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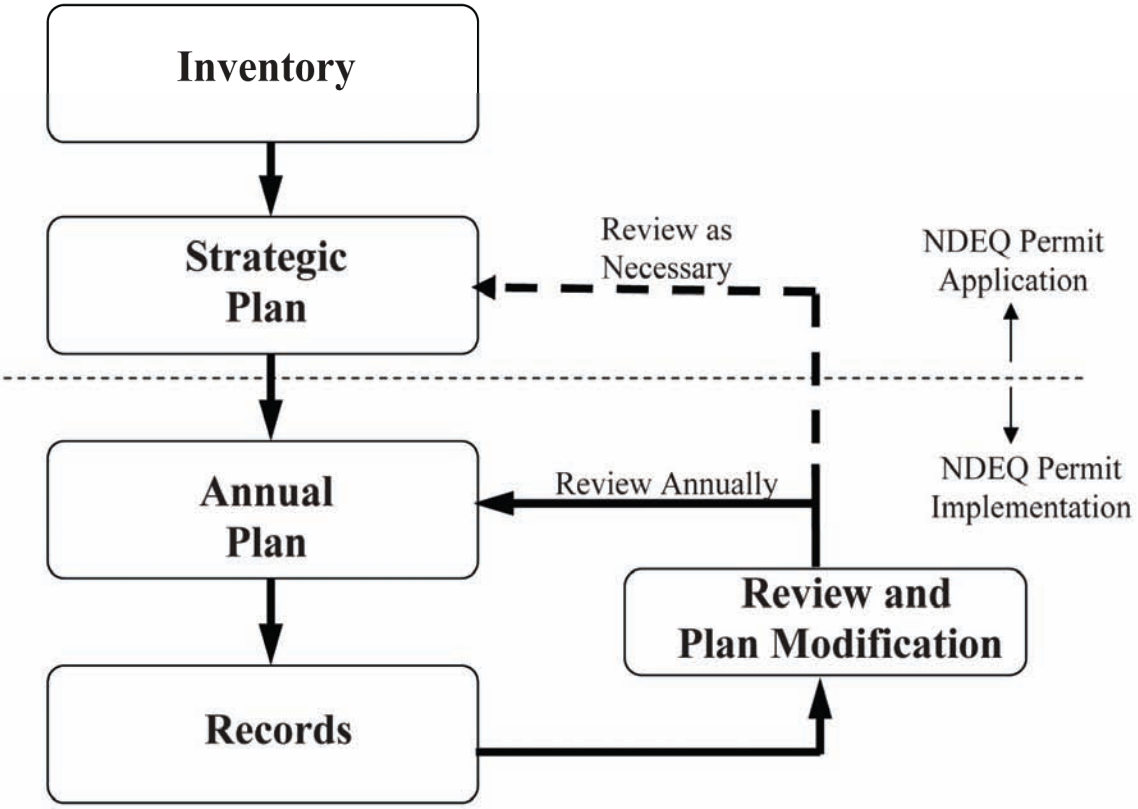
Nebraska's CNMP

Comprehensive Nutrient Management Plan

Manure Application Workbook



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Nebraska's Comprehensive Nutrient Management Plan (CNMP)

Manure Application Workbook

January 2004

To assist Nebraska livestock producers in developing and using their Comprehensive Nutrient Management Plan

Project Partners

University of Nebraska–Lincoln Extension
Upper Elkhorn Natural Resources District
Lower Elkhorn Natural Resources District
Lower Platte North Natural Resources District

Cooperating Agencies and Organizations

Nebraska Cattlemen
Nebraska Pork Producers
Nebraska Department of Environmental Quality
USDA Natural Resources Conservation Service

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Nebraska's CNMP Manure Application Workbook

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For resources available from the Natural Resource Conservation Service visit its Web site at:

http://www.ne.nrcs.usda.gov/technical/CNMP/NE_CNMP_General.html

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Review as Necessary

Review as Necessary

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[1]Or *Nutrient Inventory Spreadsheet* available from http://manure.unl.edu/koelsch-nbalance.html
[2]And/or *Plan for Manure Transfer to off-Farm Users*

What is a CNMP?

What is a CNMP? A Comprehensive Nutrient Management Plan (CNMP) is the environmental operating or management plan for a livestock or poultry facility. It is intended to encourage efficient management of nutrients in all aspects of a livestock system, environmentally and agronomically beneficial utilization of manures, and integration of nutrient management with other key environmental issues such as odor control or soil conservation planning.

Nutrients in manure, when managed incorrectly, represent the single largest threat to water quality from livestock production. However, if managed correctly, manure is an environmental and agronomic asset. Soils receiving agronomic rates of manure require less commercial fertilizer (conserving energy and limited phosphorus reserves), are higher in organic matter (contributing to greater soil productivity and water storage capacity), and may experience less runoff, erosion, and nitrogen leaching. Thus, choices made relative to the management of nutrients within a livestock operation are absolutely critical.

What is the purpose of this workbook? This CNMP workbook is to help a producer in the:

- preparation of a permit application to the Nebraska Department of Environmental Quality (NDEQ) for a CNMP for land application of manure;
- implementation of a nutrient management plan that maintains profitable crop production while minimizing the risk of water contamination; and the
- establishment of a record keeping system and an annual summary of recommended manure application rates that complies with NDEQ and US Environmental Protection Agency regulations.

This workbook focuses on manure application. Separate CNMP workbooks focus on 1) odor management planning; 2) manure and open lot runoff storage planning, operation, and maintenance; and 3) additional stewardship planning tools for whole farm nutrient management.

How is the CNMP organized? The Nebraska CNMP is organized according to a five-step process:

- **Inventory**. Inventory records define current livestock or poultry numbers, land application sites, and available land application equipment required for an NDEQ permit.
- **Strategic Plan.** The Strategic Plan documents long-term plans targeting issues specific to NDEQ permit requirements.
- **Annual Plan.** The Annual Plan estimates an agronomic application rate of manure specific to individual cropping programs and guides a producer's compliance with NDEQ requirements for manure application to not exceed agronomic rates for nitrogen.
- **Documentation and Records.** Sample records can be used to verify a nutrient management plan's successful implementation and meet all NDEQ record keeping requirements.
- **Review and Plan Modification.** This final section summarizes an individual field's nutrient balances at the end of the season and identifies potential modifications necessary for the following year's Annual Plan.

Regulation vs. Good Stewardship? This document follows procedures accepted by NDEQ as part of its permit application and record keeping requirements. Those worksheet or record keeping forms marked with the Nebraska Department of Environmental Quality symbol *(Figure 1)* contain information that is mandatory for an NDEQ permit application or follow-up NDEQ inspections.

At a minimum these planning tools (or comparable tools supplied by the producer or his/her advisor) are critical for insuring compliance with Nebraska regulations. Those worksheets or record keeping forms marked with the "Good Stewardship" symbol *(Figure 2)* suggest recommended planning procedures for your farm's economic and environmental benefit.

Figure 1. The Nebraska Department of Environmental Quality Symbol.

Figure 2. The Good Steward Symbol.

Summary of Management Plans and Records Required by the Nebraska Department of Environmental Quality

Forms and Planning Procedures	Page #	Form #	Permit Application Required	Permit Application Com-pleted	Record Keeping Required	Record Keeping Currently Used
Introduction					—	—
General Information (see *Storage Workbook*)			X		—	—
Summary of Strategic Plan Recommendations	5	1			—	—
Inventory					—	—
Livestock and Poultry Inventory for Meat Production	8	2	X or		—	—
Livestock Inventory for Milk, Egg and Wool Production	10	3	X			
Inventory of Land Application Sites	12	4	X		—	—
Land Application Equipment Inventory	16	5	X		—	—
Strategic Plans					—	—
Manure Nutrient Production					—	—
Book Values Method	20	6	X			
Nutrient Balance Method	22	7	X			
Nutrients Available After Storage Loss	24	8	X			
Nutrients Available After Land Application Loss	26	9	X			
Land Requirements for:					—	—
Manure Nitrogen Utilization	28	10	X			
Manure Phosphorus Utilization	30	11	—			
Sludge P Utilization from Anaerobic Lagoon	32	12	X			
Manure Transfer to Off-Farm Users	34	13	X		—	—
Land Application Site Agreements	36	14	X		—	—
Emergency Response Plan	38	15	X		—	—
Nutrient Management Activities Plan	40	16	X		—	—
Annual Plan					—	—
Crop Available Manure Nitrogen	48	17	—	—	X	
Annual Field Plan for Nitrogen	50	18	—	—	X	
Annual Field Plan for Phosphorus	52	19	—	—		
Action Plan	54	20	—	—	X	
Documentation and Records	57		—	—		
Manure Analysis Reports			—	—	X	
Soil Test Reports			—	—	X	
Manure Application Field Records			—	—		
Solid Manure	59	21			X or	
Slurry or Sludge	60	22			X or	
Towed Hose or Irrigation	61	23			X or	
Irrigation	62	24			X	
Crop, Soil, Water Nutrient Status Indicators	63	25	—	—		
Continuing Education Summary	64	26	—	—		
Manure Transfer to Off-Farm Users	65	27	—	—	X	
Reports of High Soil Phosphorus Levels	66	28	—	—	X	
Livestock Waste Discharge Notification	67	29	—	—	X	
Review and Plan Modification			—	—		
Post Cropping-Season Summaries of Manure Analysis and Application Rate	72	30	—	—		
Post Cropping-Season Summaries of Crop Yield	73	31	—	—		

Good Steward

Form 1. Summary of Strategic Plan Recommendations

These pages are to be completed after completing the strategic plan.

Animal Feeding Operation Name: _____

Manure Nutrient Inventory Summary

A. Summarize *Nutrient Excretion* from *Form 6 or 7 (page 21 or 22)* or *Nutrient Inventory* spreadsheet.

Manure Handling System	Nitrogen (lbs./year)	P_2O_5 (lbs./year)
1.		
2.		
3.		
Totals		

B. *Annual Available Nutrients After All Losses* from *Forms 8 and 9 (pages 25 and 27)* or *Nutrient Inventory* spreadsheet.

Manure Handling System	Nitrogen (lbs./year)	P_2O_5 (lbs./year)
1.		
2.		
3.		
Totals		

C. *Land Requirements for Managing Nutrients* from *Forms 10, 11, and 12* or *Nutrient Inventory* spreadsheet.

		For N Management *(Form 10, Column c)*	For P Management *(Form 11, Column c)*	For Sludge P Management *(Form 12, Column c)*
Crop 1:		acres	acres	acres
Crop 2:		acres	acres	acres
Crop 3:		acres	acres	acres
Crop 4:		acres	acres	acres
Crop 5:		acres	acres	acres
Crop 6:		acres	acres	acres
Totals:		**acres**	**acres**	**acres**

Years between sludge removal: _____yrs.

Good Steward

Form 1. Summary of Strategic Plan Recommendations (continued)

Summary of _____: (Form _____)

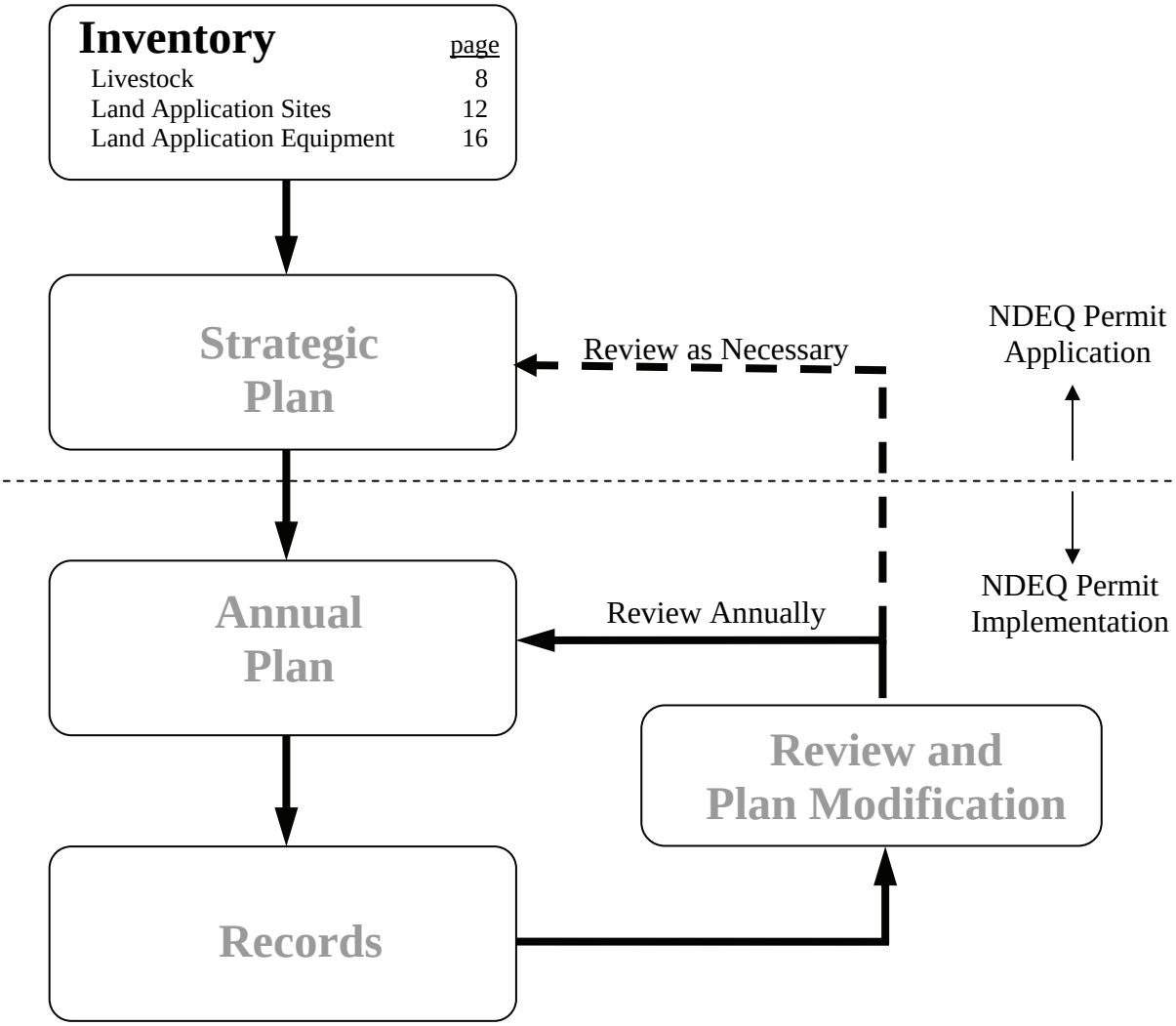
Summary of _____: (Form _____)

Summary of _____: (Form _____)

Nebraska's CNMP

Comprehensive Nutrient Management Plan

Inventory of Resources



An electronic copy of this workbook and individual worksheets are available online at http://cnmp.unl.edu

Instructions for Livestock and Poultry Inventory for Meat Production (Form 2)

Required Information: Information requested by the first five columns (a through e) in *Form 2* is required for an NDEQ Livestock Waste Control Facility (LWCF) Permit application.

Col. a. Describe each production animal "Species and Group"

Species	Grouping examples
Pork	Nursery, grow/finish, gilts
Cattle	Calves, feeder
Poultry	Broilers, pullets
Turkey	

Col. b. Describe housing type used for managing animals (e.g. open lot, freestall barn, slatted floor barn) **and** a reference location (identified on a map of facilities) for where this animal group is typically housed.

Col. c. Enter the maximum one-time animal population[1] for this group of animals. (Do not use the annual throughput or number of animals finished in this facility.)

Cols. d and e. List the average weight of animals entering and leaving this animal group.

[1] All calculations of land requirements, manure storage capacity and related estimates are based upon a facility's **maximum** one-time number of livestock for which the facility will be permitted.

Optional Information: To accurately estimate the quantity of nutrients excreted annually, the remaining information requested is valuable but not required by NDEQ.

Cols. f and g. Enter "Average Days on Feed" and "Turns per Year".

Cols. h - m. Enter Daily Feed Intake, based on maximum one-time population, and Feed Composition. Moistures for feed intake and composition can be entered on an "As Fed" or "Dry Basis". However, both intake and composition must be on the same moisture basis. CP = crude protein, P = phosphorus, K = potassium.

Col. n. For pork finishing production only, enter average Fat Free Lean Index of marketed hogs. This value is used to estimate nitrogen retention and excretion by grow/finish hogs.

Form 2. Livestock and Poultry Inventory for Meat Production

Good Steward

Inventory of animals (in confinement housing or open lots) fed for meat production, replacements, or reproduction.

Information in Columns a-e is required for the NDEQ permit application.					Information in Columns f-n is not required for permit application.								
a. Species and Group	b. Describe Confinement and Location	c. Maximum One-Time Capacity (# of animals)	Average Weight (lbs.)		f. Average Days on Feed	g. Turns per Year	Daily Feed Intake		Feed Composition[1]				n. Fat Free Lean Index[2]
			d. Begin	e. End			h. Feed (lbs./day)[1]	i. Moisture Basis	j. % CP	k. % P	l. % K	m. Moisture Basis	
Example: Pigs/Finish	Slatted floor barn…Barn 1	1,000	45	250	110 days	3	5,350 lbs.	☒ As Fed ☐ Dry	17%	0.6%	1%	☒ As Fed ☐ Dry	
1.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
2.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
3.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
4.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
5.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
6.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
7.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
8.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
9.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
10.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	

1. Both daily feed intake and feed composition should be measured on the same moisture basis (e.g. both on an "As Fed" basis).
2. *Fat Free Lean Index* is needed only for market hog. This measure should be available for market hogs at the time of slaughter.

Inventory

Instructions for Livestock and Poultry Inventory for Milk, Egg, and Wool Production (Form 3)

Required Information: Information requested by the first five columns (a through e) is required for an NDEQ Livestock Waste Control Facility Permit application.

