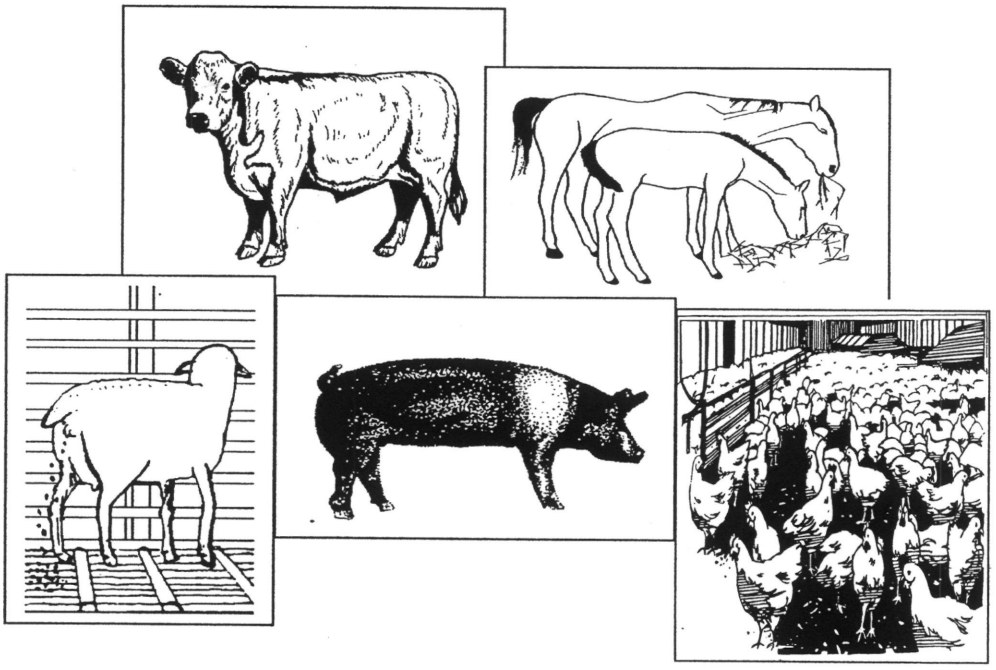
ES00-049

NUTRIENT MANAGEMENT PLAN

Prepared for

Quarry Farm Dairy

February, 2004



In

Fayette County, Kentucky

Assisted by

Dr. Monroe Rasnake

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Preface

This Nutrient Management Plan is being developed by Dr. Monroe Rasnake on Feb. 4,2004 as requested for Quarry Farm Dairy The plan is developed in accordance with the NRCS Nutrient Management conservation practice standard (Code 590) that is currently in effect.

Planner certification number (if applicable). _____

FARM DATA FOR: **Quarry Farm Dairy**
Fayette, COUNTY, KENTUCKY
Information current as of: February 4, 2004

This Nutrient Management Plan applies to fields referenced on the planning map that is maintained as part of the conservation plan or otherwise enclosed in Appendix C of this plan document. The land mentioned in this plan can be identified on USDA records as FSN _____ Tract/s _____.

System Description

This plan is being developed to manage the manure nutrients generated by a dairy operation.
The operation consists of livestock feeding facilities and manure storage structures currently in use on an adjacent property. Manure will be available for land application on the operation as of March, 2004.

Note: Specific operational background information used in developing this plan can be referenced in Appendix C. Animal manure production estimates, field nutrient balancing (budget) and record keeping information is documented on worksheets 1, 2 and 3, which are included in this document. ***Additional background information for this operation that is pertinent to the development and implementation of a nutrient management plan is attached in Appendix C and/or is documented in the conservation plan.***

Manure Handling and Storage

Manure generated by this operation will be stored in a dry stack pad and holding pond. Although these structures may have the capacity to only store manure for a partial year, this plan will identify acreage and application rates that consider the total manure generated throughout a 1year period by the operation. Reference specific information on Appendix A Worksheet 1 for estimated annual manure volume and nutrient content.

Land Application of Manure

The manure will be land applied as a source of plant available nutrients on land that is under the control of the operator. Manure applied on your property, or property under your control, will be land applied according to an application rate determined for each field using the following methods:

1. **(New Operations - Year One)** Use the estimated plant available nutrients per ton of manure to determine total nutrients available in the system. Use the estimated crop nutrient removal values or current field soil test recommendations (when available) as a basis for planning manure application rates. When current soil tests are not available at the time the plan is prepared, application rates of manure in year one will be based on crop nutrient removal values for phosphorus as indicated in Table 6 of the NRCS Nutrient Management Standard (590). When soil test material becomes available, a plan revision can be made. ***Note: When the current soil test level of Phosphorous is above 400, additional information will be gathered by the planner prior to recommending a basis for planning application rates.*** When the manure has not been analyzed for nutrient content, nutrients in the manure will be determined using "book values" until a laboratory analysis of the stored manure can be obtained. Land application rates that are based on book values should be adjusted as needed after sampling and testing of stored manure and subsequent soil sampling in application fields is performed.

2. **(Established Operations - Year Two and Beyond)** Use manure analysis data to determine total nutrients (per ton of manure) in the system. ***Note: When the current soil test level of Phosphorous is above 400, additional information will be gathered by the planner prior to recommending a basis for planning manure application***

rates. Previous year land application rates that were based on book values should be adjusted as needed after sampling and testing of stored manure and soil sampling in application fields is performed.

In all years, manure will be land applied according to information that is documented on nutrient balance worksheets *(see appendix A worksheet 2 for each field) that have been developed for this operation. When copies become available, soil test analysis and fertilizer recommendations for each field can be referenced in Appendix C.*

Note: Additional land can be rented for disposal if needed or the excess manure can be sold. ***See information in the section: Utilization of manure transported off-site and not under your control.***

Determining Application Rates and Land Requirements

Information in this portion of the plan includes specific references to fields on this operation that will be receiving application of animal manures. ***Aerial farm maps, soils maps and other data can be referenced in Appendix C of this plan.***

Nutrient Production

Refer to Appendix A, Worksheet 1 for the total (annual) amount of nutrients produced by this operation and available for land application.

