

Kansas Technical Standards for Nutrient Management – Revised 2010

All concentrated animal feeding operations (CAFOs) in the State of Kansas are required to develop and implement an approved nutrient management plan (NMP) as a condition of National Pollutant Discharge Elimination System (NPDES) Permit coverage. The following technical standards for nutrient management were developed in accordance with 40 CFR 412.4(c)(2) and are intended to comply with the Environmental Protection Agency's (EPA's) 2008 Final Rule for CAFOs. All CAFOs in the State of Kansas must follow these technical standards when land applying livestock manure, litter, compost, or process wastewater.

According to EPA's 2008 Final Rule, facilities must choose to follow either the "linear" or "narrative rate" approach for determining application rates. Development of the NMP is similar under either approach; however the terms of the NMP will be enforced differently. Under the linear approach, for each of the next five years the intended crop(s) to be planted, the timing and method of nutrient applications, and the resulting pounds of nitrogen and phosphate to be applied shall be considered terms of the permit and shall be adhered to as specified in the NMP. Under the narrative approach, the methodology for determining application rates in accordance with this technical standard shall be outlined in the NMP and adhered to as a term of the permit. The narrative approach is intended to allow the producer to adjust application rates based on real-time inputs rather than five-year projections, with Annual Reporting requirements providing documentation that the methodology was correctly followed.

Example NMPs found at the website listed below have been developed to assist facility owners/operators, technical service providers, and consultants in designing and implementing a Nutrient Management Plan (NMP) that meets EPA's revised regulatory requirements. Submit three paper copies of the NMP to the address listed below, and include an electronic copy on CD, if available. For questions or comments, contact the Kansas Department of Health and Environment (KDHE) Livestock Waste Management Section.

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Non-swine CAFOs:

1. Manure, litter, compost, and process wastewater shall be analyzed a minimum of once annually for total nitrogen, organic nitrogen, ammonium-nitrogen, phosphorus, and moisture content. Samples shall be obtained and handled according to [Midwest Plan Service Publication MWPS-18, Manure Management Systems Series, Section 1 "Manure Characteristics"](#) or other similar methods. Testing shall be conducted by an approved laboratory using analytical procedures similar to those outlined in the ["Recommended Methods of Manure Analysis" \(A3769\)](#).
2. Each field shall have a surface soil test taken within 12 months prior to the first year of a new plan, and thereafter a minimum of every three years, when the field is used for land application of manure, litter, or process wastewater. If manure, litter, or process wastewater is applied two or more consecutive years, annual testing is required. Profile soil samples shall be taken within 12 months prior to any land application of manure, litter, or process wastewater. Soil

samples shall be collected and prepared according to the [Kansas State University Extension Publication MF-734 \(revised\)](#), or other similar method. Testing shall be conducted by an approved laboratory using analytical procedures similar to those referenced in the [“Recommended Chemical Soil Test Procedures for the North Central Region” \(NCR-221\)](#). Soil sampling areas typically shouldn't exceed 80 acres; however, results may be averaged for purposes of determining field scale nutrient budgets and fertilizer application rates. Justification for any soil sampling areas greater than 80 acres shall be documented. A certification of the location and number of representative cores collected from the field shall be submitted with each soil test (Appendix A). A representative number of cores shall be taken from each area by either of the following methods:

