chapter 5 describes how to obtain maps.

If a good aerial photograph is available for the farm, then field boundaries should be delineated and a field identification scheme should be agreed upon with the operator. This is critically important as field ID schemes have been confused in the past and the wrong application rates went to the wrong fields. It may be worthwhile to document aspects of the operation with photographs. Digital cameras make it easy to place photographs directly into the plan.

Step 3

The collection of soils information for the farm is Step 3. This information should be collected on a field by field basis. The soils information can be divided into two types of information:

- Soil fertility information derived from soil testing
- Soil descriptions and associated properties found in the soil survey

Chapter 5 outlines how to take soil samples and how to utilize the soil survey. All of the collected soils information will go into Section 4 of the plan.

Step 4

Estimating soil loss from each individual field using the Revised Universal Soil Loss equation (RUSLE) is the next step. Soil loss estimates are needed to calculate the Arkansas P-Index for pastures to account for the nutrients that can be transported attached to soil particles. Instructions on using RULSE in Arkansas pastures can be found in Chapter 6 of this guide. Soil loss calculations and results should be included into Section 5 of the plan. There are many options for calculating RUSLE including: 1) manually by hand, 2) using the NRCS nutrient management planning spreadsheet, or 3) using the UA-CES's "What-if" Nutrient Management Calculator. If using a spreadsheet or computer program, at least one calculation should be shown by hand and all RUSLE input parameters for each field should be placed in a table. Soil loss results should be placed in Section 5 of the plan.

Figure 4-1. The Eight Basic Steps of Developing a Nutrient Management Plan to meet the State of Arkansas requirements as specified in Title XXII

Step 1
Collect Information about the Operation

- Information collected here will go into Section 1 of plan: "Overview of Operation"
- See Chapter 5 of this guide for instructions
- Method: Operator interview
- Forms: Operator Questionnaire (Appendix D)

Step 2
Collect Photographs and Maps of Operation

- Maps and photographs will go into Section 4 of plan: "Maps and Photographs"
- See Chapter 5 of this guide for instructions
- Source: Paper – NRCS; digital – Internet

Step 3
Collect Soils Information

- Soils information will go into Section 4 of plan: "Soils Information and Other Test Results"
- See Chapter 5 of this guide for instructions
- Method: Soil Sampling and Soil Survey
- Sample Forms: (1) Soil Test Results Form from Testing Lab; (2) Soil Submission Form (Appendix F)

Step 4
Determine Soil Loss for P-Index

- The calculations and results will go into Section 5 of the plan:"Nutrient Application Calculations and Analysis"
- Method: Revised Universal Soil Loss Equation (RUSLE);
- Tools: Manually, RUSLE software or NRCS-AR spreadsheet
- See Chapter 6 of this guide for instructions
- Soil loss values are needed to calculate the P-index

Step 5
Determine Poultry Litter Application Rates Using the Arkansas P-Index for Pastures

- The calculations and results go into Section 5 of the plan: Nutrient Application Calculations and Analysis
- Tools: Manually or NRCS-AR spreadsheet or UACES "What-if" calculator
- See Chapter 7 of this guide for instructions

Step 6
Determine Animal Outputs and Nutrient Production

- The calculations and results will go into Section 5 of the plan.
- Tools: Manually or NRCS spreadsheet
- See Chapter 8 of this guide for instructions
- Use Checklist in Appendix to ensure step is completed
- Use nutrient balance worksheet (Appendix F)

Step 7
Determine Whole Farm Nutrient Budget Based on Crop Needs

- The calculations/results will go into Section 5 of the plan
- See Chapter 8 of this guide for instructions
- Use nutrient balance worksheet (Appendix F)

Step 8
Develop Nutrient Management Recommendations

- Recommendations should be on a field-by-field basis
- Conservation practices should adhere to NRCS standards
- See Chapter 9 of this guide for instructions
- Summarize recommendations into easy reference sheet in Section 2 of plan

Step 5

Calculating the P-Index for each field is Step 5. This is central for developing phosphorus-based management plans as this tool determines the appropriate poultry litter application rate for each individual field based on the respected conditions. Detailed information about the P-Index and how to calculate it can be found in Chapter 7 of this manual. The P-Index for pastures can be calculated by: 1) manually, 2) using the NRCS nutrient management planning spreadsheet, or 3) using the UA-CES's "What-if" P-Index Calculator. P-Index results should be placed in Section 5 of the plan. If the calculations are calculated with computer programs, at least one example by hand should be included and a table of P-Index parameters should be placed in a table by field.

Step 6

Determining the nutrients contained in generated animal outputs is Step 6. Chapter 8 of this manual provides instructions for making these calculations. The results should be placed in Section 5 of the plan.

Step 7

The next step is to calculate the crop nutrient needs and nutrient budgets for each individual field using results from both the P-Index for manure applications and soil test results for total nutrient needs. Chapter 8 of this manual explains in detail how to calculate nutrient budgets. The results should be placed in Section 5 of the plan.

Step 8

Once all the calculations for each field are completed, then nutrient management recommendations need to be prepared to include the manure or litter application rates, additional commercial fertilizer needs, recommended conservation practices, and the determination of any excess nutrients that cannot be utilized on-farm. At a minimum, this should include manure and fertilizer recommendations along with application setback differences from water, sinkholes, etc. It should also include any suggested or recommended conservation practices. However recommended conservation practices should adhere to NRCS conservation standards. These field-by-field recommendations should be placed in Section 6 of the plan.

This step also includes developing a recordkeeping system so that implemented practices can be documented. Records should be placed in Section 7 of the plan. Chapter 10 describes the types of records needed.