

USDA / NRCS Waste Utilization
Standard and Management Plans
Revised 7/05

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Outline

- Interactions with Nutrient Management Standard (590)
- Waste Utilization Standard (633)
- Components of the waste management plan

Interactions with Nutrient Management Standard (590)

- Need for current soil test to get started (Appendix 1)
- Sampling depths and protocols (Appendix 2)
- Soil testing methodology and crop requirements based on TAMU guidance (Appendix 3)
- Realistic yield goals (General Criteria)

Interactions with Nutrient Management Standard (590)

- Requires P - Index to be completed when wastes are applied (General Criteria)
- P application rates for waste are specified (Appendix 6)

Interactions with Nutrient Management Standard (590)

- Requires a current waste analysis or an analysis history of at least 2 years for land application (**General Criteria**)
- Published NRCS values may be used to develop the initial plan on a new or expanding (**General Criteria**)

Interactions with Nutrient Management Standard (590)

- Requires that supplemental nutrients be applied if the waste application does not meet the soil test recommended nutrient levels for the planned yield goal (**General Criteria**)

Why do we need a soil test before we can write a plan?

- The litter, manure, or effluent application rate is based on the **Soil P Index results** of each field in the application area.
- Soil test P level is part of the P index.
- To determine maximum application rates we need to know the P-Index rating and if any fields exceed the **200, 350, or 500 ppm**.

Maximum Annual and Biennial Manure Application Rates for *Fields with Soil Test P <200 East or <350 ppm West*

APPENDIX 6

Commercial fertilizers will be applied in accordance with Texas A&M recommendations based on soil test results. Application of animal waste, other agricultural waste products, biosolids or other organic soil amendments will not exceed the values in Table 1 or 2.

TABLE 1. Phosphorus Index Vulnerability Ratings and Maximum Annual and Biennial Phosphorus Application Rates where Soil Test P Level ^{1/} Is Below 200 or 350 ppm ^{2/}.

P – Index Rating	Maximum Annual P Application Rate	Maximum Biennial Application Rate
Very Low, Low	Annual Nitrogen (N) Requirement	2.0 Times Annual N Requirement
Medium	2.0 Times Annual Crop P Requirement ^{3/}	2.0 Times Annual N Requirement
High	1.5 Times Annual Crop P Requirement ^{3/}	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Requirement
Very High	1.0 Times Annual Crop P Requirement ^{3/}	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Requirement

Maximum Annual and Biennial Manure Application Rates for *Fields with Soil Test P 200 or > East , 350 or > ppm West*

TABLE 2. Phosphorus Index Vulnerability Ratings and Maximum Annual and Biennial Phosphorus Application Rates where Soil Test P Level ^{1/} Is Greater Than 200 or 350 ppm^{2/}.

P – Index Rating	Maximum Annual P Application Rate	Maximum Biennial Application Rate
Very Low, Low	Annual Nitrogen Crop Removal	2.0 Times Crop N Removal
Medium	1.5 Times Annual Crop Removal ^{4/}	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Crop Removal
High	1.0 Times Annual Crop Removal ^{4/}	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Crop Removal
Very High or soil test P ^{1/} 500 ppm or above in watersheds where TMDL for nutrients has been implemented. ^{5/}	0.5 Times Annual Crop Removal ^{4/}	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Crop Removal

Footnote to (590) Appendix 6 Tables

Footnotes Applicable to both Tables

- 1/** Soil test P will be determined by Mehlich III with inductively coupled plasma (ICP) on areas used for animal waste application.
- 2/** Counties receiving 25 inches or more annual rainfall will use the 200 ppm P level (East Texas \geq 25 inches), and counties receiving less than 25 inches of annual rainfall will use the 350 ppm P level (West Texas $<$ 25 inches), see map in TX Agronomy Technical Note 15, Phosphorus Assessment Tool for Texas, for county designation.
- 3/** Not to exceed the annual nitrogen requirement rate.
- 4/** Not to exceed the annual nitrogen removal rate.
- 5/** Nutrient TMDL watersheds are designated by Texas Commission on Environmental Quality (TCEQ).

P Index Classifications

Phosphorus Index Classification for East Texas	
Index Points	P Runoff Potential
< 12	Very Low - Low
12 - 22.75	Medium
23 - 32	High
> 32	Very High

P Index Classifications

Phosphorus Index Classification for West Texas	
Index Points	P Runoff Potential
< 15	Very Low - Low
15 - 24.75	Medium
25 - 35	High
> 35	Very High

Waste Utilization Standard (633)

- Definition
 - Using agricultural wastes such as manure, wastewater, or other organic residues.

Waste Utilization Standard (633)

- Purposes
 - Protect water quality.
 - Provide fertility for crop, forage, fiber, and forest products production.
 - Improve or maintain soil structure.
 - Provide feedstock for livestock.
 - Provide source of energy.

Conditions where practice applies

- This practice applies where agricultural wastes including animal manure and contaminated water from livestock and poultry operations; solids and wastewater from municipal treatment plants; and agricultural processing residues are generated, and/or utilized.