Application Methods and Timing

Key components of manure management are application timing and method of land application. Manure must be applied as close to planting as possible or when the crop is actively growing and by a method that lessens the risk of it entering streams, other water bodies, and environmentally sensitive areas. ***Timing and method of each application is indicated in the recordkeeping information which can be referenced on Worksheet 3 of Appendix A. Timing and method of application may also be documented in the Phosphorus Index calculation if applicable.***

Soil Testing

Soil tests should be utilized to develop this plan. ***Refer to Appendix C of this plan for current soil test information recorded by field for this operation.*** Soil nutrient levels should be monitored by soil testing to determine the buildup of phosphorus and potassium in the soil. Soil test analysis must include pH, phosphorus, and potassium. Soil amendments shall be applied to adjust pH to specific range of the crop for optimum utilization of nutrients. **Routine soil testing by field should occur according to University of Kentucky guidelines when nutrients in the form of commercial fertilizers or animal manures are land applied during the crop year.**

Soil samples are to be collected in accordance with The University of Kentucky extension service guidance.
Soil testing is to be performed by laboratories that meet all of the following:

- Certification In The North American Proficiency Testing Program (Soil Science Society of America)
- Other laboratories whose test results are accepted by The University of Kentucky
- Soil Test Phosphorus (STP) is determined by the Mehlich III method

Soil profile sampling for nitrogen, Pre-Sidedress Nitrogen Test (PSNT), Pre-Plant Soil Nitrate (PPSN) or soil surface sampling for phosphorus or acidity may be necessary in situations where there are special production or environmental concerns.

Manure Testing

When a laboratory analysis of the manure becomes available, a more accurate application rate can be determined. Modifications in application rates should be documented on Worksheet 2 in Appendix A of this plan. Testing of the manure should include an analysis for Total Nitrogen and Total Phosphorus. The results should be obtained in pounds of nutrients per ton of manure. Annual testing of manure is not required unless management changes occur that impact the number of animal units, manure storage method, manure storage frequency, feed rations or other feature that could alter the analysis data collected in a prior year.

Procedures for collecting manure samples are provided in Appendix B of this plan. Contact the local NRCS, Conservation District, Extension office or third party vendor after receiving the manure analysis report for assistance in determining an actual application amount. ***When manure analysis information is available for this operation, attach copies of the laboratory reports in Appendix C of this plan.***

Land Application Operation and Maintenance Requirements

In case of accidental spill, every effort should be made to contain the manure on site and protect environmentally sensitive areas. Contact the Kentucky Division of Water immediately.

1) If the crop, method of application, feed ration or consistency of manure changes, it will be necessary to re-calculate an appropriate application amount using Worksheet 2 in Appendix A.
2) Liquid manure shall not be applied on saturated, frozen and/or snow-covered soil.
3) Manure will not be spread in an established waterway or any defined drainage way that carries concentrated flow. Manure may be applied to newly constructed grass waterways if incorporated immediately.
4) Manure should not be applied on land that is subject to occasional or frequent flooding unless the manure is incorporated immediately.
5) Incorporating manure into the soil versus surface application can reduce odors.
6) Maintain crop residue on ground surface as prescribed in the HEL compliance plan.
7) Equipment shall be calibrated to ensure uniform distribution of manure at recommended rates.
8) Avoid unnecessary contact with chemical fertilizers and organic byproducts. Wear protective clothing when working with plant nutrients. Extra caution should be taken when handling ammonia sources of nutrients, or when dealing with organic wastes in stored or unventilated enclosures.
9) Vehicles used to transport manure on State or Federally maintained roads should be covered when the hauling distance is greater than one mile.
10) Refer to manure storage system design for emptying frequency and specific operation and maintenance requirements.
11) Buffer areas should be maintained around fields receiving manure. The following information refers to guidance for maintaining non-application buffer widths for poultry litter in accordance with Kentucky BMP#17.

Non-Application Buffer Widths For Poultry Litter[1/]

Object, Site	Situation	Buffer Width *(ft.)* from Object, Site
Well not owned by applicant	Located up-slope or down-slope of application site	200
Waterbody or Stream[2/]	Lake, river, blue-line stream, karst feature	75
Sinkholes[3/]	With surface opening	75
Dwelling	Other than Producer	300
Property Line	Located downslope of application site	50

1/ Research has shown that forested or forest/grass buffers are more effective at removing nutrients and sediment than a grass buffer.
2/ Waterbody includes pond, lake, wetland. Stream includes both perennial and intermittent streams.
3/ Where sinkholes are not "open", a buffer width should be established within a 30 ft. radius as measured from centerline of basin.

Utilization of manure transported off-site and not under your control

In some cases, all the manure generated by the system may not be land applied by the operator. In these situations, the operator is responsible for documenting quantities of manure or compost transported off-site; including the name of the recipient, date and amount transported. This documentation can be maintained by the operator in Appendix C of this plan.

Land Management

Best Management Practices (BMP's) that minimize the movement of nutrients, pathogens, organic materials, and soil to surface and ground water should be implemented as part of the plan. BMPs may include, but not be limited to; installing vegetative buffers, reducing P_2O_5 application rate, adding chemical treatments to manure that tie up soluble P, incorporating high available phosphorus corn into the feed ration, and/or incorporating the manure into the soil. ***Refer to information contained in a Conservation Plan and other documents applicable to this operation which may be attached in Appendix C of this plan.***

Dead Animal Management

Dead animals will be disposed of according to state or local laws and in a way that does not adversely affect ground or surface water or create public health concerns. Unless otherwise noted, no adjustment for mortality has been made when estimating manure volume generated by the system.

Manure Handling/Storage Facility Construction Specifications

If facility construction plans are necessary, refer to plan drawings and construction details for installing the manure storage facility. Further details regarding facility construction are not included with these plans. Refer to specific operation and maintenance guidelines that are included with the facility design and construction specifications.

Record Keeping

Field-by-field records should be kept by the producer for a minimum of 5 years or the length of the cropping rotation, whichever is longer, for fields where the producer has control to apply manures. Recordkeeping will include information pertaining to specific field manure applications. ***This information is maintained on Worksheet 3 in Appendix A of this plan.*** Additional records for the operation shall include:

1. Soil test results - Soil tests should be taken and sent to UK's soil testing lab or other approved lab to monitor the soil nutrient levels and determine appropriate application rates.
2. Quantities and sources of nutrients applied and/or sold, and heavy metals applied if applicable.
3. Dates and Methods of nutrient application (e.g., broadcast, incorporated, injected, or fertigation)
4. Crops planted, tillage method, and dates planted.
5. Harvest dates and yield, and crop residues removed.
6. Results of laboratory test (e.g., manure analysis, plant tissue, and other organic byproduct test).
7. Adjustments to the nutrient management plan based on records and changes in farming operations as appropriate.

Feed Management

There is a relationship between nutrients in manure and feed. The animal feed ration may be adjusted to alter the nutrient content of the manure. In most cases, a feed management specialist should be contacted for more information before proceeding with this activity.

Additional Reference Information

_____

_____

_____

PLAN AGREEMENT

Name of Operator: _____

The Kentucky Department For Environmental Protection Division of Water (DOW) acting under the authority of the Clean Water Act of 1972 requires that animal byproducts (manure, feedlot or holding area runoff, milkhouse supernatant, silo drainage, etc.) be managed so as not to enter the waters of the State. This Nutrient Management Plan provides the basic information on how the manure produced from your operation, and/or applied on your fields, will be utilized. Is this plan considered to be part of a Comprehensive Nutrient Management Plan (circle Yes or No). If **YES,** other components could apply that may not be referenced in this document. For further information reference Appendix C.