Col. a. Describe each production animal species and group:

Species	Grouping examples
Dairy	Lactating, dry, replacement heifer, bull
Pork	Gestating sow, sow and litter, boar
Cattle	Cow, bull
Poultry	Layers
Turkey	

Col. b. Describe housing type used for managing animals (e.g. open lot, freestall barn, slatted floor barn) and a reference location (identified on a map of facilities) for where this animal group is typically housed.

Col. c. Enter the maximum one-time animal population[1] for this group of animals. (Do not use the annual throughput or number of animals finished in this facility.) Average is not required.

Col d. List the days per year that the facility is occupied.

Col. e. List the average weight of animals in this animal group.[1]

[1] All calculations of land requirements, manure storage capacity and related estimates are based upon a facility's **maximum one-time number of livestock** and **maximum days per year the facility could be occupied** (usually 365 days) for which the facility will be permitted by NDEQ.

Optional Information: To accurately estimate the quantity of nutrients excreted annually, the remaining information requested is valuable but not required by NDEQ.

Cols. f - g. Enter the average annual production levels for wool, milk, and eggs.

Cols. h - i. Enter daily feed intake based on the maximum one-time population. Feed intake and composition can be entered on an "as fed" or "dry basis"; however, both intake and composition must be on the same moisture basis.

Cols. j - m. Feed composition in percentage: CP = crude protein, P = phosphorus, K = potassium

Form 3. Livestock and Poultry Inventory for Milk, Egg, and Wool Production

Good Steward

Information in Columns a-e is required for the NDEQ permit application.					Information in Columns f-n is not required for permit application.							
a. Species/Group	b. Describe Confinement and Location	c. Maximum One-Time Capacity (# of animals)	d. Days per Year Facility is Occupied	e. Average Weight (lbs./an.)	Average Production		Daily Feed Intake[1]		Feed Composition[1] %			
					f. Lbs./ animal/yr	g. Product	h. Feed (lbs./day)[1]	i. Moisture Basis	j. % CP	k. % P	l. %K	m. Mois-ture
Example: Dairy/lactating cows	Freestall…Barn 3	500	365	1425 lbs.	27,000	Milk	5,350 lbs.	[X] As Fed [ ] Dry	16%	0.55%	5,350 lbs.	[X] As Fed [ ] Dry
11.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
12.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
13.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
14.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
15.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
16.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
17.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
18.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
19.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry
20.								[ ] As Fed [ ] Dry				[ ] As Fed [ ] Dry

1. Both daily feed intake and feed composition should be measured on the same moisture basis (both on an "as fed" basis or both on a "dry weight" basis).
2. an. = animal

Instructions for Inventory of Land Application Sites for Manure Application (Form 4, Part 1)

Complete the information requested in the *Inventory of Land Application Sites* section for each site where manure is likely to be distributed. **Reproduce sufficient copies of *Form 4, part 1* for each potential land application site.** NDEQ should be notified of future changes in land application site information.

Field ID: Provide an identifying name or number for each field. Also indicate useable area in acres from which a crop is harvested. CRP fields may be available for manure applications, especially if they were released and harvested for hay under the Emergency Haying and Grazing Program. NRCS permission is needed for manure application.

Location: Provide a legal description for each field site. The location of each application site should be identified on the community siting map of the *Odor Management Plan Workbook (Form 1).*

Ownership: Indicate ownership of land application site, including owner's name and address. Signed *Land Application Site Agreements* are required for listed land application sites not owned by the operation. These access agreements also are required when access to an application site requires animal manure to be conveyed across property not owned by the operation, including county rights-of-way. **Note:** Responsibility for liability due to damages caused by a manure application applied by livestock owners to land under an agreement remains with the livestock producer.

Availability for Manure Application: Number of years available. Mention any restrictions.

Cropping Practices: List each crop in your planned rotation and the historic yields. Documentation is required to support yields used in determining crop utilization of nitrogen in animal manure. If no yield information is available, state or county five-year averages for crop yields must be used (Nebraska Agricultural Statistics Service, Nebraska Department of Agriculture).

Soil Type: A soil **series** is a name, like Sharpsburg or Valentine. **Texture** is the predominant proportion of sand, silt, and clay, for example: silty clay loam, loamy sand, etc. The county soil survey has this information. **Slope** is designated in the Soil Survey as a capital letter between B and F. Each letter represents a range of slope in percent. If there is no letter, then slope is assumed to be near zero. See the Soil Legend page in the Soil Survey for the percentage. **Primary** and **Secondary Soils** refer to most common and second most common soil types found within the land application site.

Distance to Nearest Body of Water: This is estimated as the distance between the edge of field and the nearest surface water down gradient of the field. NDEQ may restrict any livestock manure application "within 30 feet of any streams, lakes and impounded waters..." in the field. NDEQ also may require some conservation practices for manure applications within 100 feet of these waters. If there is any question about **stream** classification, visit your NRD or NRCS office to view the USGS topographic map.

From NDEQ Title 130, Ch.1, 047: " '**Surface waters**' shall mean all streams, lakes, ponds, impounding reservoirs, marshes, wetlands, watercourses, waterways, springs, canal systems, drainage systems, and all other bodies or accumulations of water, natural or artificial, public or private, situated wholly or partly within, or bordering upon, the State. Impounded waters in this definition do not include areas designated by the Department as wastewater treatment or wastewater retention facilities or irrigation reuse pits."

If there are any **wetlands** (as determined by NRCS) on the operation or application areas, then their locations need to be provided to NDEQ (use the map for locations). If there is any question about the status of a wet area, request a Certified Wetlands Determination from the county NRCS. Acres in wetlands are to be excluded from reported useable acres.

Soil Test Phosphorus: This is your 'base-line' record of soil phosphorus levels (not required for NDEQ permit application). Include copies of the lab soil test reports in the *Documentation and Records* section. Sample areas generally should be no more than 40 acres, with a 6- to 8-inch core depth.

Form 4 (part 1). Inventory of Land Application Sites for Manure Application

Inventory

Field ID: _____ **Field Size:** _____ useable acres

Location: _____ _____ _____ _____ ☐ ☐ _____

¼ Section Township Range E or W County

Other Manure Sources: Is livestock manure from another facility applied to this site? ☐ YES ☐ NO
If yes, attach manure production information from the other facility.

Ownership: ☐ Own ☐ Rent ☐ Neighbor **Is there a site agreement**? ☐ YES ☐ NO
If "Rent" or "Neighbor" is checked, list name and address of landowner and attach Application Agreement:

_____ _____

_____ _____

Name(s) Address(es)

Cropping Practices: Planned rotation: _____ _____ _____ _____ _____

Five year average yields: _____ _____ _____ _____ _____

Source of yield values: ☐ FSA verified yields or other _____

Irrigated[1] ☐ No ☐ Flood ☐ Sprinkler _____acres

Environmental Considerations:

Is there a USDA approved conservation plan for this site? ☐ YES ☐ NO

Current Conservation Practices:_____

_____

Soil Type:	**Series and Texture**	**Slope (avg.)**
Primary soil:	_____	_____ %
Secondary soil[1]:	_____	_____ %

Distance to nearest body of water: _____ feet

Does field contain:	**YES**	**NO**
Highly erodible land?	☐	☐
Perennial stream?	☐	☐
Intermittent stream?	☐	☐
Concentrated flow?	☐	☐
Flooding/overflow potential?	☐	☐
Designated wetlands?	☐	☐

Acres of wetlands: _____ acres.

Soil Phosphorus Levels[1]

Management Areas		**Soil Test**	
Name/ID	**Acres**	**P (ppm)**	**Method***

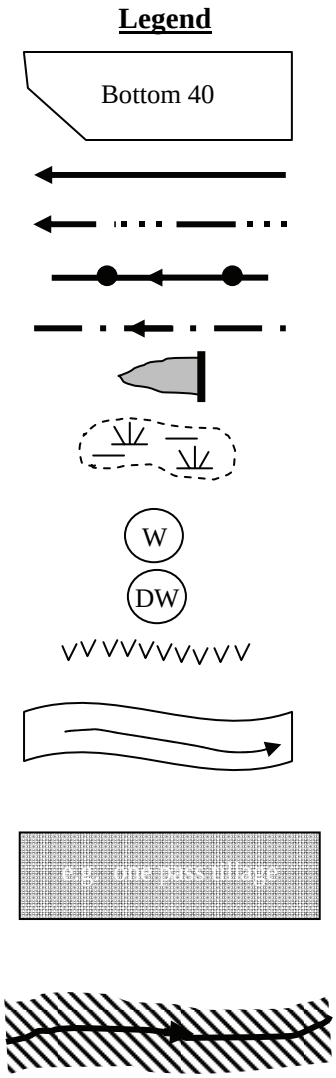
Sample depth _____ inches

* B =Bray 1, weak acid
M = Mehlich III
O = Olsen (sodium bicarbonate).
Write in test name if not one of these.

[1]Not required for NDEQ permit application.

Form 4 (Part 2). Land Application Sites for Manure Application

Field Map of Current Conservation Practices: For each land application site, complete a scaled drawing or attach an aerial photograph (e.g. soils map, USGS topographic map or USDA FSA aerial photo) showing field location. The following items should be clearly marked on each field:



1. Field boundaries and field ID. Check the field ID on the map for a match with the field ID listed in *Form 4, Part 1*.

2. Identify location of all surface water features, including:
   - perennial (continuous) streams;
   - intermittent streams;
   - drainage tiles;
   - drainage ditch;
   - small pond, reservoir or wetland; and
   - designated wetlands.

3. Identify location of all groundwater connections, including:[1]
   - well locations;
   - drainage wells; and
   - rock outcrops.

4. Identify current conservation measures and locations, including:
   - grassed waterway; and
   - other (e.g. areas of no or reduced tillage, terraces, grass filter strip, setback areas with no manure application, etc.). Clearly label each conservation practice.

5. Nebraska operating permit: A 30-foot minimum setback is required between the edge of a stream channel, pond, or lake and the manure application. Setbacks of 100 feet are sometimes required. No setback is required from wetlands or grass waterways if they are not part of a stream or lake, but manure cannot be applied to standing or flowing water. Setback distances are required for some intermittent streams. Check with NDEQ. Setback distances are not required wells, buried tile lines, wetlands, irrigation reuse pits, manure storage facilities, or grassed waterways.

   EPA's NPDES permit will require setbacks of 100 feet or a permanent vegetated buffer of 35 feet between areas of manure application and down-gradient surface waters, open tile line intake structures, sinkholes, agricultural well heads, or other conduits to surface waters.

[1] Not required for NDEQ permit application.

Form 4 (Part 2): Field maps of Manure Application Sites

Create a scaled drawing on this page or replace with USDA-FSA aerial photograph for each land application site. Attach to *Form 4, Part 1 (page 13).*

DRAFT

Land Application Equipment Inventory

Instructions for Form 5

Purpose

Form 5 is designed to summarize the availability of equipment for land application of manure and related descriptive information. NDEQ requests this information as part of its cursory review of the ability of a livestock operation to handle the volume of manure (based on animal numbers) and the transport distances (based on land application site information) indicated by a permit application.

Instructions

For each piece of equipment used for application of manure or lagoon effluent (spreader, slurry tank, irrigation system, towed hose unit), please identify the following information. For custom application equipment, list the most likely custom application equipment that normally will be used:

Column a. Indicate a name or description for each piece of land application equipment.

Column b. Type of Equipment: slurry tank…check "ST"; solids spreader…check "SS"; center pivot…check "CP"; other sprinkler…check "OS"; flood irrigation…check "FI"; towed hose tractor unit…check "TH"

Column c. Does equipment include applicator that allows immediate incorporation into soil?

Column d. What is the capacity of this equipment for hauling or pumping?

Column e. What is a typical total daily application rate for this piece of equipment?

Column f. Who owns this land application equipment? If Owned by livestock operation…check "O"; if Leased by livestock operation…check "L"; if equipment belongs to a Custom Applicator… check "CA".

Column g. Which livestock system(s) or storage system(s) is (are) served by this equipment for land applying manure? For example, a box spreader might be used for land applying scraped manure from the feedlot pens and settle solids from the settling basin. A center pivot might be used for land applying top water from an anaerobic lagoon.

Form 5. Land Application Equipment Inventory

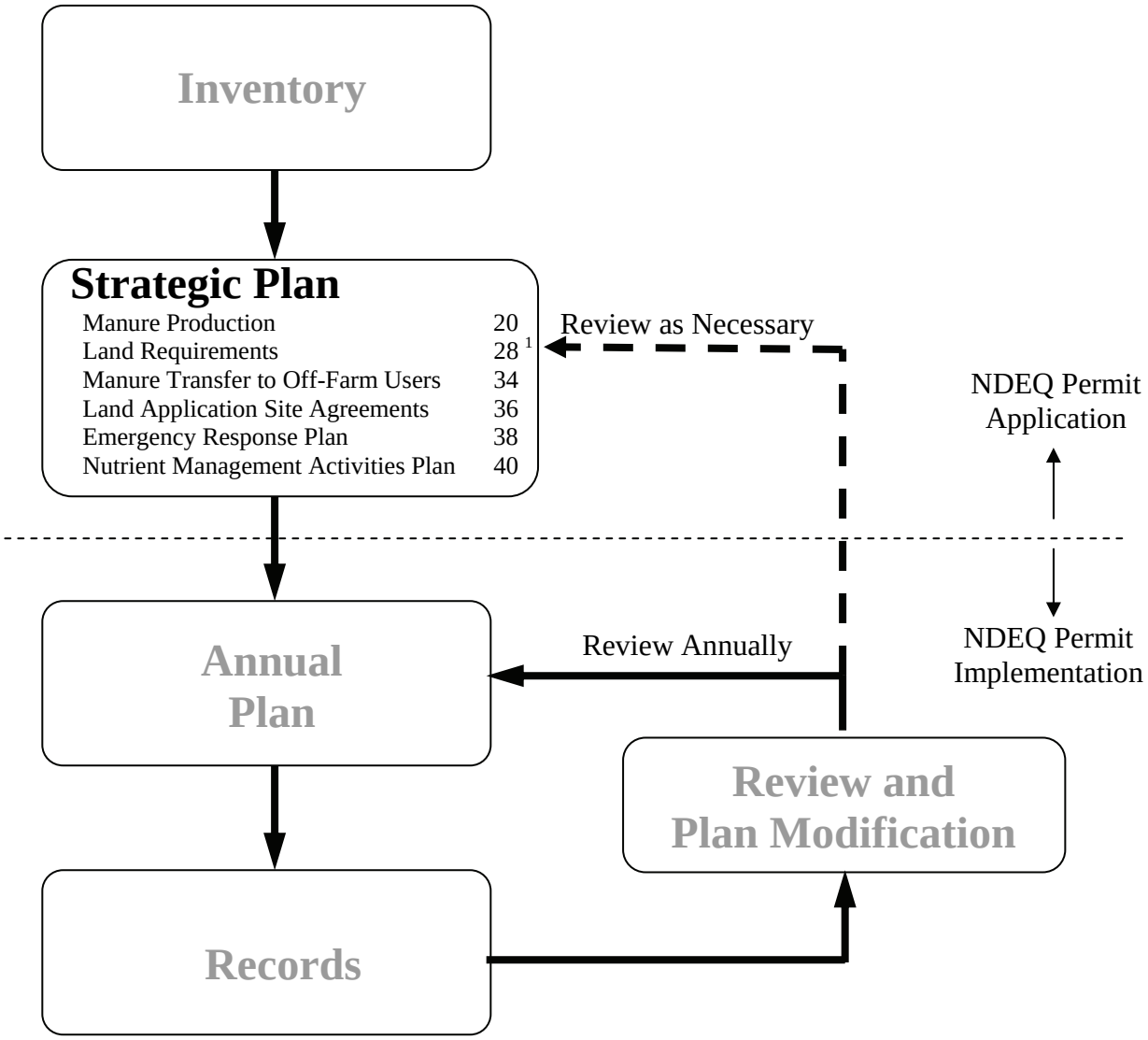
a. Equipment Description	b. Type of Equipment	c. Includes Incorporation Attachment?	d. Capacity	e. Typical Total Daily Application Rate	f. Ownership of Land Application Equipment [1]	g. Manure Storage System Served by this Equipment
Example: Slurry Tank Spreader	☒ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☒ YES ☐ NO	3,000 ☐ tons/load ☐ gallons/min. ☒ gallons/load	30 loads in 10 hrs. or 90,000 ☐ tons/day ☒ gallons/day ☐ acre-in./day	☒ O ☐ L ☐ CA	Swine finish, Deep pits
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	
	☐ ST ☐ SS ☐ CP ☐ OS ☐ FI ☐ TH	☐ YES ☐ NO	☐ tons/load ☐ gallons/min. ☐ gallons/load	☐ tons/day ☐ gallons/day ☐ acre-in./day	☐ O ☐ L ☐ CA	

1. Name and address of custom applicator: _____

Nebraska's CNMP

Comprehensive Nutrient Management Plan

Strategic Plan



[1]Or *Nutrient Inventory Spreadsheet* available from http://cnmp.unl.edu/cnmpsoftware.html

An electronic copy of this workbook and individual worksheets are available online at http://cnmp.unl.edu

Manure Nutrient Production

Instructions for Book Value Method of Estimating Nutrient Excretion (Form 6)

Purpose

Forms 6 through 12 estimate the land requirements for managing the nutrients in manure. Having access to sufficient land to utilize the nutrients in manure is fundamental to reducing environmental risk associated with manure management. The first step is to estimate the quantity of nutrients excreted by livestock. *Form 6* provides a method for estimating nutrient excretion generally accepted by NDEQ.

Regulations

The state of Nebraska requires that a livestock operation demonstrate access to sufficient land to manage the nitrogen in manure. Although land requirements are not directly related to phosphorus in manure, Nebraska regulations trigger an NDEQ review of land application sites when soil phosphorus levels exceed 150 ppm measured by the Bray 1 or Mehlich III soil tests (or 100 ppm by Olsen soil test[1]). To avoid this trigger, sufficient land is critical for managing the phosphorus in manure.