- a. Soil sample cores shall be taken to a depth of 24 inches. The top 6 to 8 inches of each core shall be combined to obtain a surface sample. The remaining portions of each core shall be combined to obtain a profile sample. The surface sample shall be tested for organic matter, pH, phosphorus, potassium, and nitrate-N. The profile sample shall be tested for nitrate-N.
 - b. Surface and profile samples shall be obtained from separate cores. Surface sample cores shall be taken to a depth of 6 to 8 inches and shall be tested for organic matter, pH, phosphorus, and potassium. Profile soil sample cores shall be taken to a depth of 24 inches and shall be tested for nitrate-N.
3. An assessment of the risk of phosphorus loss and corresponding maximum allowable application rate limitations shall be determined for each field as follows (Refer to Table 1, “Basis for Nutrient Application Rates for Livestock Manure” found in Appendix C for more information):
- a. For surface soil test results from 0 – 50 ppm P using the Bray-1 or Mehlich-3 tests (or 0 – 33 ppm P using the Olsen test), the risk assessment for the field shall be considered “Low”. Application rates for legume crops shall not exceed agronomic phosphorus requirements or 1.5 times the estimated crop phosphorus removal if there is no agronomic phosphorus requirement.
 - b. For surface soil test results from 51 – 150 ppm P using the Bray-1 or Mehlich-3 tests (or 34 – 100 ppm P using the Olsen test), the risk assessment for the field shall be considered “High” and application rates for all crops shall not exceed the estimated crop phosphorus removal, unless a Kansas Phosphorus Index assessment demonstrates a “Very Low”, “Low”, or “Medium” risk, in which case, application rates for all crops shall not exceed 1.5 times the estimated crop phosphorus removal. Copies of the Kansas Phosphorus Index and supporting tables are included in Appendix B.
 - c. For surface soil test results from 151 – 200 ppm P using the Bray-1 or Mehlich-3 tests (or 101 – 133 ppm P using the Olsen test), the risk assessment for the field shall be determined using the Kansas Phosphorus Index. If the Kansas Phosphorus Index assessment demonstrates a “Very Low”, “Low”, or “Medium” risk, application rates for all crops shall not exceed 1.5 times the estimated crop phosphorus removal. Livestock waste application shall not be allowed if the Kansas Phosphorus Index assessment demonstrates a “High” or “Very High” risk.
 - d. For surface soil test results greater than 200 ppm P using the Bray-1 or Mehlich-3 tests (or greater than 133 ppm P using the Olsen test), the risk assessment for the field shall be determined using the Kansas Phosphorus Index. If the Kansas Phosphorus Index assessment demonstrates a “Very Low”, “Low”, or “Medium” risk, application rates for all

crops shall not exceed the estimated crop phosphorus removal. Livestock waste application shall not be allowed if the Kansas Phosphorus Index assessment demonstrates a "High" or "Very High" risk.

4. An assessment for the risk of loss of nitrogen shall be determined for each field using the NRCS County Soil Leaching Potential Index Report, which can be found in Section 2 of the [NRCS electronic Field Office Technical Guide](#). For areas of high leaching potential, best management practices shall be included that will minimize nitrogen leaching losses whenever possible.
5. The intended crop(s) to be planted or other uses (i.e. fallow) shall be specified for each field, for each year of Permit coverage, with corresponding realistic yield goals and estimated nutrient requirements. Facilities choosing the "narrative" approach may include for each field a list of alternative crops that may be planted, along with corresponding realistic yield goals and estimated nutrient requirements. Estimated crop nitrogen and phosphorus requirements shall be determined using [Kansas State University Extension Publication MF-2586, Soil Test Interpretations and Fertilizer Recommendations](#); estimated crop nutrient removal rates as described in [Chapter 6 of the National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook \(NEH – Part 651, AWMFH\)](#); and/or other equivalent databases or publications approved by the Department. Alternatively, nitrogen and phosphorus requirements may be estimated using the facility's plant tissue analysis records, in which case the methods for plant sampling and estimating nutrient requirements must be properly documented and approved by the Department.
6. During any crop year, total nitrogen applications from both organic and inorganic fertilizers shall not exceed the nitrogen requirement of the crop(s), with adjustments made for any nitrogen in the field that will be plant-available. Adjustments for plant-available nitrogen in the field shall include credits for profile soil test nitrogen, but may also include credits for organic matter mineralization, past manure applications, previous crops, and/or irrigation water. The following sources shall be used to estimate field nitrogen credits: [Kansas State University Extension Publication MF-2586, Soil Test Interpretations and Fertilizer Recommendations; Chapters 6 and 11 of the NEH – Part 651, AWMFH](#); and/or other equivalent databases or publications approved by the Department.
7. Agronomic phosphorus requirements and estimated crop phosphorus removal rates shall be determined using [Kansas State University Extension Publication MF-2586, Soil Test Interpretations and Fertilizer Recommendations; Chapters 6 and 11 of the NEH – Part 651, AWMFH](#); and/or other equivalent databases or publications approved by the Department. If application rates are phosphorus based, rates may be equal to the estimated crop phosphorus removal for multiple years provided the following conditions are met:
 - a. Rates shall not exceed the recommended nitrogen application rate during the year of application, or the estimated crop nitrogen removal during the year of application if there is no recommended nitrogen application.
 - b. During any single year, rates shall not exceed five times the one-year phosphorus application rate in watersheds not impaired by nutrients, or three times the one-year phosphorus application rate in nutrient impaired watersheds. Nutrient impaired watersheds shall be determined based upon either current [Total Maximum Daily Loads \(TMDL\) or waters listed on the current Kansas 303\(d\) list of impaired waters](#).
8. Livestock waste application rates shall be determined using the most recent waste sample test results and shall be calculated based upon the plant-available fraction of nutrients in the waste.

