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PHOSPHORUS ASSESSMENT TOOL For Texas

BACKGROUND AND INTRODUCTION

Phosphorus (P) is an essential element for plant and animal growth and has long been recognized as necessary to maintain optimum agricultural production. Phosphorus inputs can also increase the biological productivity of surface waters by accelerating eutrophication. Eutrophication is the natural aging of lakes or streams brought on by nutrient enrichment. Phosphorus enrichment can come from any number of sources; however, agricultural non-point sources are currently receiving much attention. The amount of phosphorus contribution to surface water from agricultural sources is dependent on a number of factors.

A simple P index was developed by the U.S. Department of Agriculture, Agricultural Research Service, in cooperation with several research scientists, as a screening tool for use by field staffs, watershed planners, and farmers to rank the vulnerability of fields as sources of P loss in surface runoff. This Index was first published for NRCS use in the South National Technical Center publication, *Engineering Technical Note 1901, A Phosphorus Assessment Tool*, August 1994.

The index accounts for and ranks transport and source factors controlling P loss in surface runoff and predicts where the risk of P movement is expected to be higher than that of others. Each site characteristic affecting P loss is weighted according to the assumption that certain characteristics have a relatively greater effect on potential P loss than others do. This index was modified to establish a P Index for East Texas and a P Index for West Texas, see **Figure 1**. NRCS and Extension Service specialists in Texas developed the P indices discussed in this Technical Note.

An assessment of site vulnerability to P loss in surface runoff is made by selecting the rating value for each site characteristic from the P index. Each rating is multiplied by the appropriate weighting factor. The P index value for the site is the sum of weighted values of all site characteristics, which can then be used to categorize the site's vulnerability to P loss (**Table 1 and Table 2**).

PURPOSE

The P index is a tool for field personnel to identify agricultural areas or practices that have the greatest potential to accelerate eutrophication. It can be used to identify management options available to land users and will allow them flexibility in developing field specific remedial strategies. The first step is to determine the P index for each field and prioritize the efforts needed to reduce P losses. Then, management options appropriate for soils with different P index ratings and critical P buildup levels can be implemented. Refer to “P Vulnerability Class Ratings Described” for general guidance for management of fields according to P Index Classification. P management is very site specific and requires a well-planned, coordinated effort among farmers, extension agronomists, and soil conservation specialists.

SITE CHARACTERISTICS

The site characteristics fall into two main categories, source factors and transport factors. These factors can have an influence on phosphorus availability, retention, management, and movement. The P Index is a simple 8 by 5 matrix that relates site characteristics with a range of value categories.

Field specific data for the 8 site characteristics of the P Index can be collected and readily interpreted at the field level. The producer must provide soil and organic material test results in order to determine their rating levels. This soil and material analyses are considered essential as a basis for the assessment.

Each site characteristic is rated **VERY LOW, LOW, MEDIUM, HIGH, or VERY HIGH**, by determining the range for each category.

DEFINITIONS

The definitions of each of the 8 site characteristics are:

Soil Test P Level

The soil test P rating used in the P Index is based on the ***Mehlich III by inductively coupled plasma (ICP)*** method recommended by the Texas A&M AgriLife Extension Soil, Water and Forage Testing Laboratory (SWFTL). The soil samples will be collected according to SWFTL guidelines in the current Texas NRCS Nutrient Management Standard. **NOTE:** If the soil testing is being completed as part of a Texas Commission on Environmental Quality (TCEQ) permit requirement, the soil samples must be collected and analyzed as stated in the permit requirement.

The soil test level for "available P" does not ascertain the total P in the surface soil. It does, however, give an indication of the amount of total P that should be available for crop uptake.

DEFINITIONS continued

Fertilizer Phosphorus (P₂O₅) Application Rate

The Phosphorus fertilizer application rate is the amount, in pounds per acre per year (lbs/ac/yr), of phosphorus as P₂O₅ from commercial sources that is applied to the soil. The rate ranges from an application of zero to greater than 150 lbs/ac/yr P₂O₅.

Organic Phosphorus (P₂O₅) Application Rate

The P organic application rate is the nutrient amount, in pounds per acre per year (lbs/ac/yr), of phosphorus as P₂O₅ from organic sources (manure, poultry litter, lagoon effluent, biosolids, etc.) that is applied to the soil. The rate ranges from application of zero to greater than 150 lbs/ac/yr P₂O₅.