Operator Agreement

I (we) understand and will follow and implement this plan for the farm named above. I (we) know that any expansion or management change to the existing design capacity of the system will require a revised plan and possibly a new or revised permit. The approved plan should be filed on-site at the farm. When implementation of this plan is a required component of a regulatory permit or is mandated by other regulations, I will assume all responsibility for compliance. Manure that is sold or given away must be documented by the operator. The recipient is responsible for handling and utilizing the animal waste in accordance with state laws and regulations.

Signatures:

Operator Information (Persons Responsible For Plan Implementation):

Print Name:_____

Signature:_____Date:_____

Print Name of Manager (if different from owner):_____

Signature:_____Date:_____

Nutrient Management Plan Developer Information: (Enter information for all applicable items)

Print Name: _____ Address: _____

Signature:_____Date:_____

Planner Certification Number if Applicable: _____

WORKSHEET 1 - ESTIMATING NUTRIENTS GENERATED PER CONFINEMENT PERIOD

SOLIDS WORKSHEET

Nutrients Generated (As Excreted)

Animal Type	Number	x	Avg. Weight	/ 1000	x	Confinement Period (days/yr)*	=	Animal Unit Days		Table 1 Value	=	N	P_2O_5 (lbs)	K_2O
									N		=			
									P_2O_5		=			
_____	_____	x	_____	/ 1000	x	_____	=	_____	x K_2O		=			
									N		=			
									P_2O_5		=			
_____	_____	x	_____	/ 1000	x	_____	=	_____	x K_2O		=			
									N		=			
									P_2O_5		=			
_____	_____	x	_____	/ 1000	x	_____	=	_____	x K_2O		=			
											Step 1 Total	=			

Manure Generated (As Excreted)

Animal Unit Days (from Step 1)	x	Manure/A.U. Table 1 value	=	Volume of Manure	
_____	x	_____	=	_____	cu.ft.
_____	x	_____	=	_____	cu.ft.
_____	x	_____	=	_____	cu.ft.
			Step 2 Total	_____	cu.ft.

* Confinement period must be adjusted for dairy cows where they are only held a short period of time during milking (e.g., 365 days x 25% confinement during the day = 91 days total confinement)

Bedding (cu.ft.) cu.ft.

Total Tons = Step 2 + Step 3 / _____ Cu.Ft./Ton Tons

(Swine, Dairy, Beef, Horse, Sheep = 33 Cu. Ft./Ton; Poultry = 74Cu.Ft./Ton)

Weighted Nutrient Value before Nitrogen Losses (lbs/ton)
(Step 1 Total / Step 4)

ote: Carry all manure calculations to two decimal points with no rounding. All commercial fertilizer calculations will be rounded to whole numbers with rmal rules for rounding.

WORKSHEET 1 - ESTIMATING NUTRIENTS GENERATED PER CONFINEMENT PERIOD

LIQUIDS WORKSHEET

. Nutrients Generated (As Excreted)

Animal Type	Number		Avg. Weight		1000		Confinement Period (days/yr)*		Animal Unit Days		Table 1 Value		N	P_2O_5 (lbs)	K_2O
		x		/	1000	x		=		x	N	=			
											P_2O_5	=			
											K_2O	=			
		x		/	1000	x		=		x	N	=			
											P_2O_5	=			
											K_2O	=			
		x		/	1000	x		=		x	N	=			
											P_2O_5	=			
											K_2O	=			
												Step 1 Total =			

. Manure Generated (As Excreted)

Animal Unit Days (from Step 1)		Manure/A.U. Table 1 value		Volume of Manure	
	x		=		cu.ft.
	x		=		cu.ft.
	x		=		cu.ft.
		Step 2 Total			cu.ft.

* Confinement period must be adjusted for dairy cows where they are only held a short period of time during milking (e.g., 365 days x 25% confinement during the day = 91 days total confinement)

. **Water Added by Flushing, Wastage, or Cleaning (cu.ft.)** cu.ft.
(Gal/day) x (days of confinement per year) / (7.5) *(Estimate 5 gal/hd/day for dairy, 2 gal/hd/day for swine)*

. **Water Added by Feedlot Runoff (cu.ft.)** *(From animal waste software)* cu.ft.

. **Water Added from Rainfall minus Evap. on Storage Structure (cu.ft.)** *(From animal waste software)* cu.ft.

. **Total Tons = Step 2 + Step 3 + Step 4 + Step 5 / _____ Cu.Ft./Ton** Tons
(Swine, Dairy, Beef, Horse, Sheep = 32 cu.Ft/Ton)

. **Weighted Nutrient Value before Nitrogen Losses (lbs/ton)**
(Step 1 Total / Step 6)

ote: Carry all m e calculations to two decimal points with no rounding. All comm al fertilizer calculations will be rounded to whole numbers with ormal rules for r ng.

WORKSHEET 2 - NUTRIENT BALANCE

Tract /Field No./Acres Soil Test P Value (Mehlich 3) ☐

_____/_____/_____

		N	P_2O_5	K_2O
1.	**Crop or Crop Sequence/Rotation**			
2.	**Realistic Yield Goal**			
3.	**Plant Nutrients Needed or Allowed** (lbs/ac) (based on soil test recommendation ***or*** crop removal rates in Table 6) **NOTE:** Plant Nutrient Needs for "**N**" cannot exceed a one year crop sequence (e.g., corn/wheat in a corn/wheat/soybean sequence) When based on crop removal, nutrients needed are based on yield level.			
4.	**If applicable, adjusted P_2O_5 Application Rate according to Threshold or P Index.** (Step 3 P_2O_5 x 1.0, 0.50, or 0)			
5.	**Nitrogen Credits from previous legume crop** (lbs/ac. from Table 4)			
6.	**Fertilizer Credits** (Starter ***or*** Other) (lbs/ac)			
7.	**Nitrogen credits for previous manure applications** (lbs/ac) Table 5 value x net application of manure nutrients "**N**" in previous year(s)			
8.	**Plant Nutrients Needed minus Credits** (lbs/ac) (Step 3 for N minus Steps 5, 6, & 7 or Step 4 for P_2O_5 minus Step 6)			
9.	**Nutrients in Manure** (lbs/ton) Circle: Solids or Liquids (Use lab test ***or*** weighted value as determined in Worksheet 1)			
10.	**Percent Nutrients Retained in System** (Table 2) Enter Table value as a decimal. (Enter zero with lab analysis)			
11.	**Net Retained Nutrients in Manure (lbs./ton)** (Step 9 x Step 10) Enter zero with lab analysis.			
12.	**Nutrient Availability Coefficient** (Table 3)			
13.	**Net available nutrients (lbs./ton)** (Step 11 x Step 12 without lab analysis. Step 9 x Step 12 with lab analysis)			
14.	**Total Annual Application Rate** (tons/ac) (Step 8 / Step 13) Rate based on N or P2O5 Note: When application volume limitations apply, enter lower rate. See 590 Standard			
15.	**Net Application Amount for All Nutrients** (lbs/ac) [Step 13 x Step 14]			
16.	**Nutrient Needs or Surpluses** (lbs/ac) (Step 15 minus Step 8) "-" sign indicates need			