Plant-available nutrients in the waste shall be determined using [Kansas State University Extension Publication MF-2562, Estimating Manure Nutrient Availability](#); Chapter 11 of the [NEH – Part 651, AWMFH](#); and/or other equivalent databases or publications approved by the Department. In planning for new facilities, “book values” for livestock waste nutrient content may be used for initial NMP development, but must be from an approved source such as the [Midwest Plan Service Publication MWPS-18, Manure Management Systems Series, Section 1 “Manure Characteristics”](#), Chapter 4 of the [NEH – Part 651, AWMFH](#), or [American Society of Agricultural and Biological Engineers Standard D384.2, “Manure Production and Characteristics”](#).

9. Unless the CAFO exercises an approved compliance alternative, manure, litter, compost, and process wastewater may not be applied closer than 100 feet to any down-gradient surface water, open tile line intake structure, sinkhole, agricultural well head, or other conduits to surface water. The following items may be considered compliance alternatives if approved by the Department:
 - a. The CAFO may substitute the 100-foot setback with a 35-foot wide vegetative buffer on which applications of manure, litter, or process wastewater are prohibited.
 - b. The CAFO may demonstrate that a setback or buffer is not necessary because implementation of alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent or better than the reductions that would be achieved by the 100-foot setback.
10. Equipment and/or infrastructure used for land application of livestock waste shall be inspected and maintained to ensure proper operation. Land application equipment shall be calibrated annually to ensure accurate application rates using methods similar to those described in [Chapter 13 of the NEH – Part 651, AWMFH](#). Dates of all manure application equipment inspections shall be recorded. Land application events shall be monitored as appropriate to prevent discharges.
11. If the NMP cannot demonstrate that the facility controls a sufficient amount of acreage available for the disposal of process wastewater, written landowner agreements shall be obtained for fields utilized for land application of process wastewater that are not owned, rented, or leased by the facility. Written agreements shall permit the facility to apply process wastewater whenever necessary in order to maintain compliance with the facility’s permit. Fields available via wastewater agreement shall have surface soil samples taken annually and results shall be submitted to the Department with the Annual Report.
12. Any facility seeking a variance from the above standards shall submit to the department a written request for variance from the Kansas Technical Standards for Nutrient Management and shall provide any information relevant to the request. The request for variance may be granted if the proposal represents best management practices that meet or exceed the above standards in minimizing phosphorus and nitrogen losses to both surface waters and groundwater.

Swine CAFOs:

- S1. Manure, litter, compost, and process wastewater shall be analyzed a minimum of once annually for total nitrogen, organic nitrogen, ammonium-nitrogen, phosphorus, and moisture content. Samples shall be obtained and handled according to [Midwest Plan Service Publication MWPS-18, Manure Management Systems Series, Section 1 “Manure Characteristics”](#) or other similar methods. Testing shall be conducted by an approved

laboratory using analytical procedures similar to those outlined in the [“Recommended Methods of Manure Analysis” \(A3769\)](#).