Organic P and Fertilizer P Source Application Method and Timing

The manner in which organic and/or commercial P material is applied to the soil and the time of year or length of time that the material is exposed on the soil surface until crop utilization can affect potential P movement. The date ranges in the “Medium” through “Very High” categories of the East Texas Index (**Table 1**) are based on the average intensity, duration, frequency, and quantity of rainfall in the region. Due to the somewhat less predictable timing and the lower quantity of rainfall in West Texas, the application factors are primarily based on the duration of time the materials are on the surface before crop utilization (**Table 2**). Regardless of the methodology, the function of this factor in the P index is to differentiate between periods of higher and lower potential for surface loss within the year.

Incorporation implies that the organic P material is plowed below the soil surface at >2 inches. If the material is not incorporated within 48 hours, the application will be rated according to whichever higher category is appropriate. However, if using effluent with less than 2% solids (applied through a center pivot or big gun), the *Organic Phosphorus Source Application and Timing*, would be considered equivalent to “Placed deeper than 2 inches or broadcast and incorporated within 48 hours”. If using effluent with 2% or more solids, not followed up with clear, or not diluted to less than 2% solids, the *Organic Phosphorus Source Application and timing*, would be considered as solid application and selection of any other application method and timing that best fits the situation. The value categories of increasing severity, ranging from no application to surface applied during the period of the year when rainfall intensity, frequency, and duration is highest in East Texas. Or, in the case of West Texas, greater than 4 months before there will be a crop planted to utilize the applied material.

Proximity of Nearest Field Edge to Named Stream or Lake

This factor considers the flow distance from the edge of application in a field to the nearest named stream or water body, which would normally receive overland flow from the

DEFINITIONS continued

application area. The term “named stream or water body” means any named stream or water body on a USGS Topographic Map or USDA/NRCS Soil Survey Sheet. The closer the application area is to a named stream or water body, the higher the parameter category’s value. These values should also consider the local topography, i.e., a named stream or water body in a different watershed, separated from the application by a natural or man-made levee, or for whatever reason cannot receive runoff from the application area of a particular field, would not be considered during the assessment of this field. Minimum set-back distances should be considered during this assessment. A lower value may be attained for an application area, if the producer agrees to set-back application further from a named stream or water body than minimums required by the TX NRCS 590 Standard or State regulations. All set-back locations will be noted on the application area map.

Soil Erosion

Soil erosion is defined as the loss of soil along the slope or unsheltered distance caused by the processes of water and wind. Soil erosion is estimated from current erosion prediction models; i.e., Revised Universal Soil Loss Equation 2 (RUSLE2), for water erosion and Wind Erosion Equation, WEQ, for wind erosion. The value category is given in tons of soil loss per acre per year (ton/acre/year). These soil loss prediction models do not predict sediment transport and delivery to a water body. The prediction models are used in this index to indicate a movement of soil, thus potential for sediment and attached phosphorus movement across the slope or unsheltered distance and toward a water body.

Runoff Class

The runoff class is the runoff potential of soluble P moving from locations of placement. The runoff class of the site can be determined from the runoff curve number for the field and slope measurements in the field. Guidance in determining the runoff curve number can be attained from Texas Engineering Technical Note, [*“Hydrology 210-18-TX5, Estimating Runoff for Conservation Practices, 10/90.”*](#) **Table 3** depicts the relationship between the predominant percent slope of the field and the runoff curve. The results of using the matrix relating slope and runoff curve number provides the value categories: NEGLIGIBLE, LOW, MEDIUM, HIGH, and VERY HIGH. **Table 4** contains a partial listing of runoff curve value that may be used for the P index.

PROCEDURES FOR MAKING AN ASSESSMENT

The site characteristics have been assigned weighting based on the reasoning that particular site characteristics may be more prominent than others in allowing potential phosphorus movement from the site. There is scientific basis for concluding that these

relative differences exist; however, the absolute weighting factors given are based currently on professional judgment. The site characteristic weighting factors are:

- Soil Test P Level (1.0)
- Fertilizer Phosphorus Application Rate (0.75)
- Organic Phosphorus Application Rate (0.75)
- Fertilizer Phosphorus Application Method and Timing (0.50)
- Organic Phosphorus Source Application Method and Timing (0.50)
- Proximity of Field Edge to Named Stream or Lake (1.25)
- Runoff Class (1.0)
- Soil Erosion (1.5)

The value categories are rated using a log base of 2. The greater ratings, the proportionally higher are the values. The higher the value, the higher potential for significant problems related to phosphorus movement.