Conditions where practice applies

- It does not apply to detailed design criteria or construction specifications for individual structures or components of waste transfer or application systems.

General Criteria

- Manure and/or effluent testing every year.
- TCEQ sampling requirements will be followed on permitted sites.

General Criteria

- Published NRCS, TAMU values, or other Texas testing lab averages can be used for initial plan.
- If actual values are more than 10% higher or lower than initial estimates the plan will need to be revised.

General Criteria

- As a minimum the waste analysis should identify total nitrogen, total phosphorus, and total potassium.
- Moisture content and/or total solids should also be noted on the analysis.

General Criteria

- Supplemental N, P, and/or K will be applied if the annual manure or effluent application does not provide the recommended nutrients for the planned yield goal, **or**
- **Yield goals and applications will be reduced accordingly**

General Criteria

- Where agricultural wastes are to be spread on land not owned or controlled by the producer, the waste management plan, as a minimum, shall document the amount of waste to be transferred and who will be responsible for the environmentally acceptable use of the waste.

General Criteria

- Records of the use of wastes shall be kept a minimum of five years.

Additional Criteria to Protect Water Quality

- All agricultural waste shall be utilized in a manner that minimizes the opportunity for contamination of surface and ground water supplies.

Additional Criteria to Protect Water Quality

- The maximum annual or biennial application rate of liquid and/or solid waste will not exceed the rates stated in the practice standard Nutrient Management (590)

Additional Criteria to Protect Water Quality

- The maximum hourly effluent application rate is determined by the texture of the soil layer with the lowest permeability in the upper 24 inches of the predominant soil in each field.
- The hourly application rate must be low enough to avoid ponding or runoff.

Additional Criteria to Protect Water Quality

Madison County, Texas

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-poten
	<u>In</u>	<u>Pct</u>	<u>g/cc</u>	<u>In/hr</u>	<u>In/in</u>	<u>pH</u>	
RaB----- Rader	0-25	5-20	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.5	Low----
	25-34	18-30	1.40-1.60	0.2-0.6	0.12-0.18	5.1-6.5	Moderat
	34-50	35-50	1.45-1.70	<0.06	0.12-0.18	4.5-5.5	High----
	50-96	24-45	1.45-1.70	0.06-0.2	0.12-0.18	5.1-8.4	Moderat
RbA* : Rader-----	0-24	5-20	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.5	Low----
	24-29	18-30	1.40-1.60	0.2-0.6	0.12-0.18	5.1-6.5	Moderat
	29-33	35-50	1.45-1.70	<0.06	0.12-0.18	4.5-5.5	High----
	33-80	24-45	1.45-1.70	0.06-0.2	0.12-0.18	5.1-8.4	Moderat

Additional Criteria to Protect Water Quality

- The maximum one time application rate of effluent is the amount that will bring the top 24 inches of the predominant soil to 100% field capacity.
- Use Soil Survey or NASIS data for permeability and available water holding capacity.



Additional Criteria to Protect Water Quality

- The Rader soil is a sandy loam and has an average of 3.12 inches of AWC in the upper 24 inches.
- From a visual analysis of the existing moisture conditions of the upper 24" we estimate it to be at about 50% to 75% moisture capacity.
- We estimate that we could apply between 0.75" and 1.5" of effluent without having runoff or ponding.

Additional Criteria to Protect Water Quality

Figure 2 – Sandy Loam and Fine Sandy Loam Soils

Percent available: Currently available soil moisture as a percent of available water capacity.

Available Soil Moisture Remaining	Appearance of soil
0-25 percent available	Dry, forms a very weak ball, clustered soil grains break away easily from ball.
25-50 percent available	 <p data-bbox="1024 818 1725 922">Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away.</p>
50-75 percent available	 <p data-bbox="1024 1260 1772 1365">Moist, forms a ball with defined finger marks, very light soil/water staining on fingers, darkened color will not stick.</p>
75-100 percent available	

Additional Criteria to Protect Water Quality

- A traveling big gun with a 0.75 inch nozzle operating at 50 psi will be used.
- It will apply about 0.25 inches per hour
- I want to apply about 1 inch of effluent to part of the application area.

Additional Criteria to Protect Water Quality

- Is this a realistic expectation?

Table2 – Maximum Application Rate (in/hr) 50% of field moisture capacity

Texture	Application amount in inches						
	0.25	0.5	0.75	1	1.25	1.5	2
Sand	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Loamy sand	6.00	6.00	4.83	4.22	3.86	3.62	3.32
Sandy loam	4.91	2.97	2.32	1.99	1.80	1.67	1.51
Loam	3.11	1.69	1.21	0.98	0.84	0.74	0.62
Silt loam	2.70	1.45	1.03	0.82	0.70	0.61	0.51
Sandy clay loam	1.74	0.96	0.69	0.56	0.48	0.43	0.37
Clay loam	1.27	0.68	0.48	0.39	0.33	0.29	0.24
Silty clay loam	1.09	0.57	0.40	0.32	0.26	0.23	0.19
Sandy clay	0.61	0.33	0.23	0.19	0.16	0.14	0.12
Silty clay	0.84	0.44	0.30	0.24	0.20	0.17	0.14
Clay	0.39	0.21	0.14	0.11	0.09	0.08	0.07

Additional Criteria to Protect Water Quality

- Is this a realistic expectation?