Tons Available _____ **- Tons Applied in Field** _____ **= Balance** _____

Circle: Solids or Liquids) (Step 14 x Field Acres)

WORKSHEET 2 - NUTRIENT BALANCE

Tract /Field No./Acres _____/_____/_____

Soil Test P Value (Mehlich 3) [ ]

		N	P_2O_5	K_2O
1.	**Crop or Crop Sequence/Rotation**			
2.	**Realistic Yield Goal**			
3.	**Plant Nutrients Needed or Allowed** (lbs/ac) (based on soil test recommendation ***or*** crop removal rates in Table 6) **NOTE:** Plant Nutrient Needs for "**N**" cannot exceed a one year crop sequence (e.g., corn/wheat in a corn/wheat/soybean sequence) When based on crop removal, nutrients needed are based on yield level.			
4.	**If applicable, adjusted P_2O_5 Application Rate according to Threshold or P Index.** (Step 3 P_2O_5 x 1.0, 0.50, or 0)			
5.	**Nitrogen Credits from previous legume crop** (lbs/ac. from Table 4)			
6.	**Fertilizer Credits** (Starter ***or*** Other) (lbs/ac)			
7.	**Nitrogen credits for previous manure applications** (lbs/ac) Table 5 value x net application of manure nutrients "**N**" in previous year(s)			
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16.	**Nutrient Needs or Surpluses** (lbs/ac) (Step 15 minus Step 8) "-" sign indicates need			

Tons Available _____ **- Tons Applied in Field** _____ **= Balance** _____

Circle: Solids or Liquids) (Step 14 x Field Acres)

WORKSHEET 2 - NUTRIENT BALANCE

Tract /Field No./Acres
_____/_____/_____

Soil Test P Value (Mehlich 3) [ ]

		N	P_2O_5	K_2O
1.	**Crop or Crop Sequence/Rotation**			
2.	**Realistic Yield Goal**			
3.	**Plant Nutrients Needed or Allowed** (lbs/ac) (based on soil test recommendation ***or*** crop removal rates in Table 6) **NOTE:** Plant Nutrient Needs for "**N**" cannot exceed a one year crop sequence (e.g., corn/wheat in a corn/wheat/soybean sequence) When based on crop removal, nutrients needed are based on yield level.			
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Tons Available _____ **- Tons Applied in Field** _____ **= Balance** _____

Circle: Solids or Liquids (Step 14 x Field Acres)

WORKSHEET 2 - NUTRIENT BALANCE

Tract /Field No./Acres _____/_____/_____

Soil Test P Value (Mehlich 3) [ ]

		N	P_2O_5	K_2O
1.	**Crop or Crop Sequence/Rotation**			
2.	**Realistic Yield Goal**			
3.	**Plant Nutrients Needed or Allowed** (lbs/ac) (based on soil test recommendation ***or*** crop removal rates in Table 6) **NOTE:** Plant Nutrient Needs for "**N**" cannot exceed a one year crop sequence (e.g., corn/wheat in a corn/wheat/soybean sequence) When based on crop removal, nutrients needed are based on yield level.			
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Tons Available _____ **- Tons Applied in Field** _____ **= Balance** _____

Circle: Solids or Liquids) (Step 14 x Field Acres)

WORKSHEET 2 - NUTRIENT BALANCE

Tract /Field No./Acres

_____/_____/_____

Soil Test P Value (Mehlich 3) [ ]

		N	P_2O_5	K_2O
1.	**Crop or Crop Sequence/Rotation**			
2.	**Realistic Yield Goal**			
3.	**Plant Nutrients Needed or Allowed** (lbs/ac) (based on soil test recommendation ***or*** crop removal rates in Table 6) **NOTE:** Plant Nutrient Needs for "**N**" cannot exceed a one year crop sequence (e.g., corn/wheat in a corn/wheat/soybean sequence) When based on crop removal, nutrients needed are based on yield level.			
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16.	**Nutrient Needs or Surpluses** (lbs/ac) (Step 15 minus Step 8) "-" sign indicates need			

Tons Available _____ **- Tons Applied in Field** _____ **= Balance** _____

Circle: Solids or Liquids (Step 14 x Field Acres)

WORKSHEET 2 - NUTRIENT BALANCE

Tract /Field No./Acres Soil Test P Value (Mehlich 3) [ ]

_____/_____/_____

		N	P_2O_5	K_2O
1.	**Crop or Crop Sequence/Rotation**			
2.	**Realistic Yield Goal**			
3.	**Plant Nutrients Needed or Allowed** (lbs/ac) (based on soil test recommendation ***or*** crop removal rates in Table 6) **NOTE:** Plant Nutrient Needs for "**N**" cannot exceed a one year crop sequence (e.g., corn/wheat in a corn/wheat/soybean sequence) When based on crop removal, nutrients needed are based on yield level.			
4.	**If applicable, adjusted P_2O_5 Application Rate according to Threshold or P Index.** (Step 3 P_2O_5 x 1.0, 0.50, or 0)			
5.	**Nitrogen Credits from previous legume crop** (lbs/ac. from Table 4)			
6.	**Fertilizer Credits** (Starter ***or*** Other) (lbs/ac)			
7.	**Nitrogen credits for previous manure applications** (lbs/ac) Table 5 value x net application of manure nutrients "**N**" in previous year(s)			
8.	**Plant Nutrients Needed minus Credits** (lbs/ac) (Step 3 for N minus Steps 5, 6, & 7 or Step 4 for P_2O_5 minus Step 6)			
9.	**Nutrients in Manure** (lbs/ton) Circle: Solids or Liquids (Use lab test ***or*** weighted value as determined in Worksheet 1)			
10.	**Percent Nutrients Retained in System** (Table 2) Enter Table value as a decimal. (Enter zero with lab analysis)			
11.	**Net Retained Nutrients in Manure (lbs./ton)** (Step 9 x Step 10) Enter zero with lab analysis.			
12.	**Nutrient Availability Coefficient** (Table 3)			
13.	**Net available nutrients (lbs./ton)** (Step 11 x Step 12 without lab analysis. Step 9 x Step 12 with lab analysis)			
14.	**Total Annual Application Rate** (tons/ac) (Step 8 / Step 13) Rate based on N or P2O5 Note: When application volume limitations apply, enter lower rate. See 590 Standard			
15.	**Net Application Amount for All Nutrients** (lbs/ac) [Step 13 x Step 14]			
16.	**Nutrient Needs or Surpluses** (lbs/ac) (Step 15 minus Step 8) "-" sign indicates need			

Tons Available _____ **- Tons Applied in Field** _____ **= Balance** _____

Circle: Solids or Liquids) (Step 14 x Field Acres)

WORKSHEET 3 – APPLICATION RATES AND LAND REQUIREMENTS [1/]

Tract No.	