The column value ratings are:

- 0 = None or very low
- 1 = Low
- 2 = Medium
- 4 = High
- 8 = Very high

Table 1 or **Table 2** for East Texas or West Texas respectively can be used to record the values from the index for a specific field. To make an assessment using the P Index, select a rating value for each site characteristic using the information in the appropriate Table for either East or West Texas. The values in the tables are the result of multiplying the site characteristic weighting factor by the column value to get the weighted value for that characteristic. Proceed to rate and factor each characteristic of the index. Sum the weighted values for all 8 characteristics to determine the Phosphorus Index Classification. A description of each P Index classification is given to describe the P runoff potential for a given field. The P Vulnerability Class is then related to the Critical Soil Test P Level. There are 2 sets of these values for both East and West Texas, one for non-impaired watersheds and one for impaired watersheds. The sampling and testing guidelines for the critical P level are as stated in definition section of this document for soil test P level. An impaired watershed for the purposes of the P Index is defined as one for which a TMDL for agricultural non-point source nutrients has been or is being developed. **Once a field reaches the critical soil test P level listed for a given P index classification class no further P application is recommended until the soil test P level is below the critical level or index factors are modified to result in a lower P index classification rating (if applicable).**

Special Note: When phosphorus risk assessment results equate to HIGH or VERY HIGH risk, additional phosphorus and potassium may be applied according to **APPENDIX 5, Table 1** or **Table 2** if the following requirements are met:

- a soil phosphorus drawdown strategy has been implemented, and
- a site assessment for nutrients and soil loss has been conducted to determine if mitigation practices are required to protect water quality.
- any deviation from these high risk requirements must have the approval of the Chief of the NRCS.

There is a point above which the risk of phosphorus loss from a field is too great to warrant additional application of phosphorus for plant production. When soil test phosphorus levels are greater than or equal to 500 ppm, with a P-Index rating of “HIGH” or “VERY HIGH”, there will be no additional application of phosphorus to a CMU or field.

There is a TX P Index spreadsheet available to automate the evaluation. The P Index has also been incorporated into the current version of the TX 590 Organic Nutrient Management Plan. These and other waste utilization and nutrient management tools can be downloaded from [The Texas Nutrient Management Website](#).

INTERPRETATIONS OF SITE VULNERABILITY RATINGS FOR THE P INDEX

P Runoff Potential Described

VERY LOW OR LOW - This site has a VERY LOW OR LOW potential for P movement from the site. If farming practices are maintained at current level, the probability of an adverse impact to surface water resources from P losses from this site would be very low or low. The non-impaired Critical soil test P for this P index classification is 500 ppm, and the impaired is 300 ppm.

MEDIUM - This site has a MEDIUM potential for P movement from the site. The probability for an adverse impact to surface water resources is greater than that from a LOW vulnerability rated site. Some remedial action should be taken to lessen the probability of P movement. The non-impaired Critical soil test P for this P index classification is 400 ppm, and the impaired is 250 ppm.

HIGH- This site has a HIGH potential for P movement from the site. There is a high probability for an adverse impact to surface water resources unless remedial action is taken. Soil and water conservation as well as phosphorus management practices are necessary to reduce the risk of P movement and probable water quality degradation. The non-impaired Critical soil test P for this P index classification is 300 ppm, and the impaired is 200 ppm.

VERY HIGH - This site has a VERY HIGH potential for P movement from the site. The probability for an adverse impact to surface water resources is very high. Remedial action is required to reduce the risk of P movement. All necessary soil and water

conservation practices plus a phosphorus management plan must be put in place to reduce the potential of water quality degradation. The non-impaired Critical soil test P for this P index classification is 200 ppm, and the impaired is 200 ppm.

The critical P levels stated above are intended to provide general guidance, and are based on the best professional judgment of those involved in the production of the Texas P Index. These critical P levels must not be confused with critical soil test P levels as used in soil testing, or those used in TCEQ rules and regulations.

