



# The Iowa Phosphorus Index and Manure Management Plans for Confinements

Producers who plan ahead can influence their P index results by controlling erosion.



NRCS

## Incorporating the P index into your MMP

If you have a confinement and are required to have a manure management plan (MMP), you will soon be required to use the Iowa Phosphorus Index (P index) to determine application rates when developing the MMP. Some people are already using the P index. The remainder must use the P index starting in the fall of 2006 or 2008.

The P index comes from the field office technical guide published by the U.S.D.A.'s Natural Resources Conservation Service (NRCS).

Producers who plan ahead and run the P index before it's required in their manure management plan are more likely to make this transition successfully. The Department of Natural Resources (DNR) has the following recommendations that will help:

- First, find out when the P index is required for your operation. *See Table 1.*
- Determine levels of soil P by taking soil samples as soon as possible.
- Run RUSLE2, the NRCS soil loss calculator, and the P index for each field in your plan.
- Decide how the P index results will affect your operation and what you can do about it.

Since the P index is based on several factors including the erodibility of the soil, the soil test results and the distance from a stream, many producers will find that they will be able to use nitrogen-based application rates. Others may be able to adjust their land management practices, such as increasing residue cover, and still use a nitrogen-based application rate.

## What is the implementation schedule for P index-based MMPs?

The P index will be phased in as indicated below. An original MMP is the first time an MMP is submitted.

**Table 1. Date P index must be used based on date original MMP was submitted**

Original MMP submitted	P index-based MMP update needed
prior to April 1, 2002	first updated plan after Aug. 25, 2008
April 1, 2002 - Oct. 24, 2004	first updated plan after Aug. 25, 2006
on and after Oct. 25, 2004	upon submittal

## How does the P index work?

The NRCS P index estimates the potential for P movement from a field based on landscape features, soil P, soil conservation and nutrient management practices. The result of the P index is a site vulnerability rating, which describes the risk of P movement from the field as very low, low, medium, high or very high.

## Are there soil sampling requirements?

There are specific sampling requirements for soil samples used in the MMP. Soil samples must be taken at least once every four years and one sample must be taken for every 10 acres of a field. See the MMP rule for the complete soil sampling requirements. See ISU Extension publication Pm-287 "Take a Good Sample to Help Make Good Decisions," for more information on taking soil samples.

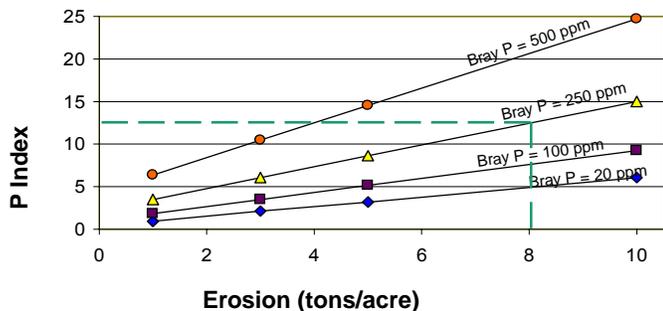
## What's needed to run the P index?

- Estimate of gross erosion (sheet and rill, ephemeral gully and classic gully).
- Distance from center of field to nearest perennial or intermittent stream.
- Recent soil P test results.
- Soil type.
- Rate and method of P application.
- Management system (tillage, crop rotation, conservation practices).

Managing erosion is the key way to reduce the P index on highly erodible fields. For example, using

Chart 1 below, if current erosion is eight tons per acre and soil tests show a Bray P of 250 ppm, the P index can be found to the left of the intersection of the dotted lines. In this example field, the P index will be 12.5.

**Chart 1. Impact of erosion and soil P on P Index**



By reducing erosion to 5 tons per acre, a producer can reduce the P Index to 8, using the same soil test results of Bray P equal to 250 ppm.

### How will the P index influence manure application rates in MMPs?

Manure application rates are based on the NRCS P index (site vulnerability rating) of each field. See Table 2 below.

**Table 2. Application Requirements based on P index**

P Index	Application Requirements
(0-2)	N-based manure management.
(>2-5)	N-based manure management but P application rate cannot exceed two times the P removal rate of the crop schedule.
(>5-10)	Until December 31, 2008, P-based manure management while adopting practices to reduce P index to 5 or below.
(>10)	No manure application until practices are adopted to reduce P index to 5 or below.

The DNR rule provides considerable flexibility for determining application rates unless a field greatly impacts water quality. See Table 3 for example fields. Producers will likely have the option of continuing to use nitrogen (N)-based manure application on many fields. However, even when planning manure applications based on N, producers should consider the effect that application rates will have on soil P concentrations. Over time, higher soil P concentrations may result in a higher P index, which could lead to application rate restrictions.

### What is a phosphorus-based application rate?

A P-based manure application rate replaces the P removed from the soil by a crop. A common miscon-

ception of P-based rates is that they drastically reduce application rates. This would be true if manure applications were limited to applying P only for the crop receiving the application. However, P can be applied for multiple crop years in a single application. This feature makes a P-based system easier to implement than producers may have anticipated.

Table 3 shows the effect of soil P concentrations and erosion on the P index in four hypothetical fields. Field A, with an optimum soil test and low erosion, has a low P index risk rating while field D, with a very high soil test and high erosion, has a high P index risk rating.

**Table 3. P index components on four hypothetical fields**

**Location:** Audubon County, center of field is 500 feet from a stream, C-slope of 5 to 9%, no buffer

Factors	Field A	Field B	Field C	Field D
Gross Erosion (Tons/A)	3	3	8	8
Bray 1-P (ppm)	20	200	20	200
Sediment Trap/SDR <sup>1</sup>	0.58	0.58	0.58	0.58
Buffer Factor	1.0	1.0	1.0	1.0
Enrichment	1.1	1.1	1.1	1.1
STP <sup>2</sup> Erosion	0.78	1.54	0.78	1.54
<b>Erosion</b>	<b>1.51</b>	<b>2.97</b>	<b>4.03</b>	<b>7.91</b>
Precipitation	7.4	7.4	7.4	7.4
Runoff	0.21	0.21	0.21	0.21
STP Runoff	0.15	1.05	0.15	1.05
<b>Run-off</b>	<b>0.23</b>	<b>1.61</b>	<b>0.23</b>	<b>1.61</b>
Flow	0.1	0.1	0.1	0.1
Precipitation	7.4	7.4	7.4	7.4
STP Drainage	0.07	0.2	0.1	0.2
<b>Subsurface<sup>3</sup></b>	<b>0.07</b>	<b>0.15</b>	<b>0.07</b>	<b>0.15</b>
<b>P index</b>	<b>1.81</b>	<b>4.73</b>	<b>4.33</b>	<b>9.67</b>
<b>P index Risk Rating</b>	<b>Low</b>	<b>Medium</b>	<b>Medium</b>	<b>High</b>

### Where can I find more information on the P index?

The Iowa P index calculator (an Excel spreadsheet), the RUSLE2 soil loss calculator, a list of technical service providers who can run the P index for producers and information about the Iowa P index are available on the Iowa Natural Resources Conservation Service's Web site, [www.ia.nrcs.usda.gov](http://www.ia.nrcs.usda.gov). A copy of the MMP rule is available in Appendix A of the MMP form, [www.iowadnr.com/afo/forms.html](http://www.iowadnr.com/afo/forms.html), DNR form number 542-4000.

1. SDR is the sediment delivery ratio
2. STP is the soil test P
3. Subsurface drainage includes tile and soil drainage