- S2. Soil samples shall be collected and prepared according to Kansas Administrative Regulation (K.A.R.) 4-21-3, [“Soil Samples”](#). Testing shall be conducted by an approved laboratory in accordance with [K.A.R. 4-21-4, “Soil Tests”](#). A certification of the location and number of representative cores collected from the field shall be submitted with each soil test (Appendix A). Each field shall have a soil test taken within 12 months prior to the first year of a new plan.
- S3. An assessment for the risk of loss of nitrogen shall be determined for each field using the NRCS County Soil Leaching Potential Index Report, which can be found in Section 2 of the [NRCS electronic Field Office Technical Guide](#). For areas of high leaching potential, best management practices shall be included that will minimize nitrogen leaching losses whenever possible.
- S4. The intended crop(s) to be planted or other uses (i.e. fallow) shall be specified for each field, for each of the next five years, as well as corresponding realistic yield goals. Facilities choosing the “narrative” approach may include for each field a list of alternative crops that may be planted, along with corresponding realistic yield goals.
- S5. The potential risk for phosphorus loss shall be assessed for each field by determining the “Category” of the field as defined in the most recent version of the *Nutrient Utilization Plan Workbook* available from the Department:

| Average Annual Rainfall | Maximum Field Slope | Category |
|-------------------------|---------------------|----------|
| ≤ 22 inches | ≤ 5% | 1 |
| ≤ 22 inches | > 5% | 2 |
| 22 – 30 inches | ≤ 5% | 2 |
| 22 – 30 inches | > 5% | 3 |
| > 30 inches | Any slopes | 3 |

- S6. The “Category” and soil test P results shall be used to determine maximum allowable application rate limitations for each field. Resulting maximum allowable application rates of livestock waste shall not exceed the phosphorus holding capacity of the soil as described in [K.A.R. 4-21-7, “Exceeding the agronomic rate for phosphorus-holding capacity”](#), and shall be determined using the most recent version of the *Nutrient Utilization Plan Workbook* available from the Department.
- S7. In planning for new facilities, “book values” for livestock waste nutrient content may be used for initial NMP development, but must be from an approved source such as the [Midwest Plan Service Publication MWPS-18, Manure Management Systems Series, Section 1 “Manure Characteristics”, Chapter 4 of the NEH – Part 651, AWMFH](#), or [American Society of Agricultural and Biological Engineers Standard D384.2, “Manure Production and Characteristics”](#). If inorganic fertilizers are to be applied, waste application rates shall be adjusted accordingly.
- S8. Unless the CAFO exercises an approved compliance alternative, manure, litter, compost, and process wastewater may not be applied closer than 100 feet to any down-gradient surface water, open tile line intake structure, sinkhole, agricultural well head, or other conduits to

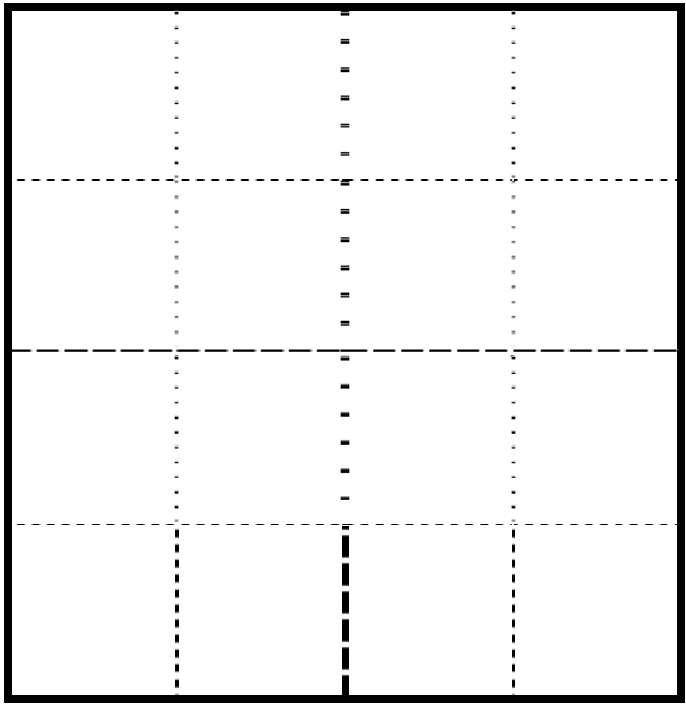
surface water. The following items may be considered compliance alternatives if approved by the Department:

- a. The CAFO may substitute the 100-foot setback with a 35-foot wide vegetative buffer on which applications of manure, litter, or process wastewater are prohibited.
 - b. The CAFO may demonstrate that a setback or buffer is not necessary because implementation of alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent or better than the reductions that would be achieved by the 100-foot setback.
- S9. Manure or process wastewater shall not be applied to bare ground within 1,000 feet of any habitable structure, wildlife refuge or city, county, state or federal park unless it is incorporated into the soil the same day, or the owner of the habitable structure has provided a written waiver to the facility.
- S10. Equipment and/or infrastructure used for land application of livestock waste shall be inspected and maintained to ensure proper operation. Land application equipment shall be calibrated annually to ensure accurate application rates using methods similar to those described in [Chapter 13 of the NEH – Part 651, AWMFH](#). Dates of all manure application equipment inspections shall be recorded. Land application events shall be monitored as appropriate to prevent discharges.
- S11. The Manure Management Plan ([K.A.R. 28-18a-13](#)), Odor Control Plan ([K.A.R. 28-18a-15](#)), Emergency Response Plan ([K.A.R. 28-18a-16](#)), and Dead Swine Handling Plan ([K.A.R. 28-18a-17](#)) shall be updated as necessary to be consistent with any information provided in the swine Nutrient Utilization Plan or Nutrient Management Plan.
- S12. Written landowner agreements shall be obtained for fields utilized for land application of manure or process wastewater that are not owned by the facility. If the NMP cannot demonstrate that the facility controls a sufficient amount of acreage available for the disposal of process wastewater, written agreements shall permit the facility to apply process wastewater whenever necessary in order to maintain compliance with the facility's permit. Fields available via agreement shall have surface soil samples taken annually and results shall be submitted to the Department with the Annual Report.
- S13. Any facility seeking a variance from the above standards shall submit to the department a written request for variance from the Kansas Technical Standards for Nutrient Management and shall provide any information relevant to the request. The request for variance may be granted if the proposal represents best management practices that meet or exceed the above standards in minimizing phosphorus and nitrogen losses to both surface waters and groundwater.

KDHE Soil Sampling Certification

| | | | |
|-------------------------------|------------------|---|---------------------------------|
| Facility Name | | Kansas Permit Number | |
| Field ID | Spreadable Acres | Field Slope (check one): <input type="checkbox"/> 0 – 5 % <input type="checkbox"/> > 5 % | |
| Quarter(s) | Section | Township ^{South} | Range ^{Circle: E or W} |
| Name of Person Taking Samples | | | Number of Cores |
| Date of Sampling | | Date Samples Shipped to Soil Test Lab | |

Please draw in approximate field boundaries and mark approximate locations within the field where soil cores were taken. Each small square represents 40 acres.



I hereby certify that the information submitted herein is true and correct to the best of my knowledge and belief:

Name: _____
(Type or Print Name and Title)

Signature: _____ Date: _____

Kansas Site Assessment Index - Phosphorus

| | | | |
|-----------------|---------------|-----------------------------|-------------|
| | | | |
| Producer | County | Program/Contract No. | Date |
| | | | |

| | | | |
|--------------|------------------|--------------|--------------------|
| Tract | Field No. | Acres | Assisted By |
|--------------|------------------|--------------|--------------------|