PRECAUTIONS IN THE USE OF THE PHOSPHORUS INDEX

The Phosphorus Index is an assessment tool intended to be used by planners and land users to assess the risk that exists for phosphorus leaving the landform site and travelling toward a water body. It also can be used to identify the critical parameters of soil, topography, and management that most influence the movement. Using these parameters, the index then can help the selection of management alternatives that would significantly address the potential impact and reduce the risk. The index is intended to be part of the planning process that takes place between the land user and resource planner. It can be used to communicate the concept, process, and results that can be expected if various alternatives are used in the management of the natural resources at the site. THE PHOSPHORUS INDEX IS NOT INTENDED TO BE AN EVALUATION SCALE FOR DETERMINING WHETHER LANDUSERS ARE ABIDING WITHIN WATER QUALITY OR NUTRIENT MANAGEMENT STANDARDS THAT HAVE BEEN ESTABLISHED BY LOCAL, STATE, OR FEDERAL AGENCIES. Any attempt to use this index as a regulatory scale would be grossly beyond the intent of the assessment tool and the concept and philosophy of the working group that developed it. As discussed in this technical note, this Phosphorus Index has been adapted to local conditions by a process of regional adaptations of the site characteristic parameters. This local development involved those local and state agencies and resource groups that are concerned with the management of phosphorus. After the index was adapted to Texas, it was tested by the development group to assure that the assessments are giving valid and reasonable results for each region.

References

1. Sharpley, A.N., T. Daniel, T. Sims, J. Lemunyon, R. Steven, and R. Parry. 1999. Agricultural Phosphorus and Eutrophication. U.S. Department of Agriculture, Agricultural Research Service, ARS-149, 42 pp.
2. Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agricultural Handbook No. 703, 404 pp.

3. Anonymous. 1994. A Phosphorus Assessment Tool. U.S. Department of Agriculture, Soil Conservation Service, South National Technical Center Engineering Technical Note No. 1901, 15 pp.
4. Anonymous. 1990. Estimating Runoff for Conservation Practices. 1990. U.S. Department of Agriculture, Soil Conservation Service, Texas Engineering Technical Note on Hydrology No. 210-18-TX5, 47 pp.

TABLE 1. PHOSPHORUS INDEX WORKSHEET FOR EAST TEXAS

| PHOSPHORUS INDEX WORKSHEET for East Texas | | | | | | |
|--|--|--|---|--|--|-----------|
| Client Name: | | Field(s): | | | Date: | |
| Planner: | | Location: | | | Crop: | |
| Impaired Watershed (Y or N): | | Runoff Curve No.: | | | % Slope: | |
| Site Characteristic (Weighting Factor) | [Weighting Factor Times the Column Factor] | | | | | Sub Total |
| | 0 | 1 | 2 | 4 | 8 | |
| Soil Test P Rating (1.00) | N/A [0] | Very Low – Low [1.0] | Moderate [2.0] | High [4.0] | Very High [8.0] | |
| Fertilizer Phosphorus (P₂O₅) Application Rate (0.75) | None Applied [0] | 1-40 lbs/ac P ₂ O ₅ [0.75] | 41-90 lbs/ac P ₂ O ₅ [1.5] | 91-150 lbs/ac P ₂ O ₅ [3.0] | >150 lbs/ac P ₂ O ₅ [6.0] | |
| Organic Phosphorus (P₂O₅) Application Rate (0.75) | None Applied [0] | 1-40 lbs/ac P ₂ O ₅ [0.75] | 41-90 lbs/ac P ₂ O ₅ [1.5] | 91-150 lbs/ac P ₂ O ₅ [3.0] | >150 lbs/ac P ₂ O ₅ [6.0] | |
| Phosphorus Fertilizer Application Method and Timing (0.50) | None Applied [0] | Placed deeper than 2 in. or broadcast and incorporated within 48 hours [0.50] | Surface applied 12/1-2/15 [1.0] | Surface applied 2/16-4/15 or 6/16-11/30 [2.0] | Surface Applied 4/16-6/15 [4.0] | |
| Organic Phosphorus source Application Method and Timing (0.50) | None Applied [0] | Placed deeper than 2 in. or broadcast and incorporated within 48 hours [0.50] | Surface applied 12/1-2/15 [1.0] | Surface applied 2/16-4/15 or 6/16-11/30 [2.0] | Surface Applied 4/16-6/15 [4.0] | |
| Proximity of nearest field edge to named stream or lake (1.25) | > 2000 feet [0] | 1000 – 1999 feet [1.25] | 500 – 999 feet [2.5] | 100 – 499 feet [5.0] | < 100 feet [10.0] | |
| Runoff Class (Runoff Class Table 3) (1.00) | Negligible [0] | Low [1.0] | Moderate [2.0] | High [4.0] | Very High [8.0] | |
| Soil Erosion (all sources) (1.50) | Very Low <1 t/ac [0] | Low 1-3 t/ac [1.5] | Medium 3-5 t/ac [3.0] | High 5-10 t/ac [6.0] | Very High >10 t/ac [12.0] | |
| Total Index Points: | | | | | | |