Maximum Application Rate (in/hr) **75% of field moisture capacity**

Application amount in inches

	0.25	0.5	0.75	1	1.25	1.5	2
Sand	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Loamy sand	3.00	3.00	2.42	2.11	1.93	1.81	1.66
Sandy loam	2.46	1.49	1.16	1.00	0.90	0.84	0.76
Loam	1.56	0.85	0.61	0.49	0.42	0.37	0.31
Silt loam	1.35	0.73	0.52	0.41	0.35	0.31	0.26
Sandy clay loam	0.87	0.48	0.35	0.28	0.24	0.22	0.19
Clay loam	0.64	0.34	0.24	0.20	0.17	0.15	0.12
Silty clay loam	0.55	0.29	0.20	0.16	0.13	0.12	0.10
Sandy clay	0.31	0.17	0.12	0.10	0.08	0.07	0.06
Silty clay	0.42	0.22	0.15	0.12	0.10	0.09	0.07
Clay	0.20	0.11	0.07	0.06	0.05	0.04	0.04

Additional Criteria to Protect Water Quality

- Agricultural waste will not be applied to frequently flooded areas, as defined by the county soil survey
- Agricultural waste will not be applied to frozen or snow covered ground

Additional Criteria to Protect Water Quality

- A minimum 100 foot vegetated buffer will be maintained between the application area and all:
 - surface water bodies, sink holes, water courses, as designated on soil survey sheets or USGS topographic maps.
- A minimum 150' setback from private wells and 500' setback from public wells.

Additional Criteria to Protect Water Quality

- Vegetated buffers include
 - Filter Strips
 - Field Borders
 - Riparian Forested Buffers
 - Other buffer practices with surface water quality listed as a purpose.

Additional Criteria to Protect Water Quality

- Wastes will not be applied to slopes $> 8\%$, unless it is being used as a component of an erosion control plan, i.e., roadside stabilization, critical area planting, reclamation work, etc.

Additional Criteria to Protect Water Quality

- Mortality management will be addressed to minimize the effects of mortality disposal on water quality.
- TCEQ guidance will be followed when appropriate.

Additional Criteria for providing fertility for crop, forage, fiber, and forest products.

- For Ag waste follow Nutrient Management Standard (590)
- Where municipal wastes are applied to agricultural land heavy metal levels shall not exceed lifetime limit.
 - See TCEQ guidance for further information.

Additional Criteria for improving or maintaining soil structure

- Application rates will not exceed (590).
- Will be incorporated within 72 hours of application.

Additional Criteria for Providing Feedstock for Livestock

- Waste shall be handled in a manner that minimizes contamination and preserves quality.
- Waste stored for this purpose will be covered

Additional Criteria for Providing Feedstock for Livestock

- Refer to TCE Publication MP-1773, *Feeding Broiler Litter to Beef Cattle*, other TCE or TAEX publications, or secure the services of a qualified animal nutritionist to develop ration that utilize wastes.

Additional Criteria for Providing a Source of Energy

- All energy components of the system will be included in the waste management plan.
- Provisions for use of the residues of energy production will be addressed.

Additional Criteria for Providing a Source of Energy

- Where the residues will be used for crop nutrients or soil conditioning the previously mentioned criteria shall apply.

Considerations

- Use a water budget in areas of shallow ground water, or areas prone to runoff.
 - SPAW Model can be used for water budgets
- Guidance in the form of references is given for estimating soil moisture, and calibration of application equipment.

Considerations

- Suggest the producer provide a current manure analysis and Waste Utilization Job Sheet to any person receiving the waste for off-site use.
- Minimize the impact of odors
- Suggest that effluent not be applied at night.

Considerations

- Suggest the use of windbreaks as visual screens or to enhance air movement around facilities, storage structures, and/or application areas.

Plans and Specifications

- Outlines the items that must be included in a waste management plan.

Waste Management Tools

- Spreadsheets to calculate application rate based on P Index
- P index spreadsheet
- Big gun application spreadsheet

Waste Management Tools

- Tables with estimated manure nutrient values:
 - Spreadsheet values
 - USDA/NRCS Ag. Waste Mgt. Field Handbook
 - TAMU Published values
- TAMU web site with crop requirement values to be used with appendix 6 of NM (590)

Waste / Nutrient Management Information on the web

- eFOTG Section IV– TX Practice Standards and Job Sheets
- eFOTG Section II - Soil data
- National Planning Procedures Handbook (CNMP criteria)
- Ag. Waste Management Field Handbook
- Core 4 Training Guide