| Source Characteristics | | | | Selected Value | |
|---|--|---|--------------------------|----------------|-------|
| | | | | Bench mark | After |
| Phosphorus Loss Rating | | | | | |
| Soil Test P | | Bray P1 or Mehlich III Soil P Test | Olsen Soil P Test | | |
| | | < 25 ppm | < 16 ppm | 1 | |
| | | 26 - 50 ppm | 17 - 31 ppm | 2 | |
| | | 51 - 75 ppm | 32 - 47 ppm | 4 | |
| | | 76 - 200 ppm | 48 - 62 ppm | 8 | |
| | | >200 ppm | > 62 ppm | 10 | |
| Annual Average Fertilizer P Application Rate (lbs P₂O₅/ac) | | | | | |
| Lbs P₂O₅ Applied | | | | | |
| 0.10 X (lbs P₂O₅) | | | | 0.0 | 0.0 |
| P Fertilizer Application Method | None applied | | | 0 | |
| | Starter applied at planting or injected deeper than 2 inches | | | 1 | |
| | Broadcast AND incorporated Nov-Feb or July-Aug OR Broadcast / NOT incorporated Nov-Feb or July-Aug with standing corn, sorghum or smallgrain residue or hay and pasture land | | | 2 | |
| | Broadcast / NOT incorporated Nov-Feb or July-Aug (no residues or pasture) OR Broadcast / NOT incorporated Sept-Oct or Mar-June with standing corn, sorghum or smallgrain residue or hay and pasture land OR Broadcast AND incorporated Sept-Oct or Mar-June (no residue or pasture) | | | 4 | |
| | Broadcast / NOT incorporated Sep-Oct and Mar-June | | | 8 | |
| | Annual Average Organic P Application Rate (lbs P₂O₅/ac) | | | | |
| Lbs P₂O₅ Applied Contained In Manure or Compost | | | | | |
| 0.10 X (lbs P₂O₅) | | | | 0.0 | 0.0 |
| Organic P Source Application Method | None applied | | | 0 | |
| | Starter applied at planting or injected deeper than 2 inches | | | 1 | |
| | Broadcast AND incorporated Nov-Feb or July-Aug OR Broadcast / NOT incorporated Nov-Feb or July-Aug with standing corn, sorghum or smallgrain residue or hay and pasture land | | | 2 | |
| | Broadcast / NOT incorporated Nov-Feb or July-Aug (no residues or pasture) OR Broadcast / NOT incorporated Sept-Oct or Mar-June with standing corn, sorghum or smallgrain residue or hay and pasture land OR Broadcast AND incorporated Sept-Oct or Mar-June (no residue or pasture) | | | 4 | |
| | Broadcast / NOT incorporated Sep-Oct and Mar-June | | | 8 | |
| | Total Source Value | | | | 0.0 |

Kansas Site Assessment Index - Phosphorus

| Transport Characteristics | | | Selected Value | |
|---|--|----|--------------------|-------|
| | | | Bench mark | After |
| Soil Erosion by Water (tons/acre/year) | Average From Ephemeral and Classic Gully | | | |
| | 2 X (tons/ac./yr.) | | 0.0 | 0.0 |
| | | | Tons From RUSLE | |
| | | | 2 X (tons/ac./yr.) | |
| | | | 0.0 | 0.0 |
| Soil Run-off Classification <small>(From NRCS Kansas Map Unit Descriptions)</small> | Very Low | 0 | | |
| | Low | 2 | | |
| | Medium | 4 | | |
| | High | 8 | | |
| | Very High | 16 | | |
| Proximity of field to perennial streams, perennial surface water bodies, or intermittent streams | Field not in proximity of intermittent stream | | 0 | |
| | Within 300 feet of intermittent stream | | 2 | |
| | 180 to 300 feet of perennial stream or water body - with effective buffer * | | | |
| | 180 to 300 feet of perennial stream or water body - without effective buffer * | | 4 | |
| | Within 180 feet of perennial stream or water body - with effective buffer * | | | |
| | Within 180 feet of perennial stream or water body - without effective buffer * | | 8 | |
| | Immediately adjacent to perennial stream or surface water - with effective buffer * | | 16 | |
| Furrow Irrigation Erosion <small>QS is gallon/minute/furrow divided by the slope. Soil erodibility hazard factors are in Table 1.</small> | N/A | | 0 | |
| | With tail water recovery, QS < 6 severe erodibility hazard soils and QS < 10 other soils | | 2 | |
| | QS > 10 for slight erodibility hazard soils | | 4 | |
| | QS > 10 for moderate erodibility hazard soils | | 8 | |
| | QS > 6 for severe erodibility hazard soils | | 16 | |
| Sprinkler System Erosion/Run-off <small>(Sandy soils include all sands and loamy sands. Non-sandy soils include all others. (See Table 2))</small> | N/A or little or no runoff indicated | | 0 | |
| | LP on 0 to 3% slopes or HP on 0 to 8 % slopes for non-sandy sites or all sandy sites | | 2 | |
| | HP on non-sandy sites > 8 % slope, and LP on non-sandy sites 3 to 5 % slopes | | 4 | |
| | LP on non-sandy sites 5 to 8 % slopes | | 8 | |
| | LP on non-sandy sites 8 % or steeper slopes | | 16 | |
| Total Transport Value | | | 0.0 | 0.0 |
| X | | | | |
| (From Page 1) Total Source Value | | | 0.0 | 0.0 |
| Total Transport Value X Total Source Value = P Loss Rating Value | | | 0 | 0 |
| P Loss Risk | | | | |