| Phosphorus Index Classification – East Texas | | | |
|--|--------------------|-------------------------------------|---------------------------------|
| Index Pts. | P Runoff Potential | Non-impaired Critical P Level (ppm) | Impaired Critical P Level (ppm) |
| < 12 | Very Low - Low | 500 | 300 |
| 12 – 22.75 | Medium | 400 | 250 |
| 23 - 32 | High | 300 | 200 |
| > 32 | Very High | 200 | 200 |

*If using effluent with less than 2% solids (applied through a center pivot), the Organic Phosphorus Source Application and Timing, would be considered equivalent to “Placed deeper than 2 inches or broadcast and incorporated with 48 hours”. If using effluent with 2% or more solids, not followed up with clear irrigation water, or not diluted to less than 2% solids, the Organic Phosphorus Source Application and Timing, would be considered as any other non-incorporated surface application.

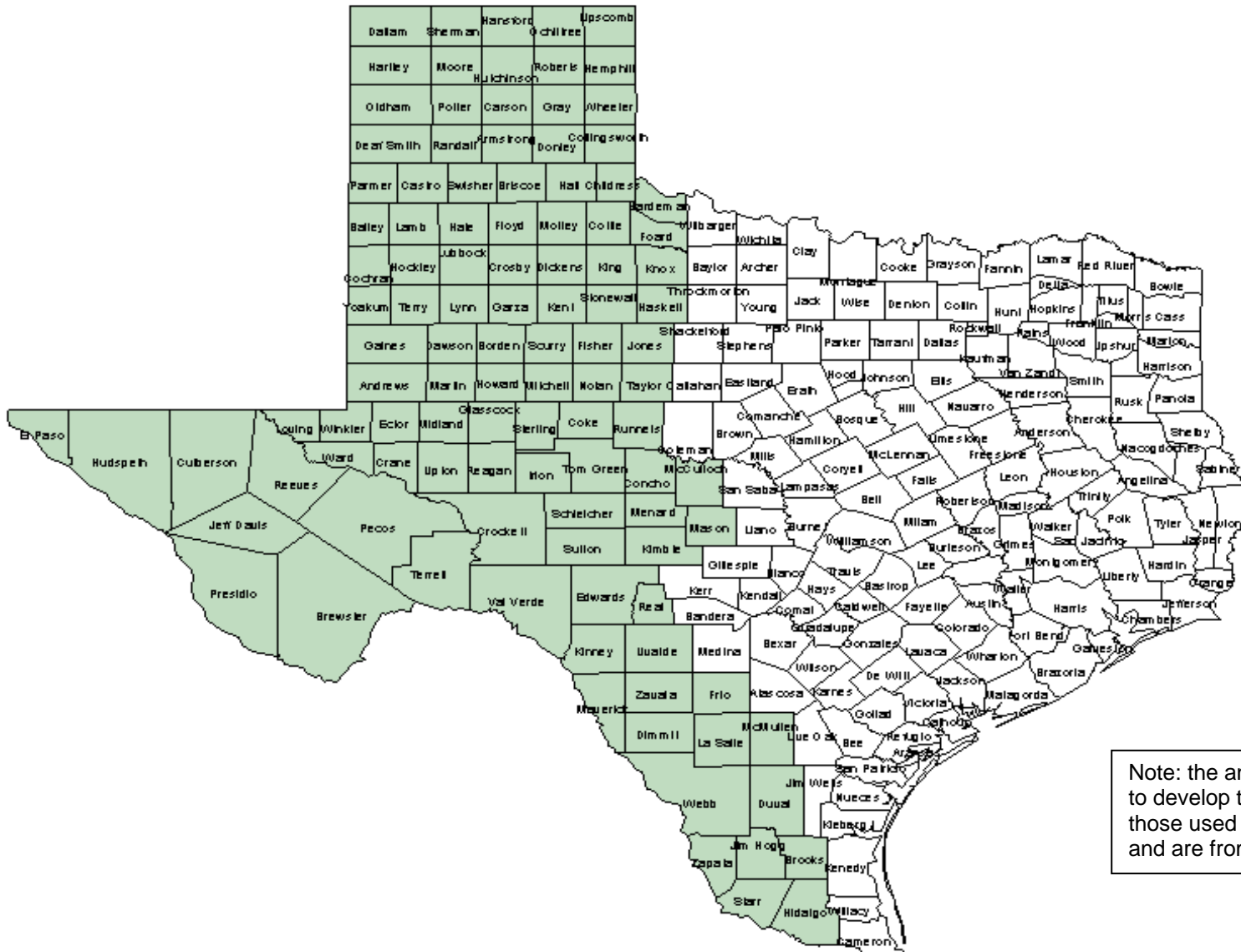
TABLE 2. PHOSPHORUS INDEX WORKSHEET FOR WEST TEXAS

| PHOSPHORUS INDEX WORKSHEET for West Texas | | | | | | |
|---|--|---|---|---|--|--------------|
| Client Name: Planner: | | Field(s): Location: | | Date: Crop: | | |
| Impaired Watershed (Y or N): | | Runoff Curve No.: | | % Slope: | | |
| Site Characteristic (Weighting Factor) | [Weighting Factor Times the Column Factor] | | | | | Sub Total |
| | 0 | 1 | 2 | 4 | 8 | |
| Soil Test P Rating (1.00) | N/A [0] | Very Low – Low [1.0] | Moderate [2.0] | High [4.0] | Very High [8.0] | |
| Fertilizer Phosphorus (P ₂ O ₅) Application Rate (0.75) | None Applied [0] | 1-40 lbs/ac P ₂ O ₅ [0.75] | 41-90 lbs/ac P ₂ O ₅ [1.5] | 91-150 lbs/ac P ₂ O ₅ [3.0] | >150 lbs/ac P ₂ O ₅ [6.0] | |
| Organic Phosphorus (P ₂ O ₅) Application Rate (0.75) | None Applied [0] | 1-40 lbs/ac P ₂ O ₅ [0.75] | 41-90 lbs/ac P ₂ O ₅ [1.5] | 91-150 lbs/ac P ₂ O ₅ [3.0] | >150 lbs/ac P ₂ O ₅ [6.0] | |
