Nutrient Management Training and Certification Regulations
Technical Advisory Committee Meeting Minutes
Virginia Department of Forestry Training Room
Charlottesville, Virginia
July 26, 2004

AGENDA ITEM - Welcome, Introductions, and Opening

Ms. Denckla Cobb and Mr. Bruce Dotson, both from the Institute for Environmental Negotiation, shared the responsibilities for facilitating the meeting. A listing of committee meeting attendees is provided in Attachment #1.

Members were given an opportunity to comment on the meeting minutes from the June 17, 2004 meeting. No substantive changes were suggested to the minutes and the omission of Dr. Cal Sawyer in the attendance list was noted for correction.

It was announced that the next two meetings of the committee will be held on August 18 and September 9, 2004 at the UVA and Virginia Tech Center in Richmond.

Staff noted that thirteen informational needs were identified at the last meeting and that all of the requested information has been provided or would be provided through subsequent presentations. In response to a question raised on the nutrient impacts of organic farming, staff noted that there is not any more impact of the regulations on organic framers than other types of farmers.

As a refresher, a handout rearticulating the rationale for modifying the regulations was provided to members. Items noted included:

- DCR must make any changes necessary to these regulations relative to poultry waste and have new criteria ready for use by 12/13/05 as indicated in §62.1-44.17:1.1 Poultry Waste Management Act.
- Federal regulation 40CFR Parts 2, 122, 123, and 412 require states to adopt nutrient management plan criteria for confined animal feeding operation permits. The criteria must address phosphorus and nitrogen.
- NRCS has established a national policy to require phosphorous to be addressed in NMPs.
- Virginia's Chesapeake Bay nutrient reduction commitments and Tributary Strategies place increasing need for reductions from nonpoint source (and point sources).
- Other state partners in the Chesapeake Bay Program have adopted phosphorus criteria for NMPs.
- Regulations were last promulgated in 1995, so there are needs to revise criteria based on technological change and increased scientific understanding.

The facilitator noted that there was an agreement in principle at the last meeting that phosphorus management needed to be addressed in the regulatory revisions. Staff noted that when the regulations were originally promulgated, much of the language indicated "shall" for nitrogen and "should" for phosphorus. Draft regulatory language to require P (4 VAC5-15-150 2 b) was shared with the committee. Discussions ensued that noted that the language referring to "If this is not possible" required better definition and further discussion.

AGENDA ITEM - The P-Index: ins and outs

Dr. Greg Mullins provided a presentation on "The P-Index: ins and outs." Text for Dr. Mullins' presentation may be found in Attachment #2. **[Editor's Note: It is the Department's intention to include these materials upon receipt in the final minutes.]**

AGENDA ITEM - Other Methods of Managing P

Staff presented a powerpoint presentation on the "Other Methods of Managing P: Soil Test, Environmental Threshold and Poultry Waste Management Act". Text from this presentation may be found in Attachment #3.

AGENDA ITEM - Scenario Analysis: comparison of various methods of P-management.

The facilitator led a discussion regarding the advantages and disadvantages of the varying methods of P-management. Staff gave a comparison of different scenarios for each of the methods. These scenarios were based on examples provided in the Virginia Phosphorus Index Version 1.3 Technical Guide.

Comparison Scenarios Between (a) Soil Test Phosphorus, (b) Poultry Waste Mgt. Act, (c) Environmental Threshold Phosphorus, and (d) Phosphorus Index

Scenario	Soil Test P	Poultry Waste Mgt. Act.	Environmental Threshold	Phosphorus Index
1. 300 ppm P	0P	1 x CR	1 x CR	1 x CR
2. 320 ppm P	0P	1 x CR	0P	0P
3. 205 ppm P	0P	1 x CR	1 x CR	1.5 x CR
4. 175 ppm P	0P	1 x CR	1 x CR	1.5 x CR
5. 100 ppm P	0P	1 x CR	1.5 x CR	1.5 x CR
6. 100 ppm P	0P	1 x CR	1.5 x CR	1 x CR
7. 100 ppm P	0P	1 x CR	1.5 x CR	0P

- Scenarios 1 through 4 are described in The Virginia Phosphorus Index Version 1.3 Technical Guide on pages 22-29.
- Scenario 5 is the same as scenario 1, but uses 100 ppm P soil test instead of 300 ppm.
- Scenario 6 is the same as scenario 1, but uses a soil loss of 8 tons per acre instead of 4 tons per acre and 100 ppm soil test instead of 300 ppm.

- Scenario 7 is the same as scenario 1, but uses a soil loss of 10 tons per acre instead of 4 tons per acre and 100 ppm soil test instead of 300 ppm.

During the ensuing discussion, and building on the advantages and concerns of the various methods identified at the June 17, 2004 meeting, the committee outlined the following discussion points:

Agronomic Soil Test

- Looks at how much P can be used by crop
- Does not directly look at runoff or erosion
- Most restrictive and protective of water quality

Concerns

- does not address erosion or water quality
- understates soil ability to carry P
- excess transport problem
- soil depth of sampling
- assumes best management practices will take care of erosion

To Make Acceptable

- have crop removal as lowest restriction
- Consideration of P-retention capacity (saturation)
- In cases of high sediment loss not conservative enough
- Need to specify sample depth

Environmental Threshold

- Looks at how much P can be desorbed/runoff
- Does not look at erosion factor
- Could vary by region

Concerns

- Not sure protective of water quality (saturation linked to 1 ppm; concern expressed that this is one order magnitude higher than EPA recommends)
- Erosion not considered
- Poultry would not be able to benefit from certain aspects
- Encourages tillage to bind P more

To Make Acceptable

- Don’t allow more P than crop removal
- Soil loss not adequately considered
- Lower rates of P-application

Phosphorus Site Index

- Evaluates 3 risk components
- Considers erosion
- In some low risk sites can tolerate added application
- "Streams" in the Index means any rain-flow event, including manmade ditches
- Buffers - must be in place pre-plan and during plan period - do not need to be owned by farmer
- Most site specific
- NRCS feels most environmentally protective because it looks at erosion and runoff

Concerns

- Plan may assume too much if the buffer is very new or the buffer is not under the control of the farmer
- Additional cost of preparing P Index could be cost prohibitive
- 1 ppm of P is unacceptable risk; some treatment plants have lower thresholds
- subsurface risk factor should never be zero
- buffers and other uncertain conditions
- complex
- reflects a number of judgments
- poultry waste applicators would not benefit from certain aspects as the poultry law may not allow for greater than 1 x CR application
- may need to re-run index to reflect minor changes in tillage or cropping systems

To Make Acceptable

- do not allow more than crop removal
- need more flexibility for crop changes
- make it more simple to understand, implement and enforce
- make crop removal the most stringent
- simplify soil loss component
- combine with environmental threshold below certain level

Poultry Waste Management Regulations

- achieves positive result under most scenarios
- less restrictive/protective in some scenarios
- have 2-3 years experience in applying these
- more flexible

To Make Acceptable

- has to benefit low-risk sites (by allowing higher applications)

- include erosion risk factor

Hybrid Approaches

- some hybrids could address impaired streams
- poultry and erosion factor (be able to benefit low risk sites)
- consideration of saturation binding
- simplified NRCS erosion index
- values of "T" or "2T" determine allowable levels of P (could give bonus P if T)
- offer menu of options with minimum standards
- use the P-Index to I.D. where "breaks" in P-levels are, as a kind of screening mechanism for different regions

Following the conclusion of this discussion, the facilitators took a strawman poll to assess the committee's current level of support for the various methodologies discussed. The strawman utilized the consensus process outlined in the first meeting; III – fully support, II – reservations but able to live with, I – cannot live with. General results of the polling are as follows understanding that some members did not yet have sufficient information to formulate an opinion on certain strategies:

Methodology	III	II	I
Agronomic Soil Test	3	0	14
Environmental Threshold	0	3	14
P-Index	4	9	5
Poultry Management Approach	4	8	5
Hybrid – Poultry with Erosion factor	7	7	3
Hybrid – Saturation binding	11	3	2
Hybrid – Simplified NRCS erosion index	8	5	3
Hybrid – Values of T or 2T determine P	8	8	2
Hybrid – Offer menu of options	4	7	5

A concern was expressed that the committee was "voting" for different methods, and it had been agreed in the ground rules that the committee would not vote. The facilitator explained that this was a test to identify levels of support of the various methods, and was not either eliminating any of the ideas or prioritizing them. The poll could help inform the Department in its formulation of a proposal for the draft regulation by identifying methods of greatest contention and methods offering potential for further development.

AGENDA ITEM - Timing of Nitrogen Application: issues, ideas and discussion:

Staff distributed a draft chart of high nitrogen environmental risk soils and addressed the following:

Timing of Winter/Spring Applications of Nitrogen Materials

1. Timing of Organic Nitrogen Sources (Manure and Biosolids)
   a. High Nitrogen Environmental Risk Soils - Apply no more than 30 days prior to planting.
   b. Moderate and Low Risk Soils - Apply no more than 60 days prior to planting.

2. Timing of High Carbon/Nitrogen Ratio Compost (>25:1 C:N)
   No timing restrictions

3. Timing of Inorganic Nitrogen Sources (Commercial Nitrogen Fertilizers)
   a. High and Moderate Nitrogen Environmental Risk Soils - Apply inorganic nitrogen in split applications.
   b. Low Nitrogen Environmental Risk Soils - May apply all nitrogen at planting for spring planted annual row crops.

Committee members made the following comments regarding Nitrogen Timing:

- 60 days pre-crop: worried about runoff as well as leaching
- Need to provide an incentive for cover crop.
- Do not allow additional time if no cover crop.
- Unless there are significant improvements in applications (fertilization) groundwater contamination and the Bay will continue to be polluted above acceptable levels.

AGENDA ITEM – Additional Issues Raised at the First Meeting

The facilitator addressed a handout regarding miscellaneous issues of concern and asked that members provide specific recommendations to the Department of Conservation and Recreation prior to the next meeting. A copy of this handout is provided as Attachment #4.

AGENDA ITEM – Public Comment

Susan Trumbo noted that it appeared that NRCS would be requiring a P site index. She noted a concern that the NRCS requirement might differ from what the Commonwealth would require. In response, Mr. Lawrence from the NRCS stated that the NRCS goal is to be consistent with the state. There is a national directive but NRCS will conform to the method selected by the Commonwealth once Virginia has a system in place.

The facilitator reminded members that the next two meetings would be held in Richmond on August 18 and September 9.

There being no further business the meeting was adjourned.

Attachment #1
Attendance List, July 26, 2004

TAC Members
Hobey Baughan (for George Ashman)
Gary Flory, CNMP, Virginia Department of Environmental Quality
Gerald Garber, Augusta County Dairy Farmer
Mark Hedrick, CNMP, Pilgrim's Pride
Ann Jennings, Chesapeake Bay Foundation
Lynton Land, Northumberland Association for Progressive Stewardship
Chris Lawrence, CNMP, Natural Resources Conservation Service
Glenn Martin, Virginia Department of Agriculture and Consumer Services
Peter Maybach, CNMP, M&M Consulting
Steve McMahan, CNMP, Synagro
Dr. Greg Mullins, Virginia Tech Crop and Soil Environmental Science Dept.
Jacob Powell (replacing Neil Zahradka – left company), Murphy-Brown
Dr. Cal Sawyer, Virginia Department of Health
Joedy Sheets, CNMP, Valley Fertilizer and Chemical
Kay Slaughter Southern Environmental Law Center
Wilmer Stoneman (for Bill Nelson)
Jim Tate (for Sharon Conner) Hanover-Caroline SWCD

DCR Supporting Technical Staff
Jack Frye
David Kindig
Russ Perkinson
Scott Ambler

DCR Regulatory Staff
Leon App
Michael Fletcher
David Dowling

Facilitators
Tanya Denckla Cobb, UVA Institute for Environmental Negotiation
Bruce Dotson, UVA Institute for Environmental Negotiation

Others
Geri Barefoot, Citizens for a Better Dinwiddie
Karl Berger, MWCOG
David Dudley, Citizens for a Better Dinwiddie
Katie Kyger, Virginia Agribusiness Council
Susan Trumbo, Recyc Systems
Missy Neff, Aqualaw PLC
Diana Parker, Sierra Club

Attachment #2

Presentation by Dr. Greg Mullins, Virginia Tech

SLIDE 1

Virginia Phosphorus Index

SLIDE 2

Virginia Phosphorus Index
Version 1.3
W.L. Daniels, M.L. Wolfe,
L.W. Zelazny, J.W. Pease,
& G.L. Mullins
Virginia Tech

Revised July 2004

SLIDE 3

Development of VA P-Index
- Initiated in 1998
- Development:
  - Funding (Sole Source): VA DCR
  - 3-year project
  - Adv Comm: DCR, VA-NRCS, Spec
- Current:
  - DCR-319 Program
  - 2-year project

SLIDE 4

Virginia P-Index:
■The P-index is a field-level assessment tool that integrates soil, management, environmental, and hydrological (transport) characteristics to determine the relative risk of P losses through erosion, surface runoff and subsurface transport to water bodies

SLIDE 5

(graphic)

SLIDE 6

Phosphorus Index: (graphic)

SLIDE 7

Mechanisms for P Loss
- Erosion – Sediment P
- Runoff – Soluble P (Soil & applied P)
- Subsurface – Soluble soil P

SLIDE 8

Virginia Phosphorus Index
Version 1.3.

Erosion Risk Factor	**=**	**Edge of field soil loss** ***(tons/ac)***	**X**	**Sediment P delivery factor (*dimensionless)***	**X**	**Sediment total P factor** ***(ppm)***	**X**	**0.002**		
Runoff Risk Factor	**=**	**Runoff from field** ***(inches)***	**X**	**Runoff P delivery factor** ***(dimensionless)***	**X**	**Runoff DRP* factor** ***(ppm)***	**X**	**0.22651**	**+**	**Applied fertilizer DRP factor** ***(lb/ac)***
Subsurface Risk Factor	**=**	**Percolation** ***(inches)***	**X**	**Soil texture/ drainage factor** ***(dimensionless)***	**X**	**Subsurface DRP* factor** ***(ppm)***	**X**	**0.22651**		

SLIDE 9

VA P-index: P-Loss Mechanisms
- Sediment bound P, through soil erosion
  - **Erosion Risk Factor**
- Dissolved P in surface runoff (soil & fertilizer)
  - **Runoff Risk Factor**
- Dissolved P through subsurface transport or leaching
  - **Subsurface Risk Factor**

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VA P-index: P-Loss Mechanisms

- Sediment bound P, lost through soil erosion
  - **Erosion Risk Factor**
    - Risk of P loss as eroded sediment
    - Mass of sediment lost X P content of sediment

SLIDE 11

VA P-index: P-Loss Mechanisms

- Sediment bound P, lost through soil erosion
  - **Erosion Risk Factor**
    - Risk of P loss as eroded sediment
    - Mass of sediment lost X P content of sediment

Tons Eroded Sediment Sediment
Sediment (EOF) Delivery P Conc.

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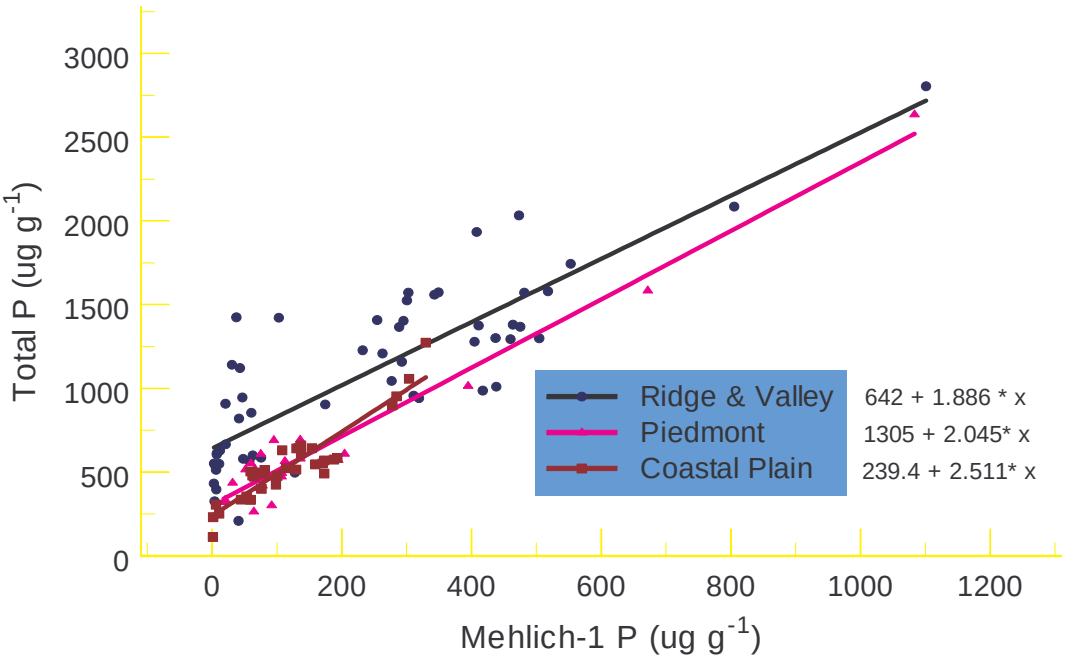
Table 4. Sediment delivery factors.

Distance from edge of field to nearest stream (intermittent or perennial)/Riparian buffer width	**Runoff Delivery Factor**
> 500 ft OR riparian buffer width > 100 ft	**0.4**
301-500 ft OR riparian buffer width of 76-100 ft	**0.6**
201-300 ft OR riparian buffer width of 51-75 ft	**0.8**
101-200 ft OR riparian buffer width of 36-50 ft	**0.9**
≤100 ft AND riparian buffer width < 36 ft	**1.0**

SLIDE 13

Relationship of Mehlich-1 P to Total Sediment P



SLIDE 14

VA P-index: P-Loss Mechanisms

■Dissolved P in surface runoff (soil & fertilizer)

- **Runoff Risk Factor**
  - Risk for loss of soluble P in surface runoff
  - Volume of runoff X runoff P concentration
  - Soluble P: Soil + Recent P Additions

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VA P-index: P-Loss Mechanisms

- Dissolved P in surface runoff (soil & fertilizer)
  - **Runoff Risk Factor**
    - Risk for loss of soluble P in surface runoff
    - (Volume of runoff) X (runoff P concentration)
    - Soluble P: Soil + Recent P Additions

RBF =	Runoff Volume (inches/acre) NRCS CN	x	Runoff Delivery Table8	x	Runoff P. Conc. (ppm) Meh.1. STP Table 9	+	Applied P Losses (lb/acre)

SLIDE 16

SCS/NRCS Curve Number Method

- Predicts Annual Runoff **(RO) (inches)**
- RO depends on**: rainfall, antecedent soil moisture, soil type & vegetative cover**
- **Table 6, Fig. 2 & Table 7.**

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Table 9. Equations for determining runoff DRP Factor.

Region[1]	Land Use	Equation
Ridge and Valley	Pasture/hayland	Runoff DRP factor (ppm) = 0.35 + 0.00855 (Mehlich I in ppm)
	No-till	Runoff DRP factor (ppm) = 0.35 + 0.00741 (Mehlich I in ppm)
	All others	Runoff DRP factor (ppm) = 0.35 + 0.00570 (Mehlich I in ppm)
Piedmont and Middle and Upper Coastal Plain (above the Surry Scarp)	Pasture/hayland	Runoff DRP factor (ppm) = -0.32 + 0.01395 (Mehlich I in ppm)
	No-till	Runoff DRP factor (ppm) = -0.32 + 0.01209 (Mehlich I in ppm)
	All others	Runoff DRP factor (ppm) = -0.32 + 0.00930 (Mehlich I in ppm)
Eastern Shore and Lower Coastal Plain (below the Surry Scarp)	Pasture/hayland	Runoff DRP factor (ppm) = 0.0132 (Mehlich I in ppm)
	No-till	Runoff DRP factor (ppm) = 0.0114 (Mehlich I in ppm)
	All others	Runoff DRP factor (ppm) = 0.0088 (Mehlich I in ppm)

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Applied Fertilizer DRP (AFDRP) Factor: Pg. 13

AFDRP = P application rate (lbs P/acre)*PSC*PAF

lbs P_2O_5 X 0.43 = lbs P
PSC = P source coefficient – Table 10
PAF = P application factor – Table 11

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VA P-index: P-Loss Mechanisms

- Dissolved P in surface runoff (soil & fertilizer)
  - Runoff Risk Factor
    - Risk for loss of soluble P in surface runoff
    - (Volume of runoff) X (runoff P concentration)
    - Soluble P: Soil + Recent P Additions

SLIDE 20

VA P-index: P-Loss Mechanisms

- Dissolved P through subsurface transport or leaching
  - Subsurface Risk Factor
    - Risk for loss of soluble P in percolation
    - Volume of percolation X P concentration
    - Soluble P: Residual soil P

SLIDE 21

- Dissolved P through subsurface transport or leaching
  - Subsurface Risk Factor
    - Risk for loss of soluble P in percolation
    - Volume of percolation X P concentration
    - Soluble P: Residual soil P

SLIDE 22

Table 16. Soil texture/drainage class factors

Soil drainage class[1]	Soil texture to depth of 18”		
	Coarse sand Sand Fine sand Very fine sand Loamy coarse sand Loamy sand	Loamy fine sand Loamy very fine sand Sandy loam Coarse sandy loam Fine sandy loam Very fine sandy loam Loam Silt loam Silt Sandy clay loam	Clay loam Silty clay loam Sandy clay Silty clay Clay
Very poorly and poorly drained	1.0	0.75	0.50
Somewhat poorly drained	0.25	0.25	0.0
Moderately-well and well-drained	0.0	0.0	0.0
Somewhat excessively and excessively drained	See footnote 2	See footnote 2	See footnote 2

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Virginia Phosphorus Index
Version 1.3

Erosion Risk Factor	**=**	**Edge of field soil loss *(tons/ac)***	**X**	**Sediment P delivery factor *(dimensionless)***	**X**	**Sediment total P factor *(ppm)***	**X**	**0.002**		
Runoff Risk Factor	**=**	**Runoff from field *(inches)***	**X**	**Runoff P delivery factor *(dimensionless)***	**X**	**Runoff DRP* factor *(ppm)***	**X**	**0.22651**	**+**	**Applied fertilizer DRP factor *(lb/ac)***
Subsurface Risk Factor	**=**	**Percolation *(inches)***	**X**	**Soil texture/ drainage factor *(dimensionless)***	**X**	**Subsurface DRP* factor *(ppm)***	**X**	**0.22651**		

SLIDE 24

Summary Interpretation of Phosphorus Index

P index value	Potential water quality impact	P management guidance based on proposed management practices
0 – 30	Low	Phosphorus application according to N-based nutrient management is acceptable.
31 – 60	Medium	Phosphorus applications should not be more than 1.5 times crop removal.
61 – 100	High	Phosphorus applications should not be greater than crop removal
> 100	Very high	No phosphorus should be applied.

SLIDE 25

Data needed for the VA P-Index

- Producer:
  - Soil test P level
  - Analysis, rate, timing and method of application for organic & inorganic P sources
  - Crop rotation sequence
  - Crop management
- Field Visit:
  - Riparian buffer width
  - Distance from downslope edge of field to stream
  - Data to calculate soil erosion using RUSLE2
- Soil Survey
  - County
  - Predominant soil mapping unit
  - Soil drainage class*
  - Soil texture class to 18 inches*
  - Hydrologic soil group

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Example: Rockingham County

- Frederick-Lodi silt loam, Hydrologic group B, Well drained, Silt loam to Clay texture to 18 inches
- Mehlich I P = 600 lbs/acre = 300 ppm
- Erosion = 4 tons/acre (RUSLE2)
- Edge of field: No Riparian Buffer
- Corn silage, No-till, planted in straight rows/ Rye silage, CT, planted in straight rows
- Poultry litter, no phytase, surface-applied at 265 lbs P_2O_5/acre (116 lbs P), no incorporation
- 150 ft from edge of field to a stream

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Virginia Phosphorus Index
Version 1

P Risk	**=**	**Erosion Risk Factor**	**,**	**Runoff Risk Factor**	**,**	**Subsurface Risk Factor**	**=**	
P Risk	**=**	**8.70**	**·**	**5.28**	**·**	**0**	**=**	
P Index Value	**=**	**55**	**·**	**33**	**·**	**0**	**=**	**88**

P Index Value = ERF*6.3 +RRF *6.3

P Index Value = 8.70 * 6.3 + 5.28 * 6.3 = 88

SLIDE 28

Summary Interpretation of Phosphorus Index

P index value	Potential water quality impact	P management guidance based on proposed management practices
0 – 30	Low	Phosphorus application according to N-based nutrient management is acceptable.
31 – 60	Medium	Phosphorus applications should not be more than 1.5 times crop removal.
61 – 100	High	Phosphorus applications should not be greater than crop removal.
> 100	Very high	No phosphorus should be applied.

SLIDES 29, 30, 31

Graphics

SLIDE 32

Soil P Saturation Levels - VA
NRCS, 590 Standard.

	Soil P Saturation Level	
Region in Virginia	Twenty Percent (20%)	Sixty-Five Percent (65%)
	--lb/acre, Mehlich 1 STP	
Lower Coastal Plain	118 (59)	590 (295)
Upper Coastal Plan and Piedmont	120 (60)	794 (397)
Mountain and Valley	106(53)	1120 (560)
	N-Based Mgmnt	NO P

Attachment #3

Other Methods of Managing P:
Soil Test, Environmental Threshold and Poultry Waste Management Act

Slide # 1 Agronomic Soil Test Phosphorus Recommendations

- Apply nutrient sources at the level recommended in a soil test (based on crop response research)

Slide #2 Agronomic Soil Test Phosphorus Recommendations
CR = Crop Removal Amounts

Soil Test Phosphorus Level	Phosphorus Application
Low	Rapid Build-up
Medium	Moderate Build-up
High	Maintenance
Very High	No P application

Slide #3 Example Corn Silage Phosphorus Using Agronomic Soil Test Method

Soil Test Level	Soil Test P ppm	Max P_2O_5 Application
L	0-6	100
M	6-18	60
H	18-55	30
VH	55+	0

Slide #4 Example Pasture Productivity Group III
Phosphorus Using
Agronomic Soil Test Method

Soil Test Level	Soil Test P ppm	Max P_2O_5 Application
L	0-6	50
M	6-18	30
H	18-55	0
VH	55+	0

Slide #5 Poultry Waste Management Act
Phosphorus Recommendations

- "…after October 1, 2001, phosphorus application rates ***shall not exceed greater of crop nutrient needs or crop nutrient removal*** as determined by the Department of Conservation and Recreation. The application of poultry waste shall be managed to minimize runoff and leaching and reduce adverse water quality impacts from phosphorus."
- The terms ***"crop nutrient needs"*** and ***"crop nutrient removal"*** are defined in current DCR regulation 4-VAC-5-15-10.
- Tables of crop nutrient needs are already promulgated in VA Nutrient Management Standards and Criteria. Crop nutrient removal rates are contained in DCR Guidance NMP-5.

Slide #6 Example 18 Tons/Ac. Corn Silage
Phosphorus Using
Poultry Waste Management Act
10/1/01 – 12/31/05 Criteria

Soil Test Level	Soil Test P ppm	Crop Nutrient Needs	Crop Nutrient Removal
L	0-6	100	72
M	6-18	60	72
H	18-55	30	72
VH	55+	0	72

Slide #7 Example Pasture Productivity Group III
Phosphorus Using
Poultry Waste Management Act
10/1/01 – 12/31/05 Criteria

Soil Test Level	Soil Test P ppm	Crop Nutrient Needs	Crop Nutrient Removal
L	0-6	70	30
M	6-18	40	30
H	18-55	0	30
VH	55+	0	30

Slide #8 Environmental Threshold Soil Phosphorus Levels

- Apply organic nutrient sources at the nitrogen based rate if soil phosphorus levels are below the threshold
- Phosphorus based or no P applications when soil phosphorus levels meet or exceed threshold values to control ***concentration*** of phosphorus runoff water.
- One approach to establish threshold levels is based on the ratio of total phosphorus to aluminum + iron in soils, since these elements form relatively insoluble compounds with phosphorus in soils
- P / (Al + Fe) = ***saturation ratio***
- Saturation ratio of 65% or greater is extreme

Slide #9 Example Phosphorus Environmental Threshold
18 Tons/Ac. Corn Silage in Piedmont

P Mgt	%P Saturation	Soil Test M1 P ppm	Max P_2O_5 Applic
N Based	< 25%	<86	175
1.5 x P CR	25-35%	86-148	108
1.0 x P CR	35-50%	149-262	72
0.66 x P CR	50-65%	263-399	48
0 P	> 65%	>399	0

Slide #10 Example Phosphorus
Environmental Threshold
Pasture Productivity Group III in Piedmont

% P Saturation	Soil Test ppm	Max P. Appl.
<25%	<57	N based 75#
25-35%	57-99	1.5 x P C.R. 45#
35-50%	100-174	1.0 x P C.R. 30#
50-65%	175-266	0.66 x P C.R. 20#

Attachment #4

DCR comments (in Italics) related to miscellaneous issues – Potential solutions and/or further input needed

Phosphorus Management

- Applicability of criteria to all sources
- Methods for P Management
- Poultry law requirements (at least as stringent as poultry)
- Need to use approaches that are science based
- P coefficient for biosolids *(addressed in P-Index, can discuss how to use in other phosphorus approaches as we move forward.)*
- Need to reduce soil phosphorus on highly loaded soils

N Application

- Timing - more uniform recommendations and clarity
- Use of "average" weather conditions to evaluate practices
- Evaluating N residuals used in NMP (Wx impacts variability)
- Evaluate nitrogen residuals in organic wastes for years 2-4 *(Have recommendation from Dr. Greg Evanylo of Virginia Tech to modify certain biosolids mineralization rates.)*
- NMP rates for N should reflect changes in cropping systems (no till*) (Use PSNT to adjust rates per last sentence in present regulations?)*
- Standards and Criteria (Pg 34) – Corn grain – timely N application for side dressing corn similar to cotton

Enhancements and fine-tuning

- VALUES technical revision *(Ongoing present project with Virginia Tech, expected completion by fall prior to draft regulation publication)*
- Potential revision of Nitrate Leaching Index *(This is tied to the nitrogen timing issue – potential new soil specific nitrate leaching ratings for soils to replace present system)*
- Wheat and barley standards/criteria applied to grain and silage? (*Present regulations apply to both – will work with Virginia Tech to consider separate recommendations)*
- Contingency plan for emergencies *(Should all NMPs tell farmers how to handle emergencies? How do we define a true emergency? If it happens more often than rarely, is it an emergency or a management / structural limitation with the operation?)*
- Clear guidance on cover crops (*Present regulations indicate cover crops are to scavenge existing soil nutrients, implies zero application of nutrients to cover crops. Need to amend regulations to allow some manure/ biosolids applications to "green manure crops" as a waste storage management tool. If rate of 30 pounds N per acre in fall were allowed on these crops, should be no need to track*

the 30 pounds into the following crop such as corn, but will need to track P since there is no "crop removal" occurs from the field with cover crops or green manure crops.)

- NMP recommendations for non-polluting nutrients – i.e. K, Boron, etc. *(K is already required to be addressed in 4 VAC 5-15-150 A. 1. Also see A.2.d. – consider changing "should" to "shall." Need to add Boron recommendations in Virginia Nutrient Management Standards and Criteria to alfalfa recommendations.)*

Soil testing procedures

- Need to establish standard soil depth for all tests *(Present regulation provides a standard depth range – will amend to 0"-6" depth for tilled land, 0"-4" for land that is not tilled)*
- Use of colormetric soil testing procedures should not be allowed *(Only methods that correlate to Mehlich 1 for phosphorus are presently allowable, procedures in Virginia Nutrient Management Standards and Criteria 32 and 33 – will add Spectrum and Waters lab correlation procedures currently in guidance. Need to know if comment related to soil nitrate testing using Penn State field method?)*
- P-testing – not testing plants Mehlich – 1 testing – uptake too *aggressive (Mehlich 1 and Mehlich 3 are present methods used by most university soil labs on the East Coast. While M1 and M3 are not a direct measure of plant availability or water solubility of P, they have been found to correlate well with these measures on a relative (not 1:1) basis.)*
- Soil sample – ensuring that sampling is representative of all soil types on property *(Should we now require soil samples for each field? Present Virginia Nutrient Management Standards and Criteria regulations require representative samples – see 4 VAC 5-15-150 A. 2. f. DEQ (and therefore DCR) requires samples for each field in VPA permits.)*

General Plan Issues

- One plan for one farm – NMP
- Need to be specific about type of plan
- Significant support for not privatizing plan-writing keep w/in DCR
- Clearinghouse/recording system straightforward, streamlined plans for multiple agencies

Best Management Practices

- 100-foot buffer strips *(DEQ VPA and VPDES regulations being amended to conform to federal CAFO requirements for 100' minimum setback distances, or 35' minimum if permanent vegetative buffer – should we do the same?)*
- Use of buffer amendments such as alum and lime prior to application on litter or on ground before applied. *(Alum use addressed in P-Index, can*

discuss how to use in other phosphorus approaches as we move forward. Research on use of lime doesn't show as clear a benefit as Alum.)

***The following three categories contain some trade-offs. Need to attempt to find a balance**.*

Flexibility – 1. *The issues of plan maintenance and revisions are covered in the last section of the regulations. Are some amendments needed? 2. Some planning flexibility exists already in allowing upward adjustments to yields on up to 20% of fields without records and use of field records to adjust planning yields for more fields.*

- Flexibility for site-specific modifications, and considerations for weather
- Flexibility needs to be straight forward, able to be implemented by users
- 3-year rotation schedule - need adaptability and flexibility. How to deal with multiple changes *(Could develop a new NMP each year under present language in regulations. Also, DCR inserts language into NMPs for permits letting farmers to change crops/manure applications in up to 10% of fields without changes to the NMP. Do we need this type of language in the DCR regulations?)*
- Want plans to be active and useful for farmers
- Decisions by group need to be implementable and realistic
- Maintain balance w/flexibility
- Contingency planning for emergencies

Accountability & Enforcement

- Plans need to be readily enforceable
- Enforceability of NMP -specifically in regard to improving water quality – do personnel know what they are looking at? – for existing permits
- Section 110 – compliance and regulatory action. Does DCR have the resources and tools to take enforcement of planners in plan writing.
- Issue of planner writing a plan and then no longer being involved in plan
- Ensuring that H2O quality is maintained in BMPs, other for runoff

Need for Scientific Accountability / Site Specificity

- Plans need to address varying soil types and different bedrocks that are found in Virginia (*Present criteria are site-specific for nitrogen.)*
- If regulations are based on P-Index should cover majority of soil types in Virginia.
- Hope that the plan developed would not only implementable, but also science based.
- Need to establish average assumed seasonal weather conditions for evaluation purposes *(What are "average weather conditions" and do they ever occur? Maybe need to evaluate criteria in terms of normal fluctuations in weather but not rarely occurring situations.)*