* Effective buffers meet NRCS standards

| P Loss Rating Value | Site Interpretation for P Loss Rating |
|---------------------|---------------------------------------|
| 0 - 75 | VERY LOW |
| 76 - 150 | LOW |
| 151 - 300 | MEDIUM |
| 301 - 600 | HIGH |
| > 600 | VERY HIGH |

Table 1. Soil Erodibility hazard (SK values) for surface irrigation.

| Slope (%) | USLE 'K' values | | | | | | | | | | | |
|-----------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| | .10 | .15 | .17 | .20 | .24 | .28 | .32 | .37 | .43 | .49 | .55 | .64 |
| 0.1 | .01 | .02 | .02 | .02 | .02 | .03 | .03 | .04 | .04 | .05 | .06 | .06 |
| 0.2 | .02 | .03 | .03 | .04 | .05 | .06 | .06 | .07 | .09 | .10 | .11 | .13 |
| Slight | | | | | | | | | | | | |
| 0.3 | .03 | .05 | .05 | .06 | .07 | .08 | .10 | .11 | .13 | .15 | .17 | .19 |
| 0.4 | .04 | .06 | .07 | .08 | .10 | .11 | .13 | .15 | .17 | .20 | .22 | .26 |
| 0.5 | .05 | .08 | .09 | .10 | .12 | .14 | .16 | .19 | .22 | .25 | .28 | .32 |
| 1.0 | .10 | .15 | .17 | .20 | .24 | .28 | .32 | .37 | .43 | .49 | .55 | .64 |
| 1.5 | .15 | .23 | .26 | .30 | .36 | .42 | .48 | .56 | .65 | .74 | .83 | .96 |
| Moderate | | | | | | | | | | | | |
| 2.0 | .20 | .30 | .34 | .40 | .48 | .56 | .64 | .74 | .86 | .98 | 1.10 | 1.28 |
| 3.0 | .30 | .45 | .51 | .60 | .72 | .84 | .96 | 1.12 | 1.29 | 1.47 | 1.65 | 1.92 |
| 4.0 | .40 | .60 | .68 | .80 | .96 | 1.12 | 1.28 | 1.48 | 1.72 | 1.96 | | |
| 5.0 | .50 | .75 | .85 | 1.00 | 1.20 | 1.40 | 1.60 | | | | | |
| 6.0 | .60 | .90 | 1.02 | 1.20 | 1.44 | 1.68 | | | | | | |
| 7.0 | .70 | 1.05 | 1.19 | 1.40 | 1.68 | | | | | | | |
| Severe | | | | | | | | | | | | |
| 8.0 | .80 | 1.20 | 1.36 | 1.60 | | | | | | | | |
| 9.0 | .90 | 1.35 | 1.53 | | | | | | | | | |
| 10.0 | 1.0 | 1.50 | | | | | | | | | | |

| | |
|--------------|-----------|
| Hazard class | SK value |
| Slight | < 0.2 |
| Moderate | 0.2 - 1.0 |
| Severe | > 1.0 |

Where:
 S = Slope in direction of irrigation
 K = USLE Soil Erodibility

Table 2. General Soil textural Categories.

| | | |
|----------------------|----------------------|------|
| Sandy soils: | | |
| Coarse | Sands | |
| | Coarse Sand | COS |
| | Sand | S |
| | Fine sand | FS |
| | Very fine sand | VFS |
| | Loamy sands | |
| | Loamy coarse sand | LCOS |
| | Loamy sand | LS |
| | Loamy fine sand | LFS |
| | Loamy very fine sand | LVFS |
| Loamy soils: | | |
| Moderately coarse | Coarse sandy loam | COSL |
| | Sandy loam | SL |
| | Fine sandy loam | FSL |
| Medium | Very fine sandy loam | VFSL |
| | Loam | L |
| | Silt loam | SIL |
| | Silt | SI |
| Moderately fine | Clay loam | CL |
| | Sandy clay loam | SCL |
| | Silty clay loam | SICL |
| Clayey soils: | | |
| Fine | Sandy clay | SC |
| | Silty clay | SIC |
| | Clay | C |

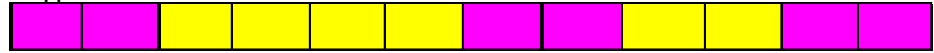
**Phosphorus Application Calendar
Kansas Site Assessment Index - Phosphorus**

| Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-------|-------|-----|------|------|-----|------|-----|-----|-----|
|-----|-----|-------|-------|-----|------|------|-----|------|-----|-----|-----|

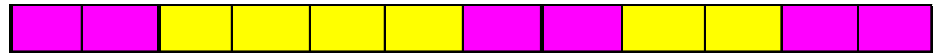
Placed with planter or subsurface applied at least 2 inches deep



Broadcast and incorporated within 48 hours of application



Broadcast and NOT incorporated
with growing summer crop,
standing residues, hay, or pasture



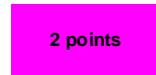
Broadcast and NOT incorporated or incorporated more than 48 hours after application
without growing summer crop or
residues



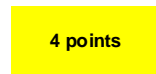
**Best Phosphorus Application
Management Practice**



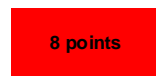
**Good Phosphorus Application
Management Practice**



**Poor-Fair Phosphorus Application
Management Practice**



**Poor Phosphorus Application
Management Practice**



| Table 1: | | Basis for Nutrient Application Rates for Livestock Manure | |
|---------------------|---------|---|---|
| Soil Test P (ppm P) | | P Index Rating Category | N and P Nutrient Application Rates |
| Bray-1 or Mehlich-3 | Olsen | | |
| 0-50 | 0-33 | All | Legume Crops – Agronomic P Rate or 1.5 X Crop Removal |
| 0-50 | 0-33 | All | Non-Legume Crops – Agronomic N Rate |
| | | | All Crops |
| 51-150 | 34-100 | Very Low, Low, Medium | 1.5 X Crop P Removal |
| | | High, Very High | 1.0 X Crop P Removal |
| 151-200 | 101-133 | Very Low, Low, Medium | 1.5 X Crop P Removal |
| | | High, Very High | None |
| 201+ | 134+ | Very Low, Low, Medium | 1.0 X Crop P Removal |
| | | High, Very High | None |

Notice:

*When applying nutrients based on P₂O₅ removal, do not exceed the recommended N application for the crop.

**When applying swine waste, do not exceed recommendations established by the Kansas Department of Agriculture's Regulations when pertaining to K.S.A. 85-1, 178 et. seq.

(Taken from NRCS, KS Conservation Practice Standard 590, Nutrient Management, revised November 2009.)