| Phosphorus Fertilizer Application Method and Timing (0.50) | None Applied [0] | Placed deeper than 2 in. or broadcast and incorporated within 48 hours [0.50] | Incorporated immediately before planting [1.0] | Incorporated >4 months before planting, or surface applied < 4 months before planting [2.0] | Surface applied >4 months before planting [4.0] | |
| Organic Phosphorus source Application Method and Timing (0.50) | None Applied [0] | Placed deeper than 2 in. or broadcast and incorporated within 48 hours [0.50] | Incorporated immediately before planting [1.0] | Incorporated >4 months before planting, or surface applied < 4 months before planting [2.0] | Surface applied >4 months before planting [4.0] | |
| Proximity of nearest field edge to named stream or lake (1.25) | > 2000 feet [0] | 1000 – 1999 feet [1.25] | 500 – 999 feet [2.5] | 100 – 499 feet [5.0] | < 100 feet [10.0] | |
| Runoff Class (Runoff Class Table 3) (1.00) | Negligible [0] | Low [1.0] | Moderate [2.0] | High [4.0] | Very High [8.0] | |
| Soil Erosion (all sources) (1.50) | Very Low <1 t/ac [0] | Low 1-3 t/ac [1.5] | Medium 3-5 t/ac [3.0] | High 5-10 t/ac [6.0] | Very High >10 t/ac [12.0] | |
| Total Index Points: | | | | | | |

| Phosphorus Index Classification – West Texas | | | |
|--|-----------------------|---|------------------------------------|
| Index Pts. | P Runoff Potential | Non-impaired Critical P Level (ppm) | Impaired Critical P Level (ppm) |
| < 15 | Very Low - Low | 500 | 300 |
| 15 – 24.75 | Medium | 400 | 250 |
| 25 - 35 | High | 300 | 200 |
| > 35 | Very High | 200 | 200 |

*If using effluent with less than 2% solids (applied through a center pivot), the Organic Phosphorus Source Application and Timing, would be considered equivalent to “Placed deeper than 2 inches or broadcast and incorporated with 48 hours”. If using effluent with 2% or more solids, not followed up with clear irrigation water, or not diluted to less than 2% solids, the Organic Phosphorus Source Application and Timing, would be considered as any other non-incorporated surface application.