References

Manure Nutrient Inventory Spreadsheet available online at:
http://cnmp.unl.edu/cnmpsoftware.html[2]

Estimating Manure Nutrients from Livestock (NebGuide G97-1334 available at http://www.ianr.unl.edu/pubs/wastemgt/g1334.htm)

Instructions

Step 1. Select between two alternative methods for estimating total manure nutrient excretion. The two methods are: 1) the Book Values Method *(Form 6)* and the Nutrient Balance Method *(Form 7)*. The Book Values Method uses standard values for nutrient excretion and is commonly utilized by NDEQ in the review of permit applications. The Nutrient Balance Method *(Form 7)* estimates nutrient excretion based on feed intake, feed nutrient concentration, and nutrients retained by the animal for meat, milk or egg production. This alternative estimate is generally a more accurate estimate of nutrient excretion and will give credit to dietary changes designed to reduce nutrient excretion. The referenced Excel spreadsheet performs the same calculations as in *Forms 6 and 7*.

Instructions for Book Values Method *(Form 6)*:

Step 2. Identify the manure storage system used on this livestock operation. A separate worksheet should be used for each manure handling system used in this livestock operation. For example, if the manure from the sow herd feeds an anaerobic lagoon and the manure from the grow/finish hogs is stored in a below-floor pit, use two separate worksheets, one for the anaerobic lagoon and one for the below-floor pits. The totals should be kept separate.

Step 3. Enter the required data:

Enter the following values for each group of livestock supplying manure:

- Col. b: Maximum one-time animal population supplying manure to the selected manure storage system.
- Col. c: The average body weight for each species and animal group.
- Col. e: The decimal fraction of the year the facility is occupied. NDEQ requires use of 1.0 to represent maximum capacity.

Step 4: Complete the following calculations:

- Col. d: Total animal weight = Columns b x c.
- Col. g: Total nitrogen production = Columns d x e x f.
- Col. i: Total phosphorus production (as phosphate) = Columns d x e x h.

Step 5: *Total nitrogen and phosphorus production.* Add manure nutrient production for all groups of animals using the same manure handing system and record it in:

- Cell j. Total nitrogen produced, and
- Cell k. Total phosphorus produced (as phosphate).

---

[1] Olsen soil test should only be used for soils with pH above 7.4.

[2] This Web site provides an alternative method for completing the calculations in *Forms 6* through *12*.

Form 6. Manure Nutrient Production:

Book Values Method for Estimating Manure Nutrient Excretion by Livestock

Manure storage system: _____

a. Livestock or Poultry Species	b. Maximum One-time Capacity (# of animals)	c. Average Weight (lb./animal)	d. Total Animal Weight at Capacity (lbs.) (b x c)	e. Fraction Of Year Facility is Occupied[1]	f. Lbs. of Manure N per lb. of Animal Weight per Year	g. Total N Production lbs. N/yr. (d x e x f)	h. Lbs. of manure P_2O_5 / lb. of Animal Weight per Year	i. Total P_2O_5 Production lbs. P_2O_5 /yr. (d x e x h)
Example : Swine...Finish	2000	150	300,000	1.0	0.15	45,000	0.13	39,000
Swine Nursery					0.22		0.21	
Grow					0.15		0.13	
Finish					0.15		0.13	
Sows and Litter					0.17		0.12	
Sows (Gestation)					0.07		0.05	
Gilts					0.088		0.066	
Boars					0.055		0.042	
Beef (450-750 lb.)					0.11		0.083	
Beef Feeder (high energy diet)					0.11		0.078	
Beef Feeder (high forage diet)					0.11		0.091	
Beef Cow					0.12		0.10	
Dairy Cow...50 lb./d					0.18		0.087	
Dairy Cow...70 lb./d					0.22		0.096	
Dairy Cow...100 lb./d					0.27		0.110	
Dry Cow					0.11		0.074	
Heifer/Calves					0.11		0.033	
Layer					0.30		0.26	
Pullet					0.23		0.20	
Broiler					0.40		0.28	
Turkey					0.27		0.23	
TOTALS:					j. Total N production: lbs. N/yr.		k. Total P_2O_5 production: lbs. P_2O_5 /yr.	

1. NDEQ typically requires use of 1.0 to represent maximum capacity. Source: *NRCS Agricultural Waste Management Handbook*, 4/92 with exception of dairy lactating and dry cows. Dairy estimates are from *H.H. Van Horn*. 1991. Achieving environmental balance of nutrient flow through animal production systems. *The Professional Animal Scientist.* 7:3:22-33.

Good Steward

Manure Nutrient Production

Instructions for Nutrient Balance Estimate of Nutrient Excretion (Form 7)

Purpose

Form 7 provides an alternative Nutrient Balance Method of estimating nutrient excretion based upon animal feed nutrient intake. It is generally considered more accurate but a less widely accepted approach at the time this publication was prepared. Typically, NDEQ uses procedures found in *Form 6* to estimate nutrient excretion.

References

Nutrient Inventory Spreadsheet available online at: http://cnmp.unl.edu/cnmpsoftware.html

Instructions

Step 1. Select between two alternative methods for estimating total manure nutrient excretion (see *Form 6* for Book Values approach discussion). Nutrient Balance Method *(Form 7)* estimates nutrient excretion based upon feed intake, feed nutrient concentration, and nutrients retained by the animal for meat, milk or egg production. This alternative estimate generally provides a more accurate indication of actual nutrient excretion and will give credit to dietary changes designed to reduce nutrient excretion. The referenced Excel spreadsheet performs the same calculations as *Form 7.*

Instructions for Nutrient Balance Method (Form 7)

Step 2. Identify the manure storage system used on the livestock operation. A separate worksheet should be used for each manure handling system. For example, if the manure from the sow herd feeds an anaerobic lagoon and the manure from the grow/finish hogs is stored in a below floor pit, two separate worksheets should be used, one for the anaerobic lagoon and one for the below floor pits. The totals should be kept separate.

Step 3. Enter the required data:

Enter the following values for each species of livestock supplying manure to this system:
(Values for Columns b, c, e, h, i, and n may be found in *Inventory Forms 2 and 3*)

- Col. a: Animal group to be evaluated
- Col. b: Daily feed intake (lbs.); note 'as fed' or 'dry'
- Col. c: Average feed crude protein (CP) content (%)
- Col. e: Average feed phosphorus (P) content (%)
- Col. h: (meat production only) Maximum one-time capacity: number of animals
- Col. i: (meat production only) Average daily gain per animal [*Form 2:* Cols. (e - d) ÷ f] (lbs. gain/day)
- Col. n: (milk and egg production only) Daily production [*Form 3*] (lbs. milk or eggs/day)
- Col. s: Days fed per year [*Forms 2 or 3*]

Step 4. Complete the following calculations:

- Col. d: Feed nitrogen concentration = Col. c ÷ 6.25 (converts quantity of protein to nitrogen)
- Col. f: Daily nitrogen in feed = Col. b x Col. d ÷ 100
- Col. g: Daily phosphorus in feed = Col. b x Col. e ÷ 100
- Col. l: Daily nitrogen retained by animals = Col. h x Col. i x Col. j
- Col. m: Daily phosphorus retained by animals = Col. h x Col. i x Col. k
- Col. q: Daily nitrogen retained by animal products = Col. n x Col. o
- Col. r: Daily phosphorus retained by animal products = Col. n x Col. p
- Col. t: Annual nitrogen excretion = [Col. s x (Col. f - Col. l)] OR [Col. s x (Col. f - Col. q)]
- Col. u: Annual phosphorus excretion = [Col. s x (Col. g - Col. m)] OR [Col. s x (Col. g - Col. r)]
- Col. v: Annual P_2O_5 (phosphate form) excretion = Col. u x 2.3

Step 5. Add together *manure nitrogen* and *phosphorus production* for *Farm Total*. Sum the values in *Column t* and put it in *Cell w* (total nitrogen production), and sum the values in *Column v* and put it in *Cell x* (total phosphorus production). This is the excretion for all groups of animals supplying the same manure handing system.

Good Steward

Form 7. Manure Nutrient Production:
Nutrient Balance Estimate of Manure Nutrient Excretion

I. Feed Nutrient Intake **Manure storage system:** _____

a. Animal Group	b. Group Daily Feed Intake (lbs./day)	Feed Nutrient Concentration (%)			Total Nutrient in Feed (lbs./day)	
		c. Crude Protein	d. N[1] (c ÷ 6.25)	e. P	f. Daily N fed (b x d ÷ 100)	g. Daily P fed (b x e ÷ 100)
Example: 1,000 beef finisher	27,000 lbs. DM/day	13.5%	13.5 ÷ 6.25 = 2.16%	0.35%	27,000 X 2.16 ÷ 100= 583 lbs./day	27,000 X 0.35 ÷ 100 = 94.5 lbs./day

II. Nutrients Retained by Animal

a. Animal Group	h. Maximum One-Time Capacity (# of animals)	i. Average Daily Gain / Animal (lbs./day) (see Form 2)	Live Weight Nutrient Concentration		Daily Nutrients Retained by Animal (lbs/day)	
			j. N	k. P	l. Nitrogen (h x i x j)	m. Phosphorus (h x i x k)
Example: Beef	1,000	4.1 lbs./d	0.026	0.0070	1,000 X 4.1 X 0.026 = 107 lbs./d	1,000 X 4.1 X 0.0070 = 28.7 lbs./d
Beef			0.026	0.0070		
Dairy			0.027	0.0075		
Pork			0.024	0.0050		
Hens			0.028	0.0058		
Broilers			0.028	0.0058		
Turkeys			0.028	0.0059		

III. Nutrients Retained by Animal Products

a. Animal Product	n. Daily Production (lbs./day) (see Form 3)	Nutrient Concentration of Animal Products		Nutrients Retained by Animal Products (lbs./day)	
		o. Nitrogen (lbs. N / lb. prod.)	p. Phosphorus (lbs. P / lb. prod.)	q. Nitrogen (n x o)	r. Phosphorus (n x p)
Milk[1]		0.0050	0.0010		
Eggs[1]		0.0166	0.0021		

IV. Nutrient Excretion by Livestock

a. Animal Group/Product	s. Days Fed per Year (days / yr.) (Forms 2 or 3)	Annual Nutrient Excretion		
		t. **N** [s x (f – l)] or [s x (f – q)] (lbs./yr.)	u. **P** [s x (g – m)] or [s x (g – r)] (lbs./yr.)	v. $\mathbf{P_2O_5}$[2] (u x 2.3) (lbs./yr.)
Example: Beef Finisher	350 days/year	350 x (583 – 107) = 167,000 lbs /year	350 x (94.5 – 28.7) = 23,000 lbs./year	23,000 x 2.3 =. 53,000 lbs P_2O_5 / year
Total		w.		x.

1. Nitrogen in feed = Protein ÷ 6.25, N in milk = Protein ÷ 6.38. Nitrogen content of 0.0050 assumes 3.2% protein in milk, Nitrogen in eggs = Protein ÷ 6.25. Nitrogen content of 0.0166 assumes 10.4% protein in eggs.
2. Lbs. P_2O_5 = lbs. P X 2.3

Instructions for Nutrients Available after Storage Losses (Form 8)

Purpose
Form 8 estimates the quantity of nutrients remaining after losses from manure storage.

References
NRCS Agricultural Waste Management Field Handbook (Chapter 11), available online at: http://www.ncg.nrcs.usda.gov/awmfh.html
Manure Nutrient Inventory Spreadsheet, available online at: http://cnmp.unl.edu/cnmpsoftware.html, completes these same calculations in a Microsoft® Excel spreadsheet.

Instructions
Nitrogen and phosphorus is lost during the storage or treatment phases of manure handling. *Form 8* allows one to develop a "ballpark" estimate of the nutrients remaining after storage losses. Producers must identify the manure storage or treatment system that most closely approximates their manure management facility, transfer the nutrient production numbers from *Form 6 or 7*, and complete the appropriate calculations.

A. Regularly harvested manure (*Part a* of *Form 8*).

Step 1. Identify the manure storage system(s) used in this livestock operation from the listing in the left hand column *(Column a).*

Step 2. Enter required data for each manure storage system. The user must enter the following values:
- Col. b: Total nitrogen excretion by livestock from *Form 6 (Column n)* or Form 7 (Column t).
- Col. e: Total phosphorus (as P_2O_5) excretion by livestock from *Form 6 (Column i)* or *Form 7 (Column v).*

Step 3. Complete the following calculations.
- Col. d: Available nitrogen after losses = Col. b x Col. c
- Col. g: Available phosphorus (as P_2O_5) after losses = Col. e x Col. f

  Note: The multiplication factor is the portion of nutrients retained in the manure. Most lost nitrogen volatilizes into the air as ammonia, and lost phosphorus settles as solids in the lagoon bottom or is lost as runoff from an open lot. Actual losses from individual situations may vary substantially.

B. Phosphorus retained in settled solids by an anaerobic treatment lagoon (*Part B* of *Form 8*)

Step 4. Retained phosphorus in anaerobic lagoon.
- Col. h: Enter the quantity of total manure phosphorus excretion from *Form 6 (Column i)* or *Form 7 (Column v).*
- Col. i: Enter the interval (years) between when settled solids are removed.
- Col. k: Calculate the total phosphorus retained in the settled solids = Col. h x Col. i x Col. j.

Form 8. Nutrients Available after Storage Losses

A. Regularly harvested manure.

a. *Manure Storage or Treatment System*	Nitrogen			P_2O_5		
	b. Total N Excretion *(Form 6 or 7)* (lbs.N/yr)	c. Fraction of N Remaining After Storage Loss	d. Available N After Losses (lbs.N/yr.)	e. Total P_2O_5 Excretion *(Form 6 or 7)* (lbs.P_2O_5/yr.)	f. Fraction of P Remaining After Storage Loss	g. Available P_2O_5 After Losses (lbs.P_2O_5/yr.)
Example: 1. Storage (liquid manure, top loaded storage)	45,000 (from Form 6)	X 0.70 =	31,500	39,000	X 1.0 =	39,000
1. Open lot or feedlot (scraped manure from pens and settling basin)		X 0.6 =			X 0.95 =	
2. Open lot or feedlot (runoff collected in holding pond)		X 0.05 =			X 0.05 =	
3. Manure pack under roof		X 0.70 =			X 1.0 =	
4. Bedded pack for swine. (e.g. hoop building) [1]		X 0.50 =			X 1.0 =	
5. Bedded pack & compost for swine. (e.g. hoop building) [1]		X 0.35 =			X 1.0 =	
6. Solid/semi-solid manure & bedding held in roofed storage		X 0.75 =			X 1.0 =	
7. Solid/semi-solid manure & bedding held in unroofed storage		X 0.65 =			X 0.95 =	
8. Liquid/slurry storage in covered storage		X 0.90 =			X 1.0 =	
9. Liquid/slurry storage in uncovered storage		X 0.75 =			X 1.0 =	
10. Storage (pit beneath slatted floor)		X 0.85 =			X 1.0 =	
11. Poultry manure stored in pit beneath slatted floor		X 0.85 =			X 1.0 =	
12. Poultry manure on shavings or sawdust held in housing		X 0.70 =			X 1.0 =	
13. Compost		X 0.70 =			X 0.95 =	
14. 1-Cell anaerobic treatment lagoon		X 0.20 =			X 0.35 =	
15. Multi-cell anaerobic treatment lagoon[1]		X 0.10 =			X 0.35 =	
16. Other:		X =			X =	

B. Phosphorus (as phosphate) retained in settled solids by an anaerobic treatment lagoon[1]

h. Total P_2O_5 Excreted Annually (from *Form 6* or *Form 7)*	i. Years Between Solids Removal	j. Portion Retained in Settled Solids	k. Total P_2O_5 in settled solids (h X i X j)
lbs./ac.	X	X 0.65	=

1. This applies to an anaerobic treatment lagoon with a permanent liquid pool and no agitation of contents or pumping from lagoon bottom during time of application.

Instructions for Manure Nitrogen after Land Application Losses (Form 9)

Purpose

The purpose of *Form 9* is to estimate the quantity of nutrients remaining after losses during manure application. For nitrogen, this procedure estimates ammonia losses but assumes all organic nitrogen will be crop available. This assumption will produce an over-estimate of crop available nitrogen for a single year, but provide a high estimate of land needed for management of manure nitrogen.

References

NRCS Agricultural Waste Management Field Handbook (Chapter 11), available online at: http://www.ncg.nrcs.usda.gov/awmfh.html

Manure Nutrient Inventory Spreadsheet, available online at: http://cnmp.unl.edu/cnmpsoftware.html, completes these same calculations in a Microsoft® Excel spreadsheet.

Instructions

Ammonia volatilization losses during land application are estimated in *Form 9* and are deducted from total available nitrogen after storage losses. The magnitude of ammonia losses depends upon the application method. The outcome of *Form 9* is the total available manure nitrogen that must be managed in crop production systems.

Col. a: Identify a manure storage and treatment system used on this livestock operation from the listing in *Form 8 (Column a)* for which available nutrient calculations were completed. Space is available for identifying three manure storage and treatment systems.

Col. b: Record the available nitrogen after manure storage losses from *Form 8, Column d,* into *Column b of Form 9.*

Col. c: Identify the application method that most closely approximates the methods used on your farm (see *Column h* of *Form 9* for choices and enter selection into *Column c*). More than one application method may be used for the manure from a single manure storage and treatment system.

Col. d: Fraction applied by this method. For example, you may broadcast one-third of your manure without incorporation and broadcast and incorporate the remaining two-thirds within one day. Enter it in decimal form.

Col. e: Record the fraction of nitrogen remaining after land application (from *Column i*) for the selected application methods.

Col. f: Available nitrogen after land application losses[1] = Column b x Column d x Column e

Cell g: Sum the total nitrogen available by summing values in *Column f* and recording the total in *Cell g.*

[1] This estimate of nitrogen availability includes assumptions for fraction of the manure nitrogen that is in organic and ammonium forms. This availability factor is acceptable for estimating land requirements for a permit application. However, it should not be used for estimating actual manure application rates. *See Figure 1 (page 48)* for availability factors for calculating application rates.