This section to be filled out with assistance from NRCS field office

Field No.	Acres	Crop Rotation / Sequence & Realistic Yield	Application Date or Timing	Application Rate [2/] *(tons/ac or lbs/ac)*	Form [6/] *(S, L, C)*	Total per Field *(tons or lbs)*	Soil Test Phosphorus [3/]	P Index Rating [4/] *(low, medium, high, very high)*	Planned BMPs [5/]	
									BMP	Date

1/ Where land application is occurring under long term lease or agreement with adjacent landowner, fields must be included in the above table.

2/ Reference maximum rate per application in 590 Standard. For phosphorus based applications, a one time application can occur for crops grown in multiple years (e.g., corn following by winter wheat followed by soybeans).

3/ When soil test P exceeds 400, use Phosphorous Threshold or Phosphorous Index

4/ P Index Rating is used to indicate the potential movement for phosphorus. A "High" or "Very High" rating value indicates the need for BMPs to reduce P movement.

5/ Fields that have a "High" or "Very High" rating according to the current P Index will implement Best Management Practices to reduce the risk of nutrient movement to sensitive waterbodies. BMPs may include, but not be limited to: installing vegetative buffers, reducing P_2O_5 application rate, incorporating manure, adding chemical treatments to litter that tie up soluble P and keep it from moving over the landscape, and/or adjusting application timing.

6/ Nutrient Form: Enter S for solid, L for liquid, or C for commercial fertilizer.

SOIL MAP LEGEND AND SOIL INTERPRETATION

CAPABILITY CLASS	CROPLAND	CAPABILITY CLASS	PERMANENT VEGETATION
I	Soils that have no limitations that effect crops and require simple managment systems.	V	Soils that are ponded, flooded, or have limitations other than erosion which are impractical to overcome.
II	Soils that have few limitations that effect crops and require slightly difficult managment systems.	VI	Slope, shallowness, or other conditions limit use to permanent vegetation.
III	Soils that have some limitations that effect crops and require very carefult managment systems.	VII	Severe limitations restrict use to limited grazing, woodland or wildlife.
IV	Soils that have severe limitations that effect crops and require extremely carefult managment systems.	VIII	Rock outcrops and other extreme features limit use to forest, wildlife, and recreation.

DEFINITION OF KEY CHARACTERISTICS FOR SOIL DESCTIPTIONS

Example: CnD3

Soil Symbol | *Slope* | *Erosion*

SLOPE

A - 0 - 2% - Nearly Level
B - 2 - 6% - Gently Sloping
C - 6 - 12% - Sloping
D - 12 - 20% - Moderately Sloping
E - 20 - 30% - Steep
F - 30 + - Very Steep

EROSION

2 - 25% to 75% of topsoil has been removed by erosion.

3 - 75% to 100% of the original surface layer has been removed by erosion.

SOIL TEXTURE *(subsoil)*

Relative porportion of clay, silt, and sand in particular soil. Textures are grouped into three classes:

Clayey soils	*Clay*
	Silty Clay
	SandyClay
Loamy soils	*Silt Loam*
	Silty Clay Loam
	Sandy Clay Loam
	Clay Loam
	Loam
	Sandy Loam
	Silt
Sandy Soils	*Loamy Sand*
	Sand

DEPTH OF ROOTING ZONE

Shallow ..... 0" - 20"

Moderately Deep ..... 20" - 40"

Deep ..... 40" - 60"

Very Deep ..... More Than 60"

PERMEABILITY

Rate of water movement through soil.

Rapid ..... 6" to 20" per hour

Mod. Rapid ..... 2.0" to 6.0" per hour

Moderate ..... 0.6" to 2.0" per hour

Mod. Slow ..... 0.2" to 0.6" per hour

Slow ..... 0.06" to 0.2" per hour

Very Slow ..... Less than 0.06" per hour

Non-Technical Descriptions

Soil Symbol	Capability Class	Soil Name and Description
ArA	I	Armour silt loam, 0 to 2 percent slopes Loamy footslope or second bottom soil. Workability is good. Root zone is over 60 inches in depth. Available water and yield potential are high.
MlA	I	Maury silt loam, 0 to 2 percent slopes Upland soil on broad ridges. The root zone and depth to bedrock is over 60 inches. Available water and yield potential are high.
ArB	II e	Armour silt loam, 2 to 6 percent slopes Loamy footslope or second bottom soil. Workability is good. Root zone is over 60 inches in depth. Available water and yield potential are high. Erodible without ground cover.
Hu	II w	Huntington silt loam Nearly level, well drained, loamy soil on flood plains. The root zone is deep and yield potential is high. Most areas flood occasionally in winter or early spring.
LoB	II e	Loradale silt loam, 2 to 6 percent slopes Clayey, upland soil on ridgetops. Depth to bedrock is over 60 inches. Water movement is slow in the clayey subsoil. Yield potential is high. Erodibility is high without ground cover.
MlB	II e	Maury silt loam, 2 to 6 percent slopes Upland soil on broad ridges. The root zone and depth to bedrock is over 60 inches. Available water and yield potential are high.
MlB2	II e	Maury silt loam, 2 to 6 percent slopes, eroded Upland soil on broad ridges. Erosion has removed about half of the original surface layer lowering yield potential. The root zone and depth to bedrock are over 60 inches.
MlC	III e	Maury silt loam, 6 to 12 percent slopes Upland soil on sideslopes of broad ridges. The root zone and depth to bedrock are over 60 inches. Available water and yield potential are high.

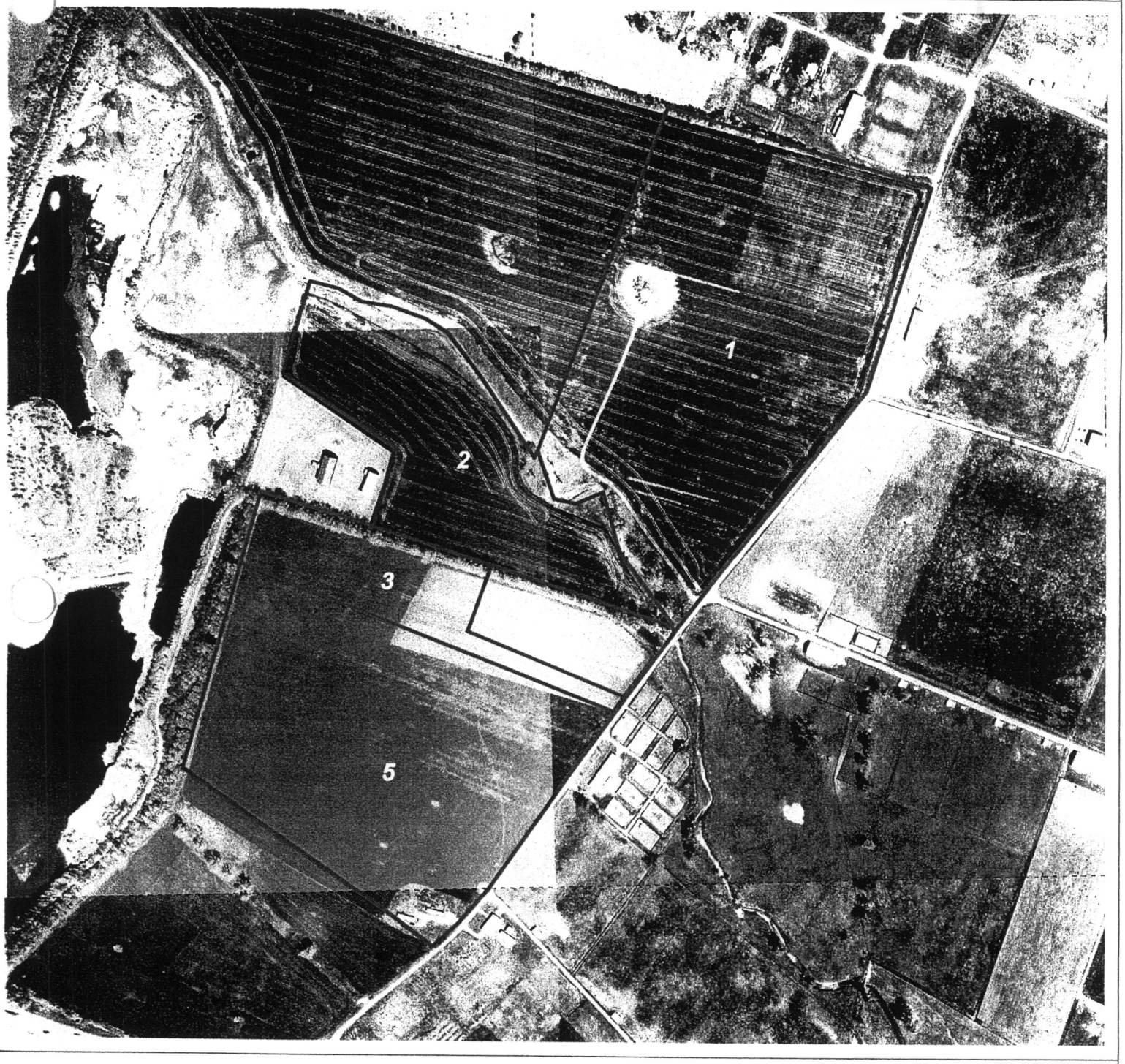
Fields 1 and 4 have hydrologic Soil Group A

U of K

FAYETTE COUNTY
Approx. Acres:
Date: 08/24/2001

PLAN MAP

USDA-NRCS
CHARLES FARMER



USDA

SCALE 1" = 500'

N

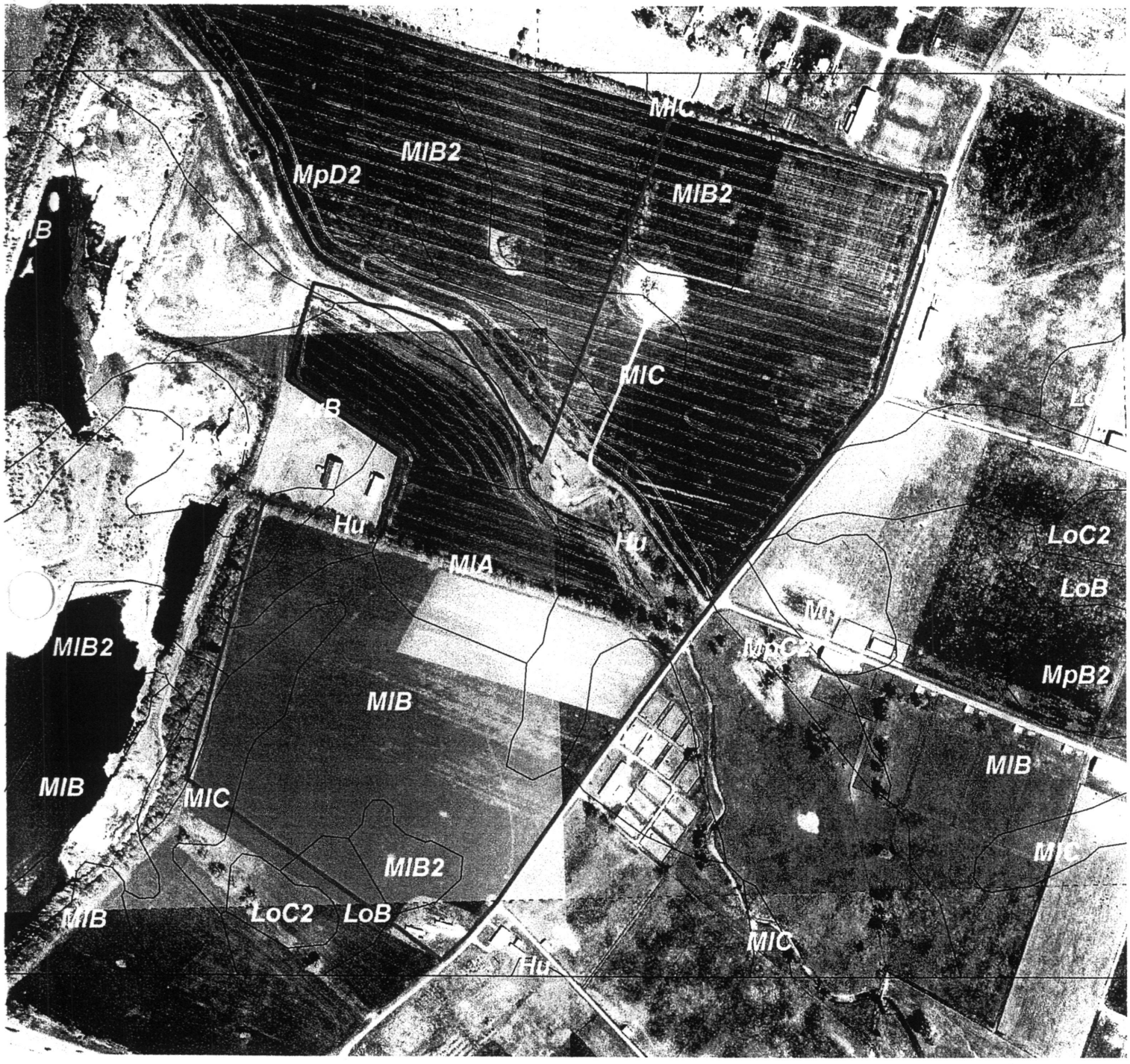
SOILS MAP

W.O. PETERSON

FAYETTE COUNTY

: 02/28/2002

USDA-NRCS
CHARLES FARMER



Legend

soils

Farm boundary

SCALE 1" = 500'

N

USDA

KENTUCKY NUTRIENT MANAGEMENT TRAINING
University of Kentucky, Main Chance Farm
February 3-5, 2004

FIELD EXERCISE: KENTUCKY PHOSPHORUS INDEX TRAINING NOTES (see bold statements)

(Stations Based on Description of Field Features and Rating Assignments)

As the group completes each station, the presenter will give them the (existing) value rating for the field feature/s being discussed. Each participant will record this value in the appropriate block for the first practice field on the provided Kentucky P Index Worksheet. The participant will enter the (planned) value for this field based on the decisions made when developing a nutrient management plan.

When the group has rotated through all stations, they will progress to a second field _____ where they will be asked to complete a P-index on their own (not as a group). Prior to beginning work on their own, the participants will be given the opportunity to ask questions from the presenters who will be assembled together! In the second field, participants will be given a scenario, which outlines management decisions, which can be used to determine the existing and planned field features for this field. This information will be evaluated and a Phosphorus Index will be computed for the field using the same P-Index worksheets used on the first practice field.

Station 1 - Frank Sikora

a. ***Residual Soil Test (P)*** considers the level of (P) in the soil prior to the application of nutrients. This level is determined by a current soil test analysis. A current soil test analysis is less than 1 year old. As soil test levels increase following repeated applications, the index points will need to be recalculated. Soil test (P) is given a weighed factor of **3.**

The NRCS 590 Standard mentions that the frequency of soil tests will be according to University of Kentucky guidelines. The P-Index will need to be re-calculated when soil test P levels elevate into another range of point value ratings as documented on the KY NRCS P-Index worksheet Remember that the P-Index will not be utilized unless soil test P is above 400. The residual soil test P for this field is _____.

Station 2 - Peggy Jackson

a. ***Application Area Is In A Watershed Identified As Being Impaired Due To Agricultural Applied Nutrients.*** These areas are identified on state supplied listings. If the application fields are in the watersheds as identified on the list currently on file in NRCS offices a weighted factor of **1** is assigned.

The listed watersheds will be identified by name. The land area considered to be in the watershed will be further identified by a Hydrologic Unit Code, which can be outlined on maps. (If this listing is not ready when will it be and how will it be made available?) If only part of the field falls into a impaired watershed base the decision on the predominant acreage in the field. Tell the group: This field is or is not _____ in an impaired watershed.

Station 5 – Monroe Rasnake

a. ***Downstream Distance To A Spring, Stream or Other Water body*** *as* measured from the closest upstream distance from the point of nutrient application in the field. This field feature is given a weighted factor of <u>2.</u>

When manure applications will be made in different areas of a field during the cropping sequence and/or if more than one spring, stream, water body or sinkhole could be impacted, use the highest field feature value rating that is applicable. Tell the group: The downstream distance for this field is _____.

b. ***Vegetative Buffer Width*** considers the filtering effect of vegetative buffers at downstream edges of fields. Filtering effect must be from sheet flow across the buffer. Filter strips, field borders, contour buffer strips, and riparian forest buffers are all examples of vegetative buffers. Due to the vast amount of favorable research that reinforces the effectiveness of buffers, this feature is given a weighted factor of <u>3.</u>

For purposes of the P Index, buffers are considered to be areas of perennial vegetation such as grasses, and trees in landscape positions <u>capable of filtering runoff at downstream edges of the nutrient application area</u> before the flow reaches a stream, sinkhole or water body. Buffers do not need to be in the same field where nutrient applications are made as long as downstream flows from the area can be intercepted. Buffers do not have to occur along or adjacent to a stream, sinkhole or water body to be considered. Remember, the buffer area is not planned for nutrient applications! If more than one buffer is needed, point values will be assigned based on the highest value rating applicable. Tell the group: The vegetative buffer width for this field is _____.

Note: Although a buffer width greater than 29 feet receives the lowest rating, the NRCS Filter Strip (393) standard includes specific criteria for filter strips planned as part of a waste management system! The standard mentions that land slopes from 0-6 percent require a flow length of between 40-60 feet and land slopes of 7 percent and above require flow lengths of between 60-100 feet!

NUTRIENT MANAGEMENT PLANNING USING A PHOSPHORUS INDEX

A Planning Tool to Assess & Manage Phosphorus in Kentucky As Part of a Nutrient Management Plan On Agricultural Lands

The Phosphorus (P) Index is one of two options available when (P) is to be considered as a basis for nutrient management plans when nutrients will be land applied. Specific guidance about the use of each of the options can be referenced in the Kentucky NRCS technical standard for Nutrient Management (590). All nutrient management plans will consider the land application of commercial fertilizers and animal manures/wastes as sources of plant available crop nutrients. These plans will require the use of soil and manure laboratory analysis to determine the level of (P) in the soil and in the manure in order to balance land applications according to crop removal. All laboratory analysis for soil and manure will be conducted according to procedures as established by the University of Kentucky soil testing laboratory. NRCS Nutrient Management plans will be applied based on the consideration that effective erosion control practices are being applied on the fields receiving nutrient applications.

The Phosphorus Index method considers conditions which affect movement of phosphorus to streams and other waterbodies. These conditions include the hydrologic characteristics of the soil, type of cover on the soil, field slope, amount of P in the soil, presence of vegetative buffers, application rate, time of application, and method of application etc. The P Index is intended to be used as an assessment tool to indicate the potential movement of P on the landscape by taking into account various transport and source factors. Once the potential impact of P is realized, the P Index can be used to develop a nutrient management plan with acceptable application rates and best management practices. ***If the P Index indicates that a low or medium risk situation is present for the field planned for land application, the nutrient management plan may be developed with either a Nitrogen (N) or Phosphorus (P) basis.***

The ultimate goal is to promote effective utilization of nutrients, specifically from organic sources, and at the same time maintain agricultural profitability and environmental quality. ***The P Index is not intended to place any restrictions on landuse or other regulatory purposes that could be construed by manipulating index parameters.***

The (P) Index is not applicable to the planning and application of human septage sludge. When planning the application of septage and sewage sludge refer to Kentucky regulations for guidance.

PHOSPHORUS AND THE ENVIRONMENT

In Kentucky, as in many other states, large inputs of P to agricultural fields may occur. Unlike commercial fertilizers which can be delivered in quantities as recommended by a soil test report, the amount of nutrients available to plants in animal manure or other organic byproducts can vary significantly. Plant needs for phosphorus are in most cases less than nitrogen, however, essentially equal amounts of these nutrients are available to plants from manure and waste water produced at animal feeding operations. When nitrogen plant needs are met from the application of manure, P is usually over-applied. Continuous applications at these rates can present environmental concerns.

DESCRIPTION

The Kentucky P Index uses ten specific field features to obtain an overall rating for each field. Assigned to each of the field features are ***weighted factors*** of 1, 2, or 3. Not all field features have the same influence and input because research has shown that relative differences exist in their importance to P loss. Also assigned to each of the ten features are ***value ratings*** of LOW (1 point), MEDIUM (2 points), HIGH (4 points), or VERY HIGH (8 points). Multiplying the ***weighted factor*** by the appropriate ***value rating*** yields points for that specific field feature. Based on a summation of the field feature points, the field falls into an overall category rating of LOW, MEDIUM, HIGH, or VERY HIGH. If a field receives an overall rating of HIGH or VERY HIGH, management practices may be implemented to reduce the rating to MEDIUM.

Field Features and Weighted Factors Used in the P Index

Field Features	*Weighted Factor*
1. Hydrologic Soil Group	1
2. Residual Soil Test (P) Level	3
3. Field Slope Percent	1
4. Land Cover Percent	3
5. Vegetative Buffer Width	3
6. Agricultural Impaired Watershed	1
7. Application Timing	3
8. Application Method	3
9. Distance To Spring/Stream/Waterbody	2
10. MLRA (County Location)	1

Currently, these weighted factors are based on the professional judgment of the various technical specialists who contributed to the development of the NRCS standard (590). As more research becomes available, the P Index will be periodically reviewed and updated.

Kentucky Phosphorus Index

Multiplying the weighted factor by the value rating, yields points for that specific field feature.

Field Features (weighted factors in parenthesis below)	Field Feature Value Ratings			
	Low (1 point)	**Medium** (2 points)	**High** (4 points)	**Very High** (8 points)
1. *Hydrologic Soil Group (1.0)*	A	B	C	D
2. *Residual Soil Test (P) Level (3.0)*	Between 400-500	Between 501-800	Between 801-1066	Above 1066*
3. *Field Slope Percent (1.0)*	<2	2-5	6-12	>12
4. *Land Cover Percent* (3.0) *estimated after application*	60-90	30-60	15-30	0-15
5. *Vegetative Buffer Width (3.0) (ft)*	>29	20-29	10-19	<10 or No Buffer
6. *Application Area Is In A Watershed Identified As Being Impaired Due To Agricultural Applied Nutrients (1.0))*	NO			YES
7. *Application Timing (3.0)*	June - Sept	April, May, Oct., March or Nov. w/ winter cover	March or Nov. w/o winter cover, Feb. w/ winter cover	Dec., Jan., Feb.
8. *Application Method (3.0)*	Injected	Surface applied and incorporated within 48 hr.	Surface applied and incorporated within 1 month	Surface applied and unincorporated for greater than 1 month
9. *Downstream Distance From Application Area To Spring, Stream or Waterbody (2.0)*	Over 150	50-150	0-50	Adjacent
10. *MLRA (County Location) (1.0)*	Bluegrass	All Other		

- ***Additional Phosphorus Will Not be Applied When Soil Test (P) Level is above 1066.***

Field Vulnerability for Phosphorus Loss	
Total Points from P Index	*Generalized Interpretation of P Index*
< 30	**LOW** potential for P movement from the field. Low probability of an adverse impact to waterbodies.
30 - 60	**MEDIUM** potential for P movement from the field. The chance of organic material and nutrients getting into waterbodies exists. Buffers, setbacks, lower manure rates, cover crops, crop residue practices alone or in combination may reduce impact.
61 - 112	**HIGH** potential for P movement from the field. The chance of organic material and nutrients getting to waterbodies is likely. Buffers, setbacks, lower manure rates, cover crops, crop residues, etc. in combination may reduce impact.
> 112	**VERY HIGH** potential for P movement from the field and an adverse impact on waterbodies.

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Quarry Farm Dairy
for
Southern States Training
Lexington, Kentucky
February 3–5, 2004

This farm consisting of 84.5 acres will be used to support a 100 cow dairy located nearby. The cows (average weight of 1200 pounds) are maintained in a dry lot facility year round. The manure is managed with a dry stack for solids and storage pond for liquids. Storage capacity is for a six month period.

The farmer wants to apply the liquid manure on the alfalfa fields and as much of the solid manure as possible on the other fields starting with field five. The cropping plan for the farm will use a rotation of alfalfa hay for five years followed by corn/wheat doublecrop silage for five years. The copping plan for 2004 is as follows:

Field	Acres	Crop	STP	Yield (T/A)	Fert. Rec.
1	33.4	Third Yr. Alf.	450	6	0–0–160
2	14.3	First Yr. Alf.	140	3	0–0–100
3	6.7	Corn Silage	200	23	165-0-100
3	6.7	Wheat Silage	200	8	40-0-40
4	4.1	Corn Silage	450	23	165-0-100
4	4.1	Wheat Silage	450	8	40-0-40
5*	26	Corn Silage	175	23	165-0-100
5	26	Wheat Silage	175	8	40-0-40

*Field 5 received 10 T/A solid dairy manure in 2003 and in alternate years prior to 2003.

Assignment:

Plan the application of manures for the 2004 cropping year:

- Use the P Indices calculated in the field exercise to determine if adjustments need to be made that will permit the use of manures on fields 1 & 4. Show the adjustments in calculating a new P-Index if needed. Remember, the new P-Index will need to reflect the cropping plan and your manure application plan.

- Calculate the manure production of the dairy using worksheets 1 for liquids and solids assuming half in each.

- Calculate manure application rates on the alfalfa fields using worksheet 2 for liquids starting with field 1, and on the other fields using worksheet 2 for solids starting with field 5.

- Determine if manure needs to be moved off-farm.

- Discuss long-term implications of manure use on this farm. How will soil test P and/or the P-Index be affected over the 10 year rotation?