Figure 1 – East / West Map of Texas for P Index



Note: the annual rainfall values used to develop this map are the same as those used in the N Leaching Index and are from USDA / NRCS sources.

Table 3 Runoff Class Based on Field Slope and Runoff Curve Number

| Slope % | Runoff Curve Number | | | | |
|---------|---------------------|----------|---------|----------|------|
| | <50 | 50 to 60 | 60 - 70 | 70 to 80 | > 80 |
| < 1 | N | N | N | N | M |
| 1 to 2 | N | N | VL | L | M |
| 2 to 4 | N | N | L | M | H |
| 4 to 8 | N | VL | M | H | VH |
| 8 to 16 | VL | L | M | VH | VH |
| > 16 | VL | L | H | VH | VH |

Refer to Texas NRCS Engineering Technical Note - Hydrology, No. 210-18-TX5, *Estimating Runoff for Conservation Practices - 10/90* for information on runoff curve numbers.
 Estimating Runoff for Conservation Practices - 10/90 for information on runoff curve numbers.

N = Negligible, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High

Table 4 - Partial Listing of Curve Numbers 1/

| Cover Type | Hydrologic Condition <u>2/</u> | Soil Hydrologic Group | | | |
|--------------------------------------|--------------------------------|-----------------------|----|----|----|
| | | A | B | C | D |
| Pasture | poor | 68 | 79 | 86 | 89 |
| | fair | 49 | 69 | 79 | 84 |
| | good | 39 | 61 | 74 | 80 |
| Hayland not grazed | | 30 | 58 | 71 | 78 |
| Fallow - bare soil | | 77 | 86 | 91 | 94 |
| Fallow w/crop residue (CR) | poor | 76 | 85 | 90 | 93 |
| | good | 74 | 83 | 88 | 90 |
| Row Crop - Straight Row | poor | 72 | 81 | 88 | 91 |
| | good | 67 | 78 | 85 | 89 |
| Row Crop - Straight Row + CR | poor | 71 | 80 | 87 | 90 |
| | good | 64 | 75 | 82 | 85 |
| Row crops contoured & terraced | poor | 66 | 74 | 80 | 82 |
| | good | 62 | 71 | 78 | 81 |
| Small grain - Straight Row | poor | 65 | 76 | 84 | 88 |
| | good | 63 | 75 | 83 | 87 |
| Small grain - Straight Row + CR | poor | 64 | 75 | 83 | 86 |
| | good | 60 | 72 | 80 | 84 |
| Small grain - Contoured and terraced | poor | 61 | 72 | 79 | 82 |
| | good | 59 | 70 | 78 | 81 |

Table 4 - Partial Listing of Curve Numbers 1/ - continued

| Cover Type | Hydrologic Condition 2/ | Soil Hydrologic Group | | | |
|--|-------------------------|-----------------------|----|----|----|
| | | A | B | C | D |
| Drilled or broadcast legumes, rotational meadow - contoured & terraced | poor | 63 | 73 | 80 | 83 |
| | good | 51 | 67 | 76 | 80 |

1/ All curve numbers shown assume average runoff conditions.

Refer to Texas NRCS Engineering Technical Note - Hydrology, No. 210-18-TX5

Estimating Runoff for Conservation Practices - 10/90

for information on runoff curve numbers.

2/ For **pasture** the hydrologic condition is interpreted as follows:

Poor: <50% ground cover or heavily grazed with no mulch

Fair: 50 - 70% ground cover not heavily grazed

Good: >70% ground cover and lightly or occasionally grazed

2/ For **cropland** the hydrologic condition is based on a combination of factors that effect infiltration and runoff:

- a) Density and canopy of vegetative areas
- b) Amount of year-round cover
- c) Amount of grass or close seeded crops in the rotation
- d) Percent residue cover (good > or = 20%)
- e) Degree of surface roughness

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average or better infiltration and tend to decrease runoff.

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