Form 9. Nitrogen Available After Land Application Losses

Manure Storage or Treatment System		Application Method			f. Nitrogen Available after Storage and Land Application Losses (Cols. b x d x e) (lbs. N/year)
a. Reference Number from Form 8, Col. a	b. Manure N after Storage System Losses (Form 8, Col. d) (lbs. N/year)	c. Application Method (From Col. h below)	d. Fraction of Manure Applied by this Application Method	e. Fraction of N Remaining after Land Application (from Col. i below)	
Example: 1. Storage (liquid manure, top loaded storage)	31,500 lbs./year	Broadcast/not incorporated	0.33 (1/3)	0.50	5,200 lbs. N / yr
	31,500 lbs./year	Broadcast/incorporated in 24 hrs	0.67 (2/3)	0.75	15,800 lbs. N / yr
TOTAL Example					g. lbs N/yr 21,000 lbs N/yr

The fraction of manure nitrogen after storage losses still potentially available in the soil is estimated below. Ammonia volatilization causes the predicted losses. All organic-N is assumed available.

h. Application Method	i. Fraction Remaining of Manure N after Storage Losses	
	Slurry or Fresh Solids[1]	Bedded Pack, Open Lot, or Composted Solids[2]
Injection	0.95	
Irrigation	0.75	
Broadcast and incorporated:		
Immediately	1.00	1.00
Within 1 day	0.75	0.90
Within 4 days	0.60	0.80
Within 7 days or more	0.50	0.75
Not incorporated	0.50	0.75

[1]Assumes manure nitrogen is 50% ammonium and 50% organic-N.
[2]Assumes manure nitrogen is 25% ammonium and 75% organic-N.

Instructions for Land Requirements for Manure Nitrogen Utilization (Form 10)

Purpose

The purpose of *Form 10* is to estimate if sufficient land is available for utilizing the nitrogen in manure at agronomic rates. If there is manure nitrogen (N) remaining, *Form 13* (Plan for Manure Transfer to Off-Farm Users) or *Form 14* (Land Application Site Agreement) will need to be completed to account for unused nitrogen.

THIS PROCESS IS NOT INTENDED FOR MAKING CROP NUTRIENT APPLICATION RECOMMENDATIONS OR DEVELOPING AN ANNUAL NUTRIENT MANAGEMENT PLAN.

Regulations

The state of Nebraska requires that a livestock operation demonstrate access to sufficient land to manage the nitrogen in manure. Although land requirements are not directly related to phosphorus in manure, Nebraska regulations trigger an NDEQ review of land application sites when soil phosphorus levels exceed 150 ppm measured by Bray 1 or Mehlich III soil tests (or 100 ppm by Olsen soil test). To avoid this trigger, sufficient land is critical for managing the phosphorus in manure.

References

NRCS Agricultural Waste Management Field Handbook (Chapter 11), available online at:
http://www.ncg.nrcs.usda.gov/awmfh.html

Manure Nutrient Inventory Spreadsheet, available online at: http://cnmp.unl.edu/cnmpsoftware.html, completes these same calculations in a Microsoft Excel spreadsheet.

Instructions

Nitrogen utilization by cropping systems is compared to the manure nitrogen after losses to determine if sufficient land is available for agronomic application of manure nitrogen. Typical cropping programs, yields, and crop nitrogen requirements are entered for individual fields available for land application. The nutrient requirements of individual fields are subtracted from the previous estimates of manure nitrogen. This process is repeated until a sufficient number of fields are identified to utilize all manure nitrogen.

Step 1. Enter required information including:

Cell a: Total available manure nitrogen from *Form 9, Cell g.*

Col. b: Field or management area ID for fields to be used for manure application. Names should match those included in the Inventory Section *(Form 4).*

Col. c: Size of individual fields in acres. (This should also match *Form 4*.)

Col. d: Crop grown for a typical year. Acres for individual crops should match a typical rotation. For example, a 200-acre farm with a corn-soybean rotation should list fields with a total of 100 acres of corn and 100 acres of soybeans.

Col. e: Expected yield. Enter the five-year historical average (excluding years with unusual stress) plus 5 percent. Units: bu./ac., tons/ac., lb./ac.

Col. f: Crop Nitrogen Requirement. (approximation for long-term planning or permit application only) =

Yield Goal X N Utilization Factor X N Removal Rate (from Reference *Table R-1*)

Use a N utilization factor of 1.3 for corn and small grains; 0.5 for legumes; and 1.0 for grain sorghum, all other forage, silage and other crops. This approximation of crop nitrogen requirement assumes a moderately low soil residual nitrate level of 3 to 6 ppm and average soil organic matter level. If nitrogen rate recommendations based on past soil tests are available for an individual field, that value may be a preferred alternative to this estimate.

Col. g: Sum of all non-manure nitrogen credits not accounted for in the value in *Col. f* (e.g. legumes [*Table R-3*], residual soil nitrate, irrigation water nitrates) and planned commercial fertilizer application.

Step 2. Complete the following calculations.

Col. h: Manure nitrogen requirement per acre = Column f - Column g

Col. i: Manure nitrogen use by field = Column c x Column h

Col. j: Remaining manure nitrogen to be used by other fields = Cell a - Column i (for first field entry)
For all remaining fields, Column j = Column j for previous field - Column i for current field.

Step 3. Enter additional fields and repeat calculations until Remaining Manure Nitrogen *(Column j)* is 0. If some manure nitrogen is left over after all available fields have been utilized, then either arrange for additional land area for manure application or use *Form 13* to show your plan to transfer manure nutrients to off-farm customers.

Form 10. Land Requirements for Manure Nitrogen Utilization

Caution: This simplified estimating procedure does not account for crop availability or manure organic nitrogen, various nitrogen credits (e.g. residual nitrates in the soil), or inefficiencies in crop recovery of nitrogen. As such this procedure is intended only to provide NDEQ an estimate of "approximate" land required for managing manure nitrogen as part of a permit application. It should not be used for estimating actual manure application rates.

Total Manure Nitrogen After Losses (*Form 9, Cell g*) =_____(a) lbs. N/yr.

Example: 21,000 lb.N/yr.

b. Field ID	c. Acres	d. Crop	e. Expected Yield units	f. Crop Nitrogen Requirement (lbs. N/ac.) [1]	g. Nitrogen Credits (lbs. N/ac.)	h. Manure-N Requirement (f – g) (lbs. N/ac.)	i. Manure-N Use by Field (c X h) (lbs. N/field)	j. Remaining Manure N (lbs/yr) …. [(a - i) or (last j - i)]
Example[1]	80	Corn	170 bu/ac.	166 lb./acre	30 lb/ac.	136 lb./ac	10,900 lbs	10,100 lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.

Separation

[1]For the example, crop N removal equals 170 bu./ac. x 1.3 x 0.75 lb. N/bu. (from *Reference Table R-1*) or 166 lbs. of N/acre. A nitrogen utilization efficiency factor of 1.3 is used. Good nitrogen management practices would be necessary to achieve this efficiency. This is an approximation for long-term planning or permit applications when soil test results would not be available.

Instructions for Land Requirements for Manure Phosphorus Utilization (Form 11)

Purpose

The purpose of *Form 11* is to estimate if sufficient land is available for utilizing the phosphorus in manure at agronomic rates. This estimate is currently not required in Nebraska; however, proposed U.S. Environmental Protection Agency rules may soon require that manure application be based on phosphorus.

THIS PROCESS IS NOT INTENDED FOR MAKING CROP NUTRIENT APPLICATION RECOMMENDATIONS OR DEVELOPING AN ANNUAL NUTRIENT MANAGEMENT PLAN.

References

NRCS Agricultural Waste Management Field Handbook (Chapter 11), available online at: http://www.ncg.nrcs.usda.gov/awmfh.html

Manure Nutrient Inventory Spreadsheet, available online at: http://cnmp.unl.edu/cnmpsoftware.html, completes these same calculations in a Microsoft® Excel spreadsheet.

Instructions

Phosphorus utilization by cropping systems is compared to the available manure nutrients after losses to determine if sufficient land is available for agronomic application of manure phosphorus. Typical cropping programs, yields, and crop phosphorus requirements are entered for individual fields available for land application. The nutrient requirements of an individual field are subtracted from the previous estimates of available manure phosphorus. This process is repeated until sufficient fields are identified to utilize all manure phosphorus.

Step 1. Enter required information including:

Cell a: Total available manure phosphorus from *Form 8, Col. g*. Sum all Column g entries.

Col. b: Field or management area ID for fields to be used for manure application. Names should match those included in the Inventory section *(Form 4).*

Col. c: Size of individual fields in acres (this should also match *Form 4*).

Col. d: Crop grown for a typical year. Acres for individual crops should match a typical rotation.

Col. e: Expected yield. Enter the five-year historical average (excluding years with unusual stress) plus 5 percent. Units: bu./ac., tons/ac., lb./ac.

Col. f: Crop Phosphorus Requirement. This should be based upon historical soil tests and recommendations. Look these up in *Reference Tables R-18 to R-32*. If this information is not available, an alternative is to use crop phosphorus removal rates from *Reference Table R-1*.

Col. g: Sum of all non-manure phosphorus credits or planned commercial fertilizer application.

Step 2. Complete the following calculation.

Col. h: Manure phosphorus requirement per acre = Column f - Column g

Col. i: Manure phosphorus use by field = Column c x Column h

Col. j: Remaining manure phosphorus to be used by other fields = Cell a - Column i (for first field entry)
For all remaining fields, Column j = Column j for previous field - Column i for current field.

Step 3. Enter additional fields and repeat calculations until *Remaining Manure Phosphorus (Column j)* is 0. If some manure phosphorus is left over after all available fields have been utilized, then either arrange for additional land area for manure application, or use *Form 13* to show your plan to transfer manure nutrients to off-farm customers.

Good Steward

Form 11. Land Requirements for Manure Phosphorus Utilization

Available Manure Phosphorus *(Form 8, Col. g)* = _____ (a) lbs. P_2O_5
Example: 39,000 lb./year

b. Field ID	c. Acres	d. Crop	e. Expected Yield (units)	f. Crop P_2O_5 Requirement[1] (lbs./acre)	g. P_2O_5 Credits (lbs./ac.)	h. Manure P_2O_5 Requirement (f – g) (lbs./acre)	i. Manure P_2O_5 Use by Field (c x h) (lbs./field)	j. Remaining Manure P_2O_5 (a-i) (lbs./year) (j above - i)
Example	80	Corn	170 bu./ac	51 lbs./ac	0 lbs./ac	51 lbs./ac	4,100 lbs.	34,900 lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.
				lbs/ac	lbs/ac	lbs/ac	lbs.	lbs.

[1]For the corn example, crop phosphorus removal equals 170 bu./ac. X 0.30 lb. P_2O_5 / bu. (from *Reference Table R-1*) or 61 lbs. of P_2O_5/ac.

Supporting Papers

Instructions for Land Requirements for Sludge P Utilization from Anaerobic Lagoon (Form 12)

Purpose

The purpose of *Form 12* is to estimate if sufficient land is available for utilizing the phosphorus in sludge harvested from anaerobic lagoons if applied at phosphorus-based rates. This worksheet makes the assumption that all sludge will be harvested which may not be true for lagoon management. An understanding of the land requirements for utilizing anaerobic lagoon phosphorus (the only nutrient that can be predicted with some accuracy in advance of sludge removal) is important to NDEQ's required Sludge and Sediment Management Plan.

THIS PROCESS IS NOT INTENDED FOR MAKING CROP NUTRIENT APPLICATION RECOMMENDATIONS OR DEVELOPING AN ANNUAL NUTRIENT MANAGEMENT PLAN.

Regulations

The state of Nebraska requires that a permitted livestock operation have a Sludge and Sediment Management Plan. A discussion of measures taken to utilize sludge and sediment nutrients at agronomic rates may be included with this plan.

References

NRCS Agricultural Waste Management Field Handbook (Chapter 11), available online at: http://www.ncg.nrcs.usda.gov/awmfh.html

Manure Nutrient Inventory Spreadsheet, available online at: http://cnmp.unl.edu/cnmpsoftware.html, completes these same calculations in a Microsoft® Excel spreadsheet.

Instructions

Phosphorus utilization by cropping systems is compared to the available sludge nutrients after losses to determine if sufficient land is available for agronomic application of sludge phosphorus.

Step 1. Enter required information including:

Cell a: Total available sludge phosphorus. Obtain value from *Form 8, Column k*.

Col. b: Field ID for fields to be used for sludge application. Names should match those included in the Inventory Section *(Form 4)*. These fields should be different from those fields that have historically received lagoon effluent or manure if those nutrient sources are meeting crop nutrient needs.

Col. c: Size of individual fields in acres. (This should also match *Form 4*).

Col. d: Crop grown for a typical year.

Col. e: Expected yield. Expected yield should be estimated based upon a five-year historical average plus 5 percent.

Col. f: Crop phosphorus requirements. If this information is not available from *Reference Tables R-18 to R-32*, use crop phosphorus removal rates from *Reference Table R-1* (see page 78).

Col. g: Years of crop phosphorus needs to be supplied by one sludge application. If soil phosphorus levels are less than 50 ppm Bray 1 or 35 ppm Olsen, it may be acceptable to build soil phosphorus levels by applying sufficient phosphorus to supply several years of crop needs (maximum of five years). **In addition, a final application rate should compare sludge nitrogen and crop nitrogen requirements (determined by laboratory analysis) to avoid over-application of nitrogen for a single cropping season.**

Step 2. Complete the following calculation.

Col. h: Sludge phosphorus use by field = Column c x Column f x Column g.

Col. i: Remaining sludge phosphorus to be applied to other fields = Cell a - Column h (for first field entry)
For all remaining fields: Column i = Column i for previous field - Column h for current field

Step 3. Enter additional fields and repeat calculations until *Remaining Sludge Phosphorus (Column i)* is 0. If some manure phosphorus is left over after all available fields have been utilized, then either arrange for additional land area for manure application, or use *Form 13* to show your plan to transfer manure nutrients to off-farm customers.

Good Steward

Form 12. Land Requirements for Using Phosphorus in Sludge from Anaerobic Lagoons

Available Sludge Phosphorus *(Form 8, Col. k)* = _____ (a) lbs. P_2O_5

Example: 164,000 lbs

Sludge was accumulated over _____ years (Form 8, Col. i).

b. Field ID	c. Acres	d. Crop	e. Expected Yield (units)	f. Crop P_2O_5 Requirement[1] (lbs./acre)	g. Years of Crop P_2O_5 Needs Supplied[2]	h. Sludge- P_2O_5 Use by Field (c x f x g) (lbs.)	i. Remaining Sludge- P_2O_5 (a - h) (lbs.) (i above - h)
Example	160	Corn	170 bu/ac.	51 lbs./acre	5 yrs.	41,000 lbs.	123,000 lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.
				lbs/acre	yrs.	lbs.	lbs.

[1]For the corn example, crop phosphorus removal equals 170 bu./ac. times 0.3 lb. P_2O_5 /bu. (from *Reference Table R-1*) or 61 lbs. of P_2O_5/acre.

[2]A final application rate should compare nitrogen applied as sludge and crop nitrogen requirements to avoid overapplication of nitrogen for any single cropping season.

Suggested Plan

Instructions for Manure Transfer to Off-Farm Users (Form 13)

Purpose

This form will guide the development of a management plan for transferring or marketing manure to off-farm users acceptable to NDEQ's requirements for utilizing manure nitrogen.

Regulations

The state of Nebraska requires that a livestock operation demonstrate access to sufficient land to manage the nitrogen in manure. If sufficient land is not available for utilization of manure nutrients on crop land owned or managed by the livestock manager, then two alternatives exist for documenting environmentally sound management of the manure nutrients that will need to be transferred to off-farm users:

- A plan for marketing or transferring manure to off-farm users of manure *(Form 13)*. This option may be acceptable to NDEQ in some situations where a livestock operation is marketing manure as a fertilizer. This marketing plan will need to be supplemented with records documenting the movement of sufficient manure to off-farm users to meet the goals of the plan. Copies of sales receipts and records of sales will be necessary.
- A signed land use agreement *(Form 14)* describing the agreement between the landowner and the livestock producer for manure application to that land (preferred by NDEQ).

Instructions

Step 1. Enter required information including:

Col. a: Annual quantity of manure to be transferred to crop producers, horticulture related businesses, and other consumers you identify.

Col. b & Col. d: Expected concentration of manure nitrogen, and manure phosphorus (optional). Terms: lbs./ton, lbs./1000 gallons, or lbs./acre-inch.

Row f: Enter the anticipated excess manure nitrogen following manure applications to owned or rented land, or land receiving manure based on easements. Obtain estimate from lowest remaining nitrogen value from *Form 10*, Column j.

Step 2. Complete the following calculation.

Col. c: Total manure nitrogen transferred off-farm annually = Column a x Column b.

Col. e: Total manure phosphorus transferred off-farm annually = Column a x Column d.

Row h: Unused manure nitrogen = Row f - Row g. Answer in Row h should be near 0. If unused manure nitrogen is significant, additional land for application or additional manure sales will need to be identified.

Step 3. Identify and describe the services the livestock operation will provide in support of manure transfer or sale.

Step 4. Identify frequency with which summary of actual manure sales or transfer will be reported to NDEQ and attach copy of record keeping forms to be maintained.

Step 5. Prepare a business plan, if appropriate, for marketing of manure and attach to report.

Form 13. Plan for Manure Transfer to Off-Farm Users

Information in *Columns a-c* is required for a state operating permit.

1. Manure nutrients to be transferred to off-farm users.

	a. Annual Quantity of Manure Transferred	Nitrogen Transferred Off-Farm		Phosphorus Transferred Off-Farm	
		b. Concentration From Manure Analysis	c. Total Annual Transfer (lbs.) [a x b]	d. Concentration From Manure Analysis	e. Total Annual Transfer (lbs.) [a x d]
f. Excess Manure Nitrogen *(Form 10, Column j)*					
Off-Farm Users: Crop Producers	☐ Tons ☐ Gallons ☐ Acre-in				
Horticulture Businesses	☐ Tons ☐ Gallons ☐ Acre-in				
Others: _____	☐ Tons ☐ Gallons ☐ Acre-in				
g. Total Off-Farm Uses of Manure	☐ Tons ☐ Gallons ☐ Acre-in				
h. Unused Manure Nitrogen *[Row f – Row g]*					

2. Services to be offered in support of manure transfer to off-farm users.

a. Handling and application services to be included with manure.

☐ Loading of manure ☐ Transport of manure to site
☐ Land application of manure ☐ Incorporation of manure

Describe: _____

b. Agronomic services to be included for assisting users in agronomic applications of manure.

☐ Calibration of manure applicator ☐ Soil testing
☐ Manure analysis ☐ Consulting agronomist
☐ Customer report following application of manure nutrient rates

Describe: _____

c. Nuisance avoidance services to be included with transfer of manure to off-farm user:

☐ Incorporation of manure ☐ Setback of application from homes:_____
☐ Composting of manure ☐ Setback of application from waters of the state:
☐ Composting _____
☐ Notification of neighbors ☐ Other setbacks: _____
☐ Notification of local government ☐ Timing to limit nuisance: _____

3. Attach copy of recording forms to be used.

4. Manure marketing plan. Attach copy of a) past years' manure sales or transfers or b) plan for promotion, pricing, and other business issues for transferring manure to off-farm users.

Sample Plan

Instructions for Land Application Site Agreements (Form 14)

Purpose

A signed agreement is required for manure application on land not owned or managed by the animal feeding operation. This form provides a sample agreement for land application of manure on land not owned by the animal feeding operation. If a lease agreement includes terms for manure application, a copy of this lease agreement is an acceptable alternative.

NDEQ Title 130

The state of Nebraska requires that a livestock operation demonstrate access to sufficient land to manage the nitrogen in manure. If sufficient land is not available for utilization of manure nutrients on cropland owned or managed by the livestock manager, two alternatives exist for documenting environmentally sound management of the manure nutrients that will need to be transferred to off-farm users:

- A plan for marketing or transferring manure to off-farm users of manure *(Form 13)*. This option may be acceptable to NDEQ in some situations where a livestock operation is marketing manure as a fertilizer. This marketing plan will need to be supplemented with records documenting the movement of sufficient manure to off-farm users to meet the goals of the plan. Copies of sales receipts and records of sales will be necessary.
- A signed land use agreement *(Form 14)* describing the agreement between the landowner and the livestock producer for manure application to that land (preferred by NDEQ).

Sample Forms Provided

1. *Form 14*. Agreement for land application of manure.

Form 14. Land Application Site Agreement for Manure Application

I, _____ , hereby give permission to the animal production facility owned by_____ for the application of animal manure to_____ acres of my land for the duration of the agreed upon time shown below. The land involved in this agreement is located at:

1/4	Sec-tion	Town-ship	Range	E or W	County	Crop Acres	Crop Rotation	Average Yields
				☐ or ☐				
				☐ or ☐				
				☐ or ☐				
				☐ or ☐				

Sample Only

Restrictions agreed upon by all parties include:

_____

_____

_____

Responsibilities of individual parties include[1]:	Landowner	Animal Producer	Other: _____
Crop nutrient management plan……...	☐	☐	☐
Soil testing*……...	☐	☐	☐
Manure analysis……...	☐	☐	☐
Manure applicator calibration…….….	☐	☐	☐
Crop nutrient status monitoring……...	☐	☐	☐
Record keeping* ……...	☐	☐	☐

* Copies must be maintained by livestock facility owner.

I understand that this manure contains organic matter, nitrogen, phosphorus, potassium, trace elements and pathogens which, if applied at agronomic rates at appropriate times to minimize surface water runoff, should not harm my land, my crops, or waters of the state of Nebraska. I also understand that the use of animal manure will reduce my need for commercial fertilizer, that a nutrient management plan that credits manure nutrients should be implemented, and that failure to reduce commercial fertilizer use when animal manure is applied is likely to have a detrimental impact on water quality.

Period of Agreement: From: _____/_____/ 20____ To: _____/_____/ 20____
month day year month day year

Landowner Signature _____ Date: _____

Animal Facility Owner Signature _____ _____

Landowner Animal Facility Owner

Name: _____ _____

Address: _____ _____

Phone Number: _____ _____

1. Assigned responsibilities should match with *Nutrient Management Activities Plan (Form 16).*

Instructions for Emergency Response Plan (Form 15)

Purpose

Form 15 provides a generic *Emergency Response Plan* from which a plan can be developed to address possible emergency situations specific to an individual farm that may lead to a manure spill or discharge. Fill out one copy of this form for each potential emergency situation related to the land application manure that applies to your livestock operation.

NDEQ Title 130

Permitted facilities must maintain an *Emergency Response Plan* for controlling a spill or discharge of animal waste due to any number of causes including:

1. power failure
2. storms or extended wet periods
3. accidents
4. equipment failure (including irrigation equipment and components)
5. failure of components of the livestock waste control facility

Permitted facilities also are required to report any discharge to NDEQ within 24 hours of the event and file a written report with NDEQ within seven days of the discharge. The department may request rainfall, land application, and storage system records for up to 12 months prior to the discharge.

Instructions

1. Identify situations associated with land application of manure or other effluent that may lead to a spill or discharge:

   ☐ Overturned manure spreader or slurry tank or other spillage of load
   ☐ Broken transfer pipe or connection
   ☐ Pivot that becomes stuck or immobile while continuing to pump effluent
   ☐ Manure runoff from land application site
   ☐ Other:_____*
   ☐ Other:_____*

   * Emergency response plans necessary for manure storage related emergencies should be prepared as part of the *"Manure and Open Lot Runoff Storage Workbook."*

2. For each issue identified in the attached generic *Emergency Response Plan,* identify the information important to your employees for responding to an emergency situation. This report is intended for emergency situations that lead to manure or other effluent spills. It also can be used for other emergency situations such as fire, loss of power, storm damage, etc.

Form 15. Emergency Response Plan

Date: _____

Farm Name and Location: _____

Potential Cause of Discharge. Possible situations which may require an *Emergency Response Plan*:

☐ Power failure ☐ Storm/extended wet period ☐ Accident

☐ Equipment failure ☐ Failure of berm or other facility component:

Describe: _____

In Case of an Emergency:

1. *Implement the following first response or containment steps:*

_____

_____

_____

2. *Assess the extent of the emergency and determine required help. Collect the following information:*

☐ Description of emergency ☐ Quantity of manure/effluenet released ☐ Required help

☐ Obvious damage: employee injury, fish kill, property damage ☐ Containment actions in progress

☐ Other: _____

3. Contact the farm's emergency response team leader:

Name: _____ Phone: _____

Name: _____ Phone: _____

4. Give the team leader the following information:

a. Your Name b. Spill/emergency location c. Information collected in *Step 2*

5. Available equipment/supplies for responding to emergency:

Equipment/Supplies	Contact Person	Phone Number

6. Contacts to be made by farm's emergency response team leader (discharge must be reported to NDEQ within 24 hours):

Organization	Contact Person	Phone Number
NDEQ		(402) 471-2186
County contact (sheriff or other)		

7. Additional containment measures, corrective measures, or property restoration measures.

8. Will written report of accident or spill be submitted to NDEQ? ☐ Yes ☐ No

(Written report must be filed with NDEQ within seven days for manure discharges.)

Instructions for Nutrient Management Activities Plan (Form 16)

Purpose

The purpose of a *Nutrient Management Activities Plan* is to define procedures to be used for manure application, soil testing and manure analysis. These activities are unlikely to change from one cropping year to the next. As such, this document only needs to be updated as the need arises. This planning document should be submitted as part of the Livestock Waste Control Facility permit application to NDEQ.

The *Nutrient Management Activities Plan for Soil Testing* summarizes the specific activities related to soil sampling procedures, sampling timing and frequency, and laboratory analysis to be completed. In addition, other indicators of crop nitrogen status to be used can be identified in this section.

The *Nutrient Management Activities Plan for Manure Nutrient Analysis* summarizes the specific activities that will be implemented relative to manure analysis, including sampling procedures, frequency and timing of sampling, and analysis to be completed.

The *Nutrient Management Activities Plan for Manure Application* summarizes the specific activities to be implemented relative to manure application, including application equipment calibration, setback distances to be maintained, timing and frequency of manure application, and records to be maintained.

Regulations

NDEQ's Title 130 requires that a permit application include a nutrient management plan that includes: "waste sampling and analysis procedures, land application soil sampling and analysis procedures, and planned application rates, methods, and frequencies." To comply with these regulations, the producer will need to submit an *Activities Plan* for:

- Soil Sampling (page 41)
- Manure Analysis (page 42)
- Manure Application (page 43)

This *Nutrient Management Activities Plan* should be submitted to NDEQ at the time of a permit application.

References

Guidelines for Soil Sampling (G1000), http://www.ianr.unl.edu/pubs/soil/g1000.htm or contact local UNL Extension office.
Manure Applicator Calibration. NebGuide G1267, http://www.ianr.unl.edu/pubs/wastemgt/g1267.htm
Manure Application Calibration Guide, page 87 of this workbook.
Manure Testing: What to Request? NebFact NF507, http://www.ianr.unl.edu/pubs/wastemgt/nf507.htm
Manure Characteristics, Midwest Plan Service Publication 18, Section 1, available from your local UNL Extension office.
Nutrient Management for Agronomic Crops in Nebraska, EC155, available to order from your local UNL Extension office.
Sampling Manures for Nutrient Analysis, NebGuide G1450, http://www.ianr.unl.edu/pubs/wastemgt/g1450.htm
The Corn Stalk Nitrate Test, NebFact NF491, http://www.ianr.unl.edu/pubs/fieldcrops/nf491.htm
Using a Chlorophyll Meter to Improve Nitrogen Management, NebGuide G1771, http://www.ianr.unl.edu/pubs/soil/g1171.htm
University of Nebraska Soils Home Study Course, http://www.ianr.unl.edu/soilshomestudy/index.htm or call (402) 821-2151.

Form 16. Nutrient Management Activities Plan for Soil Testing

Describe in *Column a* the typical procedures used for soil sampling for your most common crop(s). In *Columns b and c*, identify variations in the typical procedure that may be used for specialty crops or situations.

	a. Typical Procedures for Crop: _____ Approx. acres: _____	b. _____ Approx. acres: _____	c. _____ Approx. acres: _____
Frequency and Soil Sampling for N and P			
Sampling Procedures for N and P: (e.g. no. of cores / area, depth, acres / sample area, etc.)			
Sample Analysis Procedures for N and P:	☐ Soil nitrate ☐ Bray 1 for P ☐ Olsen for P Lab:_____ ☐ Melich III for P ☐ Other: _____	☐ Soil nitrate ☐ Bray 1 ☐ Olsen ☐ Melich III ☐ Other: _____	☐ Soil nitrate ☐ Bray 1 ☐ Olsen ☐ Melich III ☐ Other: _____
Source (e.g. UNL) of Nitrogen and Phosphorus Recommen-dations			

Additional Crop Nutrient Status Measurements
(e.g. other soil nitrate tests, irrigation water tests, chlorophyll meter readings, corn stalk nitrate test, etc.).

Test:			

Timing of Selected Activities. Check appropriate months when practice should occur.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Soil sampling												
Additional crop nutrient status indicators												

Form 16. Nutrient Management Activities Plan for Manure Nutrient Analysis

	Manure Handling System # __: _____	Manure Handling System # __: _____
Manure Sampling Frequency:		
Sample Collection Procedures: (see publications No. 4 and 7, pg. 40)		
Analysis to be Completed	☐ Total nitrogen (required) ☐ Ammonium nitrogen (required) ☐ Organic nitrogen (recommended) ☐ Phosphorus (recommended) ☐ Potassium ☐ Trace minerals ☐ Moisture or solids content (recommended) ☐ pH ☐ Electrical conductivity (recommended*) ☐ Other: _____	☐ Total nitrogen (required) ☐ Ammonium nitrogen (required) ☐ Organic nitrogen (recommended) ☐ Phosphorus (recommended) ☐ Potassium ☐ Trace minerals ☐ Moisture or solids content (recommended) ☐ pH ☐ Electrical conductivity (recommended*) ☐ Other: _____
Other: (e.g. laboratory used)		

* Recommended for anaerobic lagoons. Conductivity levels less than 7 mmho/cm or 7,000 µmho/cm are important to bacterial activity in a well functioning anaerobic lagoon.

Timing of Selected Activities. Check appropriate months when practice should occur.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Manure sampling												

Form 16. Nutrient Management Activities Plan for Manure Application

	Manure Handling System # __: _____	Manure Handling System # __: _____
Priorities for Fields Receiving Manure (response refers to both manure handling systems).	Identify top one or more priorities (number in order) from list below: ___ Potential to reduce commercial fertilizer use ___ Crops with high nitrogen requirement ___ Crops with high phosphorus requirement ___ Transport distance ___ Field's soil loss or runoff potential ___ Field's odor potential ___ Field's current phosphorus level ___ Fields benefitting from building soil organic level ___ Other: _____	
Application Plan: Method of application? Incorporation?		
Calibration Plan: Method? Frequency? See *Applicator Calibration Guide* (page 87)		
Planned Setback Distances:		
Record Keeping Plan *(attach sample forms)*	Records will be maintained of current and past: ☐ Annual crop plans (required) ☐ Actual crop yields (required) ☐ Manure analysis (required) ☐ Soil tests (required) ☐ Manure application rates (required) ☐ Off-farm transfers of manure ☐ Other: _____	Records will be maintained of current and past: ☐ Annual crop plans (required) ☐ Actual crop yields (required) ☐ Manure analysis (required) ☐ Soil tests (required) ☐ Manure application rates (required) ☐ Off-farm transfers of manure ☐ Other: _____

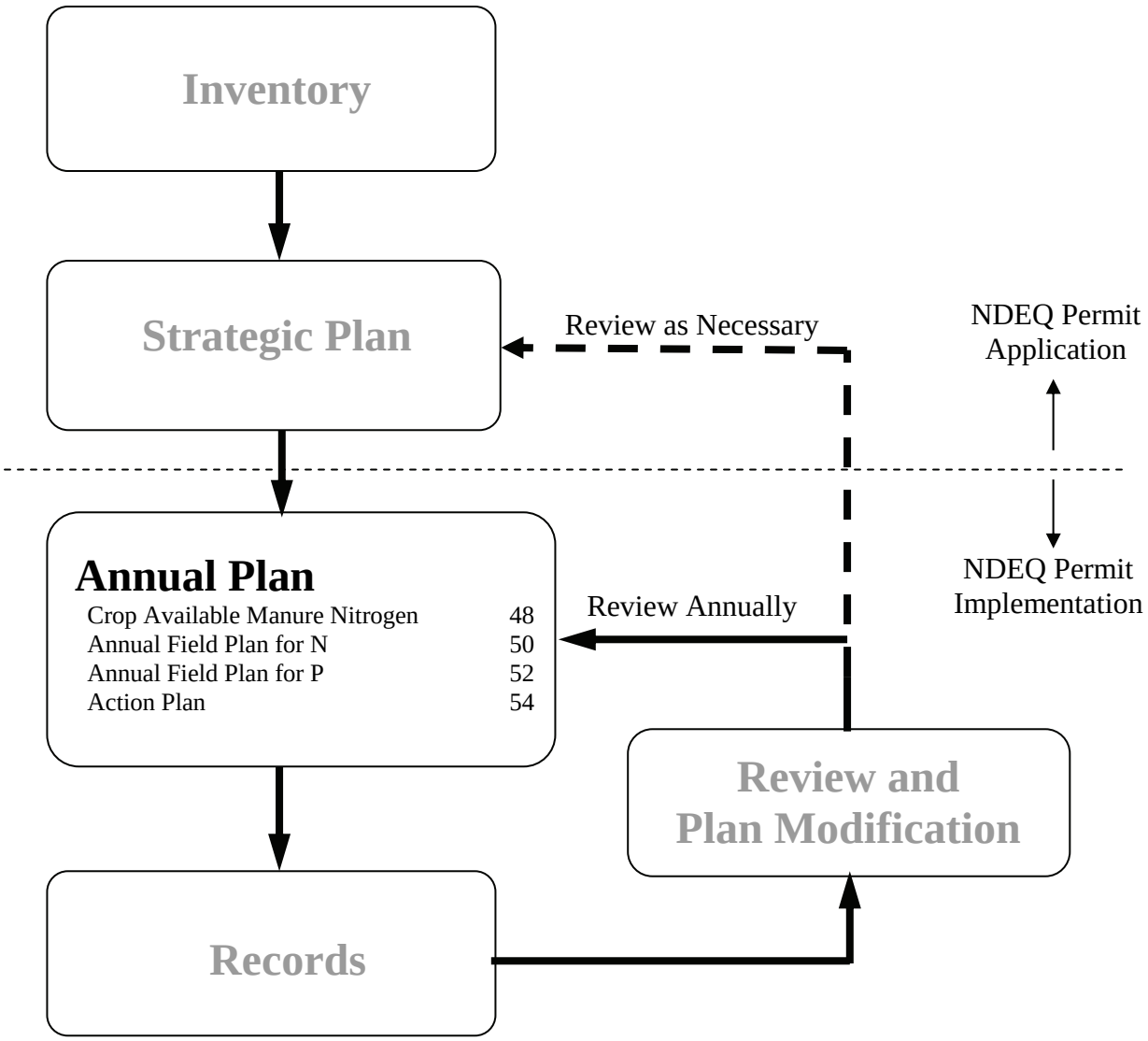
Timing of Selected Activities. Check appropriate months when practice should occur.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Application equipment calibration												
Application timing												

Nebraska's CNMP

Comprehensive Nutrient Management Plan

Annual Plan



An electronic copy of this workbook and individual worksheets are available online at http://cnmp.unl.edu

Annual Plan:
Overview of Forms 17 to 20

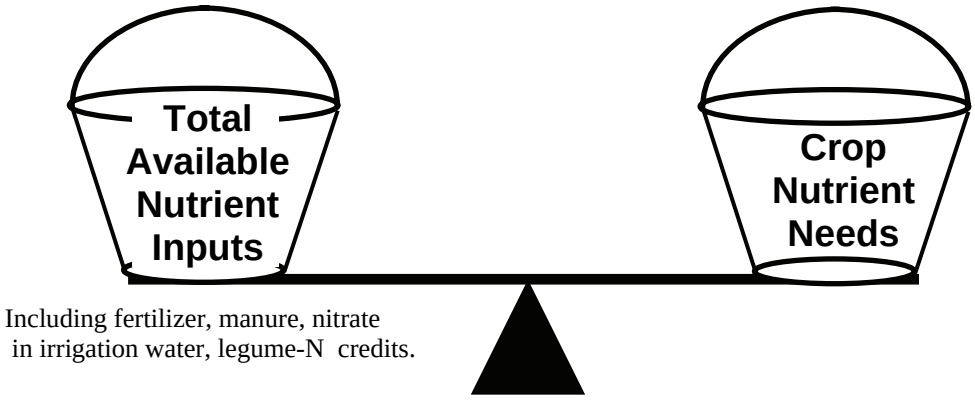
Purpose

The *Annual Plan's* purpose is to:

1. Balance the available nutrient inputs from all nutrient sources (including manure) with crop requirement for nutrients, and
2. Insure that adequate nutrients are supplied to sustain economic crop production.

Application of manure and other nutrients at rates matching crop nutrient needs minimizes ground and surface water contamination. To achieve this balance:

Nitrogen inputs must be matched with crop nitrogen needs for each growing season. Nitrogen in the nitrate form is very mobile. Residual nitrate-nitrogen commonly contributes to groundwater contamination. The goal is to balance nitrogen inputs during the growing season with crop needs and end the growing season with a low residual soil nitrate level. This is critical for optimum profitability while minimizing the potential for nitrate contamination of groundwater.



Phosphorus inputs should match crop phosphorus needs over several growing seasons. A single phosphorus application at a rate sufficient to meet multiple years' crop needs (but not exceeding crop nitrogen requirements) is acceptable if future phosphorus applications are reduced or eliminated to allow future crops to utilize excess phosphorus. Minimizing excess phosphorus accumulation in the soil surface is critical to minimizing phosphorus contamination of surface water.

Regulations

NDEQ's Title 130 requires that a producer maintain records documenting procedures used to estimate manure application rate. To comply with these regulations, the producer should follow these steps:

- Annually update a *Crop Available Manure Nitrogen Plan (Form 17)* for common manure application rates and the *Annual Field Plan for Nitrogen (Form 18).*
- From this information, annually prepare an *Action Plan (Form 20)* detailing manure and fertilizer applications. Keep the plan on file for five years (for NDEQ inspection).
- Maintain an annual set of records documenting the implementation of the *Nitrogen Management Plan* and *Action Plan* and keep these records on file for five years (for NDEQ inspection).

References

Determining Crop Available Nutrients from Manure (NebGuide G1335).
Nutrient Management for Agronomic Crops in Nebraska (EC155).
University of Nebraska Soils Home Study Course, http://www.ianr.unl.edu/soilshomestudy.

Nitrogen Management Plan
Instructions for Crop Available Manure Nitrogen (Form 17)

Purpose

This worksheet will estimate a crop available nitrogen credit for a known (calibrated) manure application rate. A *Manure Use Plan* spreadsheet, available at http://cnmp.unl.edu/cnmpsoftware.html, completes these same calculations.

Regulations

NDEQ's Title 130 requires that manure not be applied "in excess of agronomic rates for nitrogen." To comply with these regulations, the producer will need to *annually* prepare a *Nitrogen Management Plan* that determines *Crop Available Manure Nitrogen*, and keep it on file for five years (for NDEQ inspection).

Steps

Col. a: This "Option #" is used again in the *Annual Field Plan (Form 18, Column l)* to reference the selected manure application option.

Col. b: Enter description of manure source (e.g. lagoon, below barn pit, open lot), season of application, and timing of incorporation.

Col. c. Enter the planned application rate. Application equipment should be calibrated to achieve approximately the desired rate.

Col. d: Enter the manure's ammonium-N from lab analysis or, if not available, an approximate nutrient content from *Reference Table R-3 (p. 77)*.

Col. e: Fill in the ammonium-N availability factor based on the most applicable situation from the left box in *Figure 1*.

Col. f: Calculate crop available ammonium-N (Col. c x Col. d x Col. e)

Col. g: Enter the organic-N in the manure from lab analysis (Total N - Ammonium N). If a manure analysis is not available, see *Reference Table R-3*.

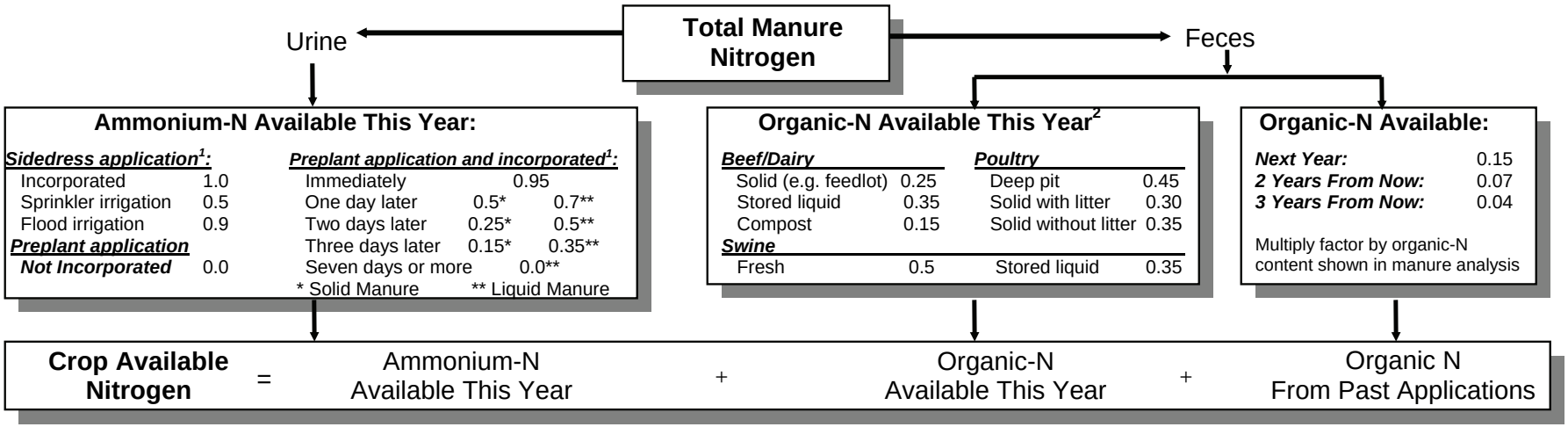
Col. h: Enter the organic-N availability factor from the middle box in *Figure 1*.

Col. i: Calculate the crop available organic-N (Col. f x Col. g x Col. h).

Col. k, l, and m: Organic-N available over the next three years can be estimated by multiplying the appropriate availability factor in the right hand box of *Figure 1* by the value in *Col. i.*

This procedure should be repeated for each manure application system (or piece of equipment), each application rate, and timing of incorporation.

Figure 1. Availability factors for manure nitrogen. Values from figure should be entered into *Form 17*.



[1] Incorporation can be accomplished by tillage or by a 0.50 inch or greater rainfall.

[2] [2] Organic-N availability assumes spring seeded crops such as corn and soybeans. For winter or spring manure application prior to planting small grains, multiply organic-N availability factor by 0.7. For late summer or fall manure application prior to planting small grains, use the organic N values shown in *Figure 1*.

Form 17. Crop Available Manure Nitrogen

Manure Application Options				Ammonium-N Available This Year				Organic-N Available This Year				j. This Year's Total N Avail-able (f + i) (lbs./ac)	Organic-N Available		
a. Option #	b. Manure Source, Season of Application, and Incorporation	c. Planned Application Rate		d. Ammonium-N Content ("as is" basis)		e. Avail-able Factor (see *Figure 1*)	f. Available NH_4-N (c x d x e) (lbs./ac.)	g. Organic-N Content ("as is" basis)		h. Avail-able Factor (see *Figure 1*)	i. Available Organic-N (c x g x h) (lbs./ac.)		k. Next Year (c x g x 0.15) (lbs./ac)	l. 2 Years from Now (c x g x 0.07) (lbs./ac.)	m. 3 years from Now (c x g x 0.04) (lbs./ac)
Ex.	Feedlot manure, surface applied, incorporate in 24 hrs.	18	☒ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac	4	☒ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.5	36	16	☒ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.25	72	108	36	18	9
1			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
2			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
3			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
4			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
5			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
6			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
7			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
8			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac				☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac						

Instructions for Annual Field Plan for Nitrogen (Form 18)

Purpose

This planning guide will determine the amount of nitrogen that will be needed (including manure nitrogen) to meet crop nitrogen requirements. All crop nitrogen annual planning documents are organized to maintain multiple years of records for a single field on one page. Make additional copies of *Form 18* so that one copy is available for each field or management area receiving manure. A *Manure Use Plan* spreadsheet, available at http://cnmp.unl/cnmpsoftware.html, completes these same calculations.

Instructions

At the top of each page: Identify the field or management area. Enter the soil test organic matter[1], the irrigation water nitrate concentration (if irrigated), and the acre-inches of water usually applied by mid season (e.g. end of silking in corn). For planning purposes UNL recommends: 6 inches of irrigation water in eastern Nebraska; 9 inches in central Nebraska , 12 inches in western Nebraska; and 15 inches in the Panhandle.

Cols. c & d: Planned crop and expected yield. Expected yield should be the average yield of the past five harvests of this crop on this field (excluding years with unusual stress), multiplied by 1.05. (from *Inventory Form 4, Part 1 - p. 12*) Growers are discouraged from applying manure to fields where the next crop will be grown for human consumption.

Col. e: Soil test nitrate-N[1] (in ppm) is the weighted average of the pre-plant soil test nitrate-N in the root zone - a minimum of 24" deep. See *Table R-2* for calculating weighted average soil nitrate level.

Col. f: Enter the total nitrogen need for the crop to be grown using the recommendations in *Reference Tables R-5* through *R-17*. In most cases this includes credits for organic matter nitrogen release (if greater than 3.0 percent, use 3.0) and soil test nitrate. Only if a nitrogen recommendation table for a crop is not available should you estimate nitrogen removal by multiplying the appropriate value from *Reference Table R-1* by the yield.

Because legumes fix their own nitrogen, they may not utilize as much of the manure nitrogen as a grass type crop. Therefore, a factor is given for legumes at the bottom of *Reference Table R-1* to multiply by the nitrogen removal rate for an environmentally sound recommendation.

Col. g: Enter the total of values from prior manure applications from *Form 17, Columns k, l, and m.* (Leave this column blank the first year you use this form unless you have actual values to enter.)

Col. h: Enter an irrigation credit by multiplying the nitrate-N concentration of the irrigation water by the acre-inches of water usually applied by mid season (e.g. end of silking in corn), and by the conversion factor 0.227. *Example*: Irrig. credit (lbs. N/ac.) = 9 inches applied X 10 ppm Nitrate-N X 0.227 = 20.

Col. i: Enter a legume or green manure nitrogen credit from *Reference Table R-4.*

Col. j: Enter fertilizer N applied since the last harvest (e.g. as 11-52-0), or planned in addition to manure nitrogen (e.g. starter N).

Col. k: Net nitrogen need before applying manure. *Column f - Columns g, h, i, and j.*

Col. l: Enter the line number from *Form 17, Column a* of the manure source, rate and incorporation schedule planned to be applied to this field. If none is to be applied this year, enter zeros in *Columns l, m, and n.*

Col. m: Enter the planned manure application rate that will meet most or all of the nitrogen needs in *Column k.*

Col. n: Enter the nitrogen available at the manure application rate in *Column m.* If this is significantly above the nitrogen need *(Column. k),* then recalculate the line in *Form 17* reducing application rates or delaying incorporation if possible.

Col. o: Extra fertilizer N needed to meet crop needs *(Column k – Column n).* If net nitrogen is within ±20 lbs., no adjustment is necessary. A larger negative number suggests the need for a lower manure or commercial fertilizer application rate. A positive number suggests the need for more manure or fertilizer.

[1] Soil test reports should be kept on file for five years with all other records related to manure storage and application.

Form 18 . Annual Field Plan for Nitrogen

Complete the line for the next year before applying any manure.

Field or Management Area: _____ **Soil Organic Matter:** Yr.: _____, _____%. Yr.: _____,_____.%

If irrigated: Acre-inches / year (for Col. h):_____ NO_3-N conc. of irrigation water: Yr.: _____, _____ ppm. Yr.: _____, _____ppm.

a. Year	b. Previous Crop	c. Planned Crop	d. Expect-ed Yield (E.Y.) bu./ac., Tons/ac., lb./ac. (Avg. x 1.05)	e. Soil Test Nitrate-N (average ppm)	f. Total Nitrogen Need or Removal (Ref. *Table R-5 to R-17)* (lbs./acre)	Nitrogen Credits (lbs./acre)			j. Fertilizer Nitrogen Credit (Starter, etc.) (lbs./ac.)	k. Net N Need Before Manure Applica-tion *(Cols. f–g – h – i – j)* (lbs./ac.)	l. Manure Applic. Option (write line no. from *Form 17, Col. a*)	m. Planned Manure Applica-tion Rate *(Form 17, Col. c)* (tons/ac, gal./ac, or in./ac.)	n. Rate of Manure Nitrogen Available *(Form 17, Col. j)* (lbs./ac.)	o. Extra Nitrogen Needed as Fertilizer *(Cols. k-n)* (lbs./ac.)
						g. Manure N from Past Years *(Form 17, Col. k-m)* (lbs./ac.)	h. Irrigation Water N (ppm x 0.227 x Ac.-in.) (lbs./ac.)	i. Legume / Green Man. N *(Ref. Table R-4)* (lbs./ac.)						
2001	Soybeans	Corn	170	3 ppm	167 at 2% OM	0	(10 ppm) 20 lb/ac	45	6	96	Ex	18 T./ac.	108	-12 lb/ac

Annual Plan

Good Steward

Instructions for Annual Field Plan for Phosphorus (Form 19)

Purpose

This optional planning guide will determine if phosphorus (including manure nitrogen) is being applied in approximate balance with crop phosphorus requirements or removal. All phosphorus annual planning documents are organized to maintain multiple years' records for a single field on one page. Make additional copies of *Form 19* so that one blank form is available for each field receiving manure. A *Manure Use Plan* spreadsheet, available at http://cnmp.unl/cnmpsoftware.html, completes these same calculations.

Regulations

For management of phosphorus, NDEQ's Title 130 requires the producer:

- to define the frequency of soil sampling and analysis for available soil phosphorus levels (typically every three years),
- to conduct the sampling for areas not to exceed 40 acres prior to any manure application, and
- to report to NDEQ all samples where phosphorus exceeds 150 ppm Bray 1 or 100 ppm Olsen.

Form 19 is not mandatory; however, it will provide insight as to the balance of phosphorus for individual fields and identifies those fields that are at risk for exceeding the 150 ppm reporting threshold.

Instructions

Fill in the field or management area name at the top of the page.

Col. a: One line will represent each crop year.

Col. b: Identify manure handling systems supplying manure.

Col. c: Enter the planned manure application rate and check the correct terms.

Col. d: Enter the phosphorus concentration from manure analysis. If manure analysis is not available, *Reference Table R-3* may provide an approximate nutrient concentration.

Col. e: Enter the phosphorus availability factor. If the Bray 1 or Mehlich III phosphorus soil test is < 30 ppm, or the Olsen test is < 20 ppm (in col. i), assume phosphorus availability to the crop is 0.7 the first year (the rest – 0.3 – is available the next year). If soil test P levels are greater that these values, assume all the P (1.0) is available the first year. Soil test level does not impact manure phosphorus availability. Higher soil P levels provide a safety factor if all manure P does not become available for crop use.

Col. f: Calculate the manure phosphorus credit (Cols. c x d x e) .

<u>Crop phosphorus balance may be estimated as follows:</u>

Cols. g & h: Enter the planned crop and expected yield. Expected yield should be estimated as the average of the past five years of this crop in this field multiplied by 1.05. (Exclude years with unusual stress.)

Col. i: Enter this year's soil test results in ppm and analysis method.

Col. j: Look up the P (P_2O_5) recommendation for *Column i* in *Reference Tables R-18* through *R-32*. If a P recommendation table is not available for this crop, then go to Column l instead.

Col. k: Enter any planned fertilizer P_2O_5 application.

Col. l: (Use *Columns l* and *m* only if there is no P recommendation table.) Enter the phosphorus removal rate from *Reference Table R-1* in lbs. P_2O_5 per unit.

Col. m: Multiply *Column l* by *the Expected Yield* to provide a rough estimate of crop P requirement. However, a soil test recommendation is always the preferred method of estimating crop requirements.

Col. n: Construct a phosphorus (P_2O_5) balance for this field by subtracting Total Phosphorus Removed from the planned fertilizer and manure credits (Cols. f + k - m).

<u>If the balance is negative</u>, then additional commercial fertilizer or manure is required to meet the phosphorus needs of the crop this year.

<u>If the balance is positive</u> by more than 25 pounds and the P Index for this field is High or Very High, reduce the manure application rate.

Col. o: Calculate the potential soil test increase or decrease by dividing *Column n* by 20. *If Column o* is positive, the soil test will increase; if negative, the soil test will decrease. Actual changes in soil phosphorus levels may not be accurately reflected by this calculation due to the complexities of soil chemistry for phosphorus.

Form 19. Annual Field Plan for Phosphorus

Field or Management Area: _____

Soil phosphorus tests above 150 ppm Bray 1 or Mehlich III, or 100 ppm Olsen tests must be reported to NDEQ.

a.	Manure Phosphorus Availability					Crop Phosphorus Balance								
						Planned Crop					Crop P (P_2O_5) Removal (use only if no soil test is available)			
Crop Year	b. Manure Handling System	c. Planned Manure Application Rate	d. Manure Phosphorus (P_2O_5) Concentration from Analysis	e. Phos. Availability Factor (0.7 or 1.0)	f. Phosphorus Manure Credit (c x d x e) (lb./ac.)	g. Name	h. Expected Yield	i. Soil Test Phosphorus (ppm) & Method	j. Phosphorus (P_2O_5) Recommendation (lb./ac.)	k. P Fertilizer Application (P_2O_5) (lbs./ac.)	l. Factor *(See Table R-1)*	m. Total P Removed (h x l)	n. P_2O_5 Balance (Cols. f + k - m) (lbs./ac)	o. Potential Soil P_2O_5 Increase or Decrease (n ÷ 20) (ppm)
2001	Beef, dirtlot	20 ☒Ton/ac ☐1000 gal/ac ☐ac-in/ac	18 ☒lbs./ton ☐lbs./1000 gal ☐lbs./ac-in	0.7	250 lbs./acre	Corn	150 bu/ac.	20 Bray-1	Row 0 Bdcst 0	10 (pop-up)	0.3 lbs./bu	45 lbs./ac.	215 lbs./ac.	11 ppm
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
		☐Ton/ac ☐1000 gal/ac ☐ac-in/ac	☐lbs./ton ☐lbs./1000 gal ☐lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	

Instructions for Action Plan (Form 20)

Purpose

The results of the nitrogen and phosphorus management plans should be summarized into an *Action Plan* that is carried to the field for defining:

- Which fields are to receive manure from which storage system;
- How much manure and other nutrients are to be applied;
- When manure should be applied and incorporated within X days.

A *Manure Use Plan* spreadsheet, available at http://cnmp.unl.edu/cnmpsoftwarehtml, completes these same calculations.

Regulations

NDEQ's Title 130 requires that a permit application have a nutrient management plan that includes… "waste sampling and analysis procedures, land application soil sampling and analysis procedures, and planned application rates, methods, and frequencies." To comply with these regulations, the producer will need to:

- Annually prepare an *Action Plan* and keep this plan on file for five years (for NDEQ inspection);

Instructions

1. Suggested manure application rate, estimated for individual fields in *Form 18* (nitrogen based), should be transferred to the Action Plan. If soil P Index is High or Very High, manure application rates based on a phosphorus balance *(Form 19)* or no manure application would be recommended. Assumptions relative to incorporation of manure were made in Form 17. Recommendations for incorporation recorded in the *Action Plan* should be compatible with those assumptions.
2. Suggested timing of manure application is based on risk of runoff, availability of cropland, labor availability and other factors. For fields with high P Index levels, winter months would be undesirable for land application. For fields susceptible to compaction, wet months (e.g. spring months) also might be unacceptable.
3. Where manure and other nutrient credits do not meet crop nutrient requirements, additional commercial fertilizer may be needed. Check *Forms 18 and 19* for commercial fertilizer recommendations.
4. For a desired application rate, identify the appropriate equipment operational settings (table at bottom of *Form 20*) that will produce the desired manure application rate. If these settings are unknown, the equipment will need to be calibrated and those operational settings identified for future reference. See *Manure Application Calibration Guide, page 87*, for options for calibrating equipment.

Form 20. Action Plan

This document should be photocopied and carried to the field during land application.

Crop Year: _____

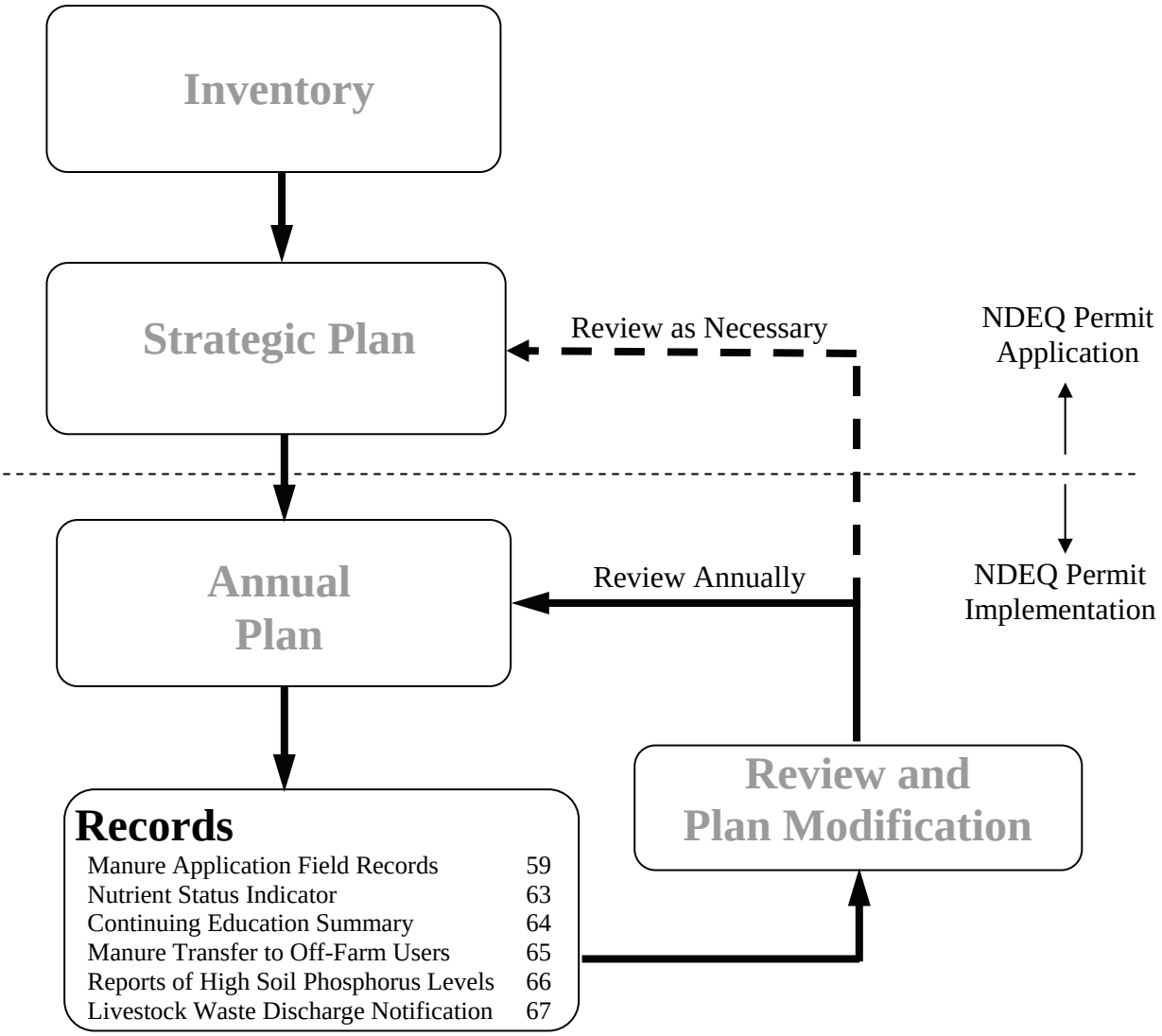
Field ID	Manure System	Planned Manure Application Rate		Incorporate Into Soil?	Manure Nutrient Applic. Rate (lbs./acre)		Suggested Timing of Manure Application	Commercial Fertilizer Rate (lbs./acre)		Application Instructions
					N	P_2O_5		N	P_2O_5	
Sample North Pivot	Beef Finish, dirt lot	18	☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☒ Yes, ☐ No 1 days	90	360	☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☒N ☒D	0	0	30 ft. creek setback
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No _____days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			

Application Rate	Tractor Settings		Applicator Settings		Pivot Settings		
	Gear	RPM	PTO / hydraulic	Chain sp. or orifice	% speed	psi / gpm	Dilution: ? manure /1 gal. water
							gallons manure
							gallons manure

Nebraska's CNMP

Comprehensive Nutrient Management Plan

Records



An electronic copy of this workbook and individual worksheets are available online at http://cnmp.unl.edu

Documentation and Records Forms (21 To 28)

Purpose

The purpose of this section is to provide sample forms for the record keeping requirements of permits for NDEQ's Title 130 and EPA's National Pollutant Discharge Elimination System (NPDES) (typically applied only to feedlots with over 1000 head of capacity).

NDEQ Title 130

As of February 28, 2000, Title 130 requires that a livestock producer operating under an NDEQ Livestock Waste Facility Control Permit must maintain appropriate records documenting implementation of an annual crop nutrient management plan and other facility maintenance activities. These records must be maintained for a five-year period and available for inspection by NDEQ field inspectors. Records of current and past annual plans for nitrogen management are required.

Instructions

It is recommended that in order to document a farm's implementation of a "Nutrient Management and Land Application Plan," the following records should be maintained for at least five years. Additional records related to management of the manure storage or holding pond are detailed in the "Manure Storage and Open Lot Runoff Storage Workbook." Records with an asterisk are required by NDEQ.

1) Planning documents and calculations for:
   - NDEQ permit application document with all Inventory and Strategic Plan documents*
   - Crop available manure nitrogen *(Form 17)**
   - Annual nitrogen management plan for each year *(Form 18)**
   - Annual phosphorus management plan for each year *(Form 19)*
   - Action plan *(Form 20)**

2) Records for:
   - Manure analysis.[1] Summaries of key manure analysis results can be included in *Form 30.**
   - Soil tests.[1] Summaries of key soil test information can be included in *Form 31.**
   - Manure application field records *(Forms 21, 22, 23, or 24)**
   - Additional crop, soil and water nutrient status indicators *(Form 25)*
   - Land application site agreements *(Form 14)**
   - Continuing Education Summary *(Form 26)*
   - Off-farm transfers of manure *(Form 27)**
   - Reports of soil phosphorus tests exceeding 150 ppm, Bray 1 or Mehlich, or 100 ppm, Olsen *(Form 28)**
   - Livestock Waste Discharge Notification reports *(Form 29)**
   - Crop yields *(Form 31)**

3) Review of past year and future plan modifications for:
   - Post cropping season summary of crop yields, manure analysis and application rates *(Form 30 and 31)**
   - Modifications to *Next Year's Plan*

[1] The soils and manure analysis reports should be maintained on file for five years in a location with all other land application and manure storage records.

Form 21. Solid Manure Application Field Record

Farm Owner:_____ Livestock/Poultry Facility:_____ Year:_____

Manure Spreader:_____ Net Load Capacity: _____ tons

Date/ Time	Field ID or Management Area	Number of Loads	Is Manure Incorporated into Soil?	Area Covered (acres)	Setbacks Maintained [1]	Precipitation and Other Weather Conditions: 24 hrs. Prior	Today	24 hrs After	Soil/Field Conditions	Operator Initials
Sample	Home 80	~~THL~~ ~~THL~~ ///	_X_Yes, _1_days ____No later	12 ac.	30' from Cow Creek	No rain	No rain SE wind	0.25" rain S wind	___Frozen ___ Snow-covered ___ Wet ___ Moist _X_ Dry	JMK
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes, _____days ____No later						___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	

1. State permitted operations: A 30-foot minimum setback is required between the edge of a stream channel, pond, or lake and the manure application. 100-foot setbacks are sometimes required. No setback is required from wetlands or grass waterways if they are not part of a stream or lake, but manure cannot be applied to standing or flowing water. EPA's NPDES permit will require setbacks of 100 feet or a permanent vegetated buffer of 35 feet from surface waters. Setbacks should be illustrated on an aerial map (*Form 4, Part 2*).

Form 22. Slurry or Sludge Application Field Record

Farm Owner:_____ Livestock/Poultry Facility:_____ Year:_____

Manure Applicator:_____ Net Load Capacity: _____ gallons

Date/ Time	Field ID	Number of Loads	Is Storage Agitated At Pump Out?	Is Manure Incorporated into Soil?	Area Covered (acres)	Setbacks Maintained [1]	Precipitation and Other Weather Conditions: 24 hrs. Prior	Today	24 hrs After	Soil/Field Conditions	Oper-ator Initials
Sample	Pivot 1	~~IIII~~ ~~IIII~~ III	_X_Yes ____No	_X_Yes, _1_days ____No later	8 acre	30' from Cow Creek	No rain	No rain SE wind	0.25" rain S wind	___Frozen ___ Snow-covered ___ Wet ___ Moist _X_ Dry	JMK
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
			____Yes ____No	____Yes, _____days ____No later	acre					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	

1. State permitted operations: A 30-foot minimum setback is required between the edge of a stream channel, pond, or lake and the manure application. 100-foot setbacks are sometimes required. No setback is required from wetlands or grass waterways if they are not part of a stream or lake, but manure cannot be applied to standing or flowing water. EPA's NPDES permit will require manure application setbacks of 100 feet or a permanent vegetated buffer of 35 feet from surface waters with no manure application. Setbacks should be illustrated on an aerial map (*Form 4, Part 2*)

Form 23. Towed Hose or Irrigation System Field Record of Manure Application

Farm Owner:_____ Livestock/Poultry Facility:_____ Year:_____

Manure Applicator:_____ Manure Pumping Rate: _____ gpm

Date/ Time	Field ID	Operating Hours Begin	End	Rate of Clean Water Addition	Is Storage Agitated At Pump Out?	Is Manure Incorporated into Soil?	Area Covered (acres)	Setbacks Maintained[1]	Precipitation and Other Weather Conditions: 24 hrs. Prior	Today	24 hrs After	Soil/Field Conditions	Oper-ator Initials
Sample 3/30/00	Pivot 1	8:00 am _____pm	_____ am 4:30 pm	2 to 1	_X_ Yes ___No	____Yes, _____days _X_No later	130 ac.	30' from Cow Creek	No rain	No rain SE wind	0.25" rain S wind	___Frozen ___ Snow-covered ___ Wet ___ Moist _X_ Dry	RK
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		_____am _____pm	_____ am _____ pm	to 1	____Yes ____No	____Yes, _____days ____No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	

1. State Permitted operations: A 30-foot minimum setback is required between the edge of a stream channel, pond, or lake and the manure application. 100-foot setbacks are sometimes required. No setback is required from wetlands or grass waterways if they are not part of a stream or lake, but manure cannot be applied to standing or flowing water. EPA's NPDES permit will require manure application setbacks of 100 feet or a permanent vegetated buffer of 35 feet from surface waters with no manure application. Setbacks should be illustrated on an aerial map (*Form 4, Part 2*).

Form 24. Irrigation Field Record of Manure Application (If Application Rate is Known)

Farm Owner:_____ Livestock/Poultry Facility:_____ Year:_____

Manure Applicator:_____ Manure Pumping Rate: _____ gpm or _____ac-inches/hr

Date/ Time	Field ID	Depth of Irrigation Application (inches)	Rate of Clean Water Addition	Is Storage Agitated At Pump Out?	Is Manure Incorporated into Soil?	Area Covered (acres)	Setbacks Maintained[1]	Precipitation and Other Weather Conditions: 24 hrs. Prior	Today	24 hrs After	Soil/Field Conditions	Oper-ator Initials
Sample 3/30/00	Pivot 1	0.75 inch(es)	2 to 1	____Yes _X_No	___Yes, ____days ___No later	130 ac.		No rain	No rain SE wind	0.25" rain S wind	___Frozen ___ Snow-covered ___ Wet ___ Moist _X_ Dry	RK
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	
		inch(es)	to 1	____Yes ____No	___Yes, ____days ___No later	ac.					___Frozen ___ Snow-covered ___ Wet ___ Moist ___ Dry	

1. State Permitted operations: A 30-foot minimum setback is required between the edge of a stream channel, pond, or lake and the manure application. 100-foot setbacks are sometimes required. No setback is required from wetlands or grass waterways if they are not part of a stream or lake, but manure cannot be applied to standing or flowing water. EPA's NPDES permit will require manure application setbacks of 100 feet or a permanent vegetated buffer of 35 feet from surface waters with no manure application. Setbacks should be illustrated on an aerial map (*Form 4, Part 2*)

Form 25. Crop, Soil, and Water Nutrient Status Indicators

Instructions: Record any relevant information below that may provide insight as to the nitrogen status of the crop or soil.

Field ID or Management Area	Pre-Sidedress Soil Nitrate Test		Chlorophyll Meter Readings				Post-Season Stalk Tissue		Other Observations or Field Test	
	Date	Content (ppm)	Date	Growth Stage	Reading	Reading - % of Reference	Date	Nitrate Conc. (ppm)	Date	Observation
Example	6/10	15	7/15	V 18	45	98	10/1	1500	8/15	Lower 3 leaves slightly yellow

Instructions: Summarize any available water quality measurements.

Field ID	Irrigation Well[1]		Nearby Well[1]:_____		Surface Water Measurements	
	Date	Nitrate (ppm)	Date	Nitrate (ppm)	Date	Observation
Sample	7/5	14				

1. Nitrate, ammonium, or coliform bacteria can be measured to provide an indication of contamination by fertilizer and/or manure.

Form 26. Continuing Education Summary

Date	Educational Program and Location	Time Involved	Who Taught Program?	Who Organized Program?	Who Attended?
Example: 3/1/00	Nutrient Mgmt. Planning /Kearney	4 hrs.	UNL Extension	NE Cattlemen	John Doe
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			
		hrs.			

NDEQ Title 130 requires the owner's attendance at an approved land application educational program every five years.

Form 27. Manure Transfer to Off-Farm Users

Method of verification of manure transfer amounts:

___ Scale ___ Flow meter ___ Count of loads ___ Other:_____

Date	Off-Farm User Name/Address	Employee Making Entry	Amount of Transfer	Manure Analysis		Total Nutrient Transfer		Location of Field Receiving Manure
				N	P_2O_5	N (lbs)	P_2O_5 (lbs)	
Mar. 6-9, 2001	John Corn Grower, RR 2, Anytown NE	Jim Part Time	2,000 ☒ Tons ☐ Gals. ☐ Ac-In.	10	10 ☒ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	32,000	38,000	Corn Grower's Home 80 (1 mi north of feedlot)
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
			☐ Tons ☐ Gals. ☐ Ac-In.		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in			
TOTAL			☐ Tons ☐ Gals. ☐ Ac-In.					

Records

Form 28. Report of High Soil Phosphorus Tests

Regulations

Title 130 requires reporting of all soil samples over 150 ppm P (Bray 1 or Mehlich III) or 100 ppm P (Olsen) to NDEQ.

Mail report to:
NDEQ
Agriculture Section
1200 N Street
P.O. Box 98922
Lincoln, NE 68509-8922

Producer name: _____
Address: _____
_____
_____
Phone number: _____
Date: _____

Field ID or Management Area [1]	Location	Date of Test	Sample Depth	Soil Phosphorus Level (ppm)	Test Method
Example	#1…North of Feedlot	4/2001	0 - 6”	205	☒ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other
					☐ Bray ☐ Mehlich III ☐ Olsen ☐ Other

1. Attach aerial map (preferably copy of one used in permit application) and identify fields being reported.

Instructions for Livestock Waste Discharge Notification (Form 29)

Purpose

The following form is recommended by NDEQ for use in reporting any discharge, either planned or accidental, from a livestock waste control facility.

NDEQ Title 130

Title 130 requires that "Any discharge of waste shall be reported to the Department within 24 hours of the event and in a written report to the Department within seven days of the event. For any discharge, the Department may request the operation to supply rainfall, land application and system storage records for up to the previous 12-month period prior to the discharge event."

A discharge of livestock waste from a Livestock Waste Control Facility (LWCF) is prohibited unless:

1. Such discharge is to prevent a facility failure, which would result in loss of life, personal injury or severe property damage; and
2. No feasible alternative exists; and
3. The permittee submits a notice to the Director of the Nebraska Department of Environmental Quality (NDEQ) as follows:
   a. Within 24 hours of becoming aware of a discharge or the need to discharge [contact NDEQ at (402) 471-4239 or for operations located in the western half of Nebraska, contact the NDEQ North Platte Office at (308) 535-8142]; and
   b. Within 7 days of a discharge, submit a written report; and
4. The discharge is conducted under such conditions as to minimize any adverse effects.

Instructions

Step 1. If a discharge occurs, initiate the steps identified in your *Emergency Response Plan.*
Step 2. Within 24 hours, notify NDEQ of the discharge.
Step 3. Complete the following form and deliver to NDEQ at the address listed below within seven days of the discharge.
Step 4. If you observe dead fish that could have resulted from the discharge, contact the Nebraska Game and Parks Commission immediately at (402) 471-0641. After hours, call (402) 471-4545.

Additional Information

Questions? Contact: Nebraska Department of Environmental Quality, Agriculture Section, P.O. Box 98922, Lincoln, NE 68509-8922; phone (402) 471-4239. Visit the NDEQ web site at http://www.deq.state.us. The attached form and most of the information on this page are from NDEQ Environmental Guidance Document, Livestock Waste Discharge Notification, dated September 2001.

Form 29: Livestock Waste Discharge Notification

Adapted from NDEQ fact sheet "Livestock Waste Discharge Notification," September 2001.

NAME: _____
Permitted Operation Name

OWNER/MANAGER: _____

ADDRESS: _____
P.O. Box, Street Address

_____
City, State and Zip Code

Legal Description of Operation

_____, _____, of _____, _____ N,_____ E or W, _____ County
1/4 1/4 Section Township Range

Do you have an **NPDES** Permit? ☐ Yes ☐ No If yes, Permit No:_____

Complete the following and submit a map or drawing of the operation, LWCF, discharge flow pattern and stream:

1 List reason(s) for discharge (i.e., power failure, large storm or chronic wet period, leak or break in water supply system, component failure of the waste control facility; and/or releases during land application due to equipment failure, accidents or irrigation equipment failure):

_____

_____

2. The discharge flowed into_____and
(name of ditch, drainage way, stream)

into _____
(name of primary stream)

3. Did the discharge flow directly into surface water or did the discharge flow over cropland prior to discharging to surface water? _____

4. The approximate width and depth of the surface water (which the discharge entered):
_____ (width in feet) and_____ (depth in feet)

5. Date and time the discharge started and ended. Please indicate whether the start time was the actual time or was when the discharge was discovered. _____

_____

_____

6. The average flow of the discharge was : _____ (gallons/minute)

7. Estimated total volume of discharge (cu.-ft.): _____ (L x W x D)

8. Describe any damage to the LWCF: _____

_____

_____

9. Describe actions taken, and factors and conditions that helped minimize any adverse effects to the environment from the discharge: _____

_____

_____

10. Describe any obvious or known impacts to the environment from the discharge:

_____

_____

_____

OPTIONAL INFORMATION

1. On a case-by-case basis, the Nebraska Department of Environmental Quality may require sampling. If not required by the Department, the operation may want to provide the Department with documentation that the discharge did not impact waters of the State or the discharge was conducted in a manner to reduce adverse effects to the environment. The following sampling procedure has been outlined:

   - ✓ Please include procedures taken toward quality control on handling the samples. Include information on the time when the samples were collected and when the lab received the samples. <u>You may wish to contact the lab for special sampling and handling instructions for the samples in order to eliminate contamination of the samples.</u>

   - ✓ Was sample kept cool (with ice) in the delivery/holding time? ☐ Yes ☐ No

   - ✓ The following items should be included in the analysis. Sample locations, at a minimum, must include point of discharge, 100 feet upstream of the discharge, 100 feet downstream of the discharge and the mixing zone (where the discharge mixes with surface water). <u>Provide a map with collection sites marked</u>.

     a) 5-day Biochemical Oxygen Demand (BOD-5);
     b) total ammonia-nitrogen as nitrogen;
     c) nitrate-nitrite;
     d) Total keldahl nitrate;
     e) pH;
     f) temperature of the effluent and receiving stream;
     g) sodium;
     h) total phosphorus;
     i) chlorides;
     j) Chemical Oxygen Demand (COD);
     k) Fecal Coliform Bacteria

I HEREBY CERTIFY THAT THE INFORMATION SUBMITTED HEREIN IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

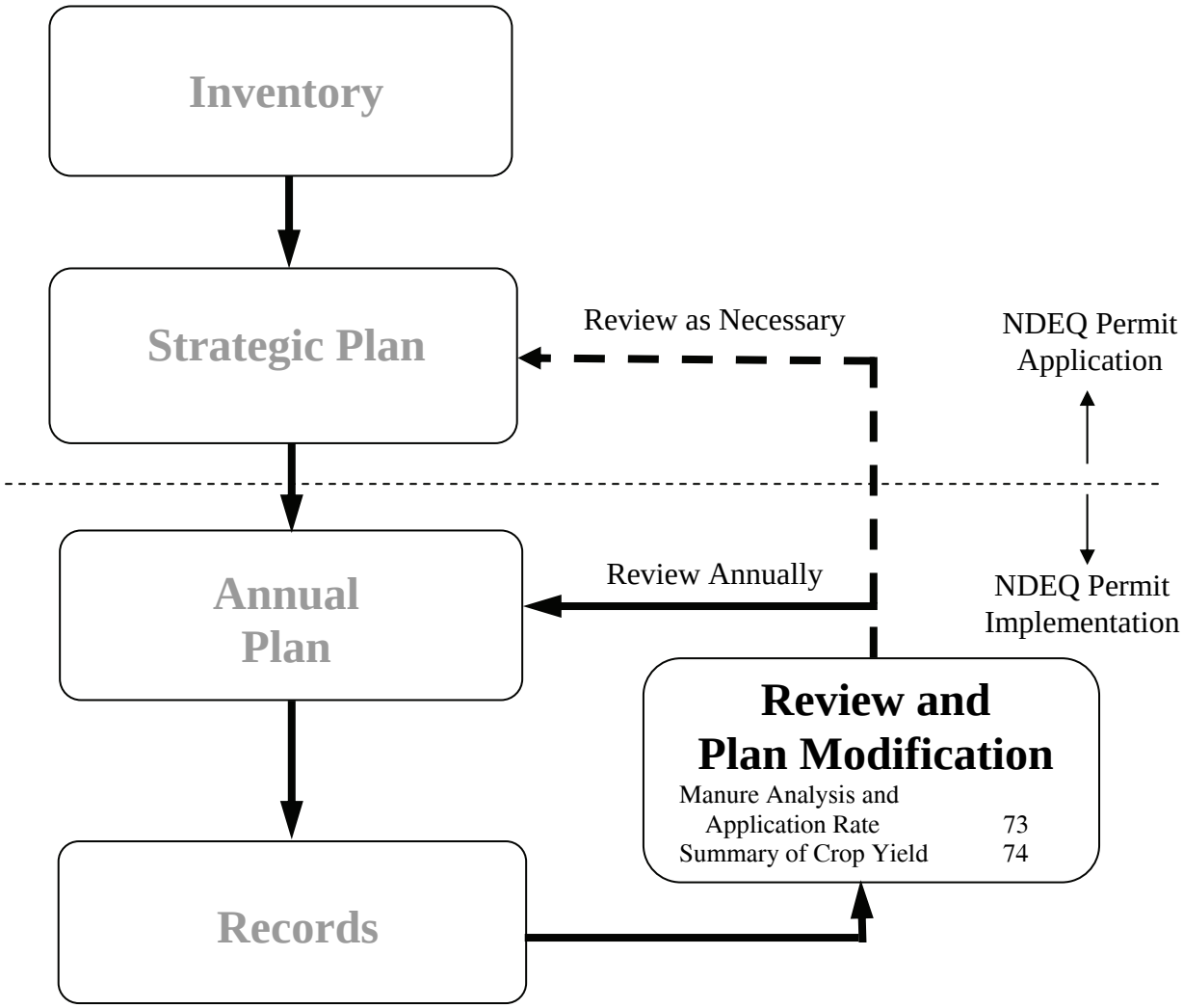
X _____ _____
Signature of Authorized Representative Date

If you observe dead fish that could have resulted from the discharge, contact the Nebraska Game and Parks Commission <u>immediately</u> at (402) 471-0641. After hours, call (402) 471-4545.

Nebraska's CNMP

Comprehensive Nutrient Management Plan

Review and Plan Modification



An electronic copy of this workbook and individual worksheets are available online at http://cnmp.unl.edu

Instructions for Post Cropping Season Summary (Form 30 & 31)

Purpose

1. Summarize actual manure application rate and manure analysis based on field records and equipment calibration records.
2. Modify future years' nitrogen credit and modify future recommended application rates.

NDEQ Title 130

As of June 18, 2001, Title 130 requires that a livestock producer operating under an NDEQ Livestock Waste Facility Control Permit must maintain appropriate records documenting implementation of an annual crop nutrient management plan and other facility maintenance activities. These records must be maintained for five years and be available for inspection by NDEQ field inspectors. NDEQ requires a record of locations and quantities of livestock manure land applied, nutrient value of livestock manures, and records of waste sold or given away.

Sample Forms Provided

1. *Form 30.* Post cropping season summary: Manure analysis and application rate
2. *Form 31.* Post cropping season summary: Crop yield

Instructions

Form 30

1. Enter planned manure application rate from *Action Plan (Form 20)* and actual application amounts from field records *(Forms 21 – 24).*
2. Enter planned manure nutrient concentrations from *Form 17* (nitrogen) and *Form 19* (phosphorus) and actual manure nutrient concentration from manure sample report.
3. Enter moisture content from manure sample report.
4. Is actual nitrogen and phosphorus application rate (manure application rate X nutrient concentration) within 25 percent of planned application rates. If a discrepancy exists, is it due to:
   - application rate? Consider recalibrating manure application equipment or adjusting application rate used in planning to reflect the most recent calibration check.
   - manure nutrient concentration and manure moisture content? *Variations in manure moisture are the most common cause for changes in manure nutrient concentration.* Is it possible to get a representative manure sample just prior to application so that application rates can be adjusted? Can you predict when manure may be drier (higher nutrient concentration) or wetter (lower nutrient concentration) and make last minute adjustments to planned application rates?
5. Was the check of nitrogen made in time to adjust any commercial nitrogen fertilizer application?
6. A manure nitrogen application rate significantly different from the planned application rate may require an adjustment in the estimated manure nitrogen availability for next year's crop. Review your calculations of organic-N availability for next year completed in *Form 17* for changes from the original plan.

Form 31

1. Update record of crops grown and actual yields for individual fields using *Form 31* or comparable records.

Form 30. Post Cropping Season Summary: Manure Analysis and Application Rate

Year: _____

Field ID or Management Area	a. Manure Application Rate			Manure Moisture Content	b. Organic-N Content of Manure		Organic N Application Rate[1] (a x b)		c. Ammonium-N Content of Manure		Ammonium –N Application Rate[1] (a x c)		d. P_20_5 Content of Manure		P_20_5 Application Rate (a x d)	
	Planned	Actual		(%)	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Sample	25	29	☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	75%	12	17	25 x 12 x 0.25 = 75	29 x 17 x 0.25 = 123	2	4	25 x 2 x 0= 0	29 x 4 x 0= 0	18	21	25 x 18 = 450	29 x 21= 609
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac													

1. To improve the accuracy of the ammonium and organic nitrogen comparison of planned and actual application rates, you may want to include the appropriate crop availability factors. Those factors can be located in *Figure 1, page 48.*

Review

Form 31. Post Cropping Season Summary of Crop Yields

Field or Management Area: _____

Crop Year	Cropping Information			Soils Analysis Information		
	Crop	Yield	Source[1]	% OM	Soil P	Soil Nitrate and Sample Depth
20						
20						
20						
20						
20						
20						
20						
20						
20						

Field or Management Area:_____

Crop Year	Cropping Information			Soils Analysis Information		
	Crop	Yield	Source[1]	% OM	Soil P	Soil Nitrate and Sample Depth
20						
20						
20						
20						
20						
20						
20						
20						
20						

Field or Management Area:_____

Crop Year	Cropping Information			Soils Analysis Information		
	Crop	Yield	Source[1]	% OM	Soil P	Soil Nitrate and Sample Depth
20						
20						
20						
20						
20						
20						
20						
20						
20						

1. The source for crop yields. Certified crop yields such as FSA records may be required by NDEQ.

CNMP Reference Tables

Reference Tables in the Nebraska CNMP Workbook

Table	Topic	Page
R-1	Plant nutrient uptake	76
R-2	Calculation of weighted soil nitrate-N credit	77
R-3	Typical crop available nutrient content of manure	77
R-4	Legume and green manure nitrogen credits	77

UNL Soil Fertility Recommendations

Crop	Nitrogen Table and Page	Phosphorus Table and Page
Alfalfa	-	R-18, page 83
Barley	R-5, page 78	R-19, page 83
Corn and corn silage	R-6, page 78	R-20, page 83
Dry beans	R-7, page 79	R-21, page 84
Grass	R-8, page 79	R-22, page 84
Millet	R-9, page 80	R-23, page 84
Oats	R-10, page 80	R-24, page 84
Popcorn	R-11, page 80	R-25, page 85
Potato	R-12, page 80	R-26, page 85
Sorghum	R-13, page 81	R-27, page 85
Soybean	-	R-28, page 85
Sugar beets	R-14, page 81	R-29, page 85
Sunflower	R-15, page 82	R-30, page 86
Wheat, spring	R-16, page 82	R-31, page 86
Wheat, winter	R-17, page 82	R-32, page 86

R-33 Applicator Calibration Guide

University of Nebraska–Lincoln Extension publications applicable to the Manure Application Workbook:

1. Nutrient Management for Agronomic Crops in Nebraska (EC155)
2. Fertilizer Suggestions for Corn (NebGuide G174)
3. Fertilizer Suggestions for Soybeans (NebGuide G859)
4. Determining Crop Available Nutrients from Manure (NebGuide G1335)
5. Manure Applicator Calibration (NebGuide G1267)
6. Sampling Manures for Nutrient Analysis (NebGuide G1450)
7. Manure Testing: What to Request? (NebFact NF507)
8. Using a Chlorophyll Meter to Improve N Management (NebGuide G1171)
9. The Corn Stalk Nitrate Test (NebFact NF491)
10. Manure Application Calibration Guide (EC182)
11. Calculating the Value of Manure for Crop Production (NebGuide G1519)

Table R-1. Plant nutrient uptake and removal in the harvested part of the crop. Values are pounds per unit at a common sales and winter storage moisture (100% DM).

Crop	Test Wt.	DM %	N	P_2O_5	Units
Grain Crops					
Barley (Grain)	48	86	0.87	0.33	lbs./bu.
(Straw)		90	12.7	2.9	lbs./ton
Buckwheat (Grain)	48	85	0.80	0.34	lbs./bu.
Corn (Grain)	56	84.5	0.70	0.31	lbs./bu.
(Stover)		85	17.7	3.5	lbs./ton
Millet, proso (Grain)		90	1.9	0.64	lbs./cwt.
Oats (Grain)	32	86	0.60	0.23	lbs./bu.
(Straw)		90	12.7	2.5	lbs./ton
Rye (Grain)	56	87	1.1	0.40	lbs./bu.
(Straw)		90	8.6	3.7	lbs./ton
Sorghum (Grain)	56	87	0.90	0.40	lbs./bu.
(Stover)		80	13.6	4.0	lbs./ton
Wheat (Grain)	60	86.5	1.2	0.50	lbs./bu.
(Straw)		90	10.1	2.1	lbs./ton
Oil Crops					
Soybeans (Grain)	60	87	3.5	0.79	lbs./bu.
(Stover)		90	15.8	2.5	lbs./ton
Sunflower, oil (Grain)	25	90	29.1	13.0	lbs./1000 lbs.
Silage Crops					
Alfalfa, mid-bloom		40	21.8	4.9	lbs./ton
Corn silage		35	9.0	3.2	lbs./ton
Small grain, dough		35	9.0	4.5	lbs./ton
Sorghum		30	9.0	3.0	lbs./ton
Sorghum-sudan		30	10.4	2.9	lbs./ton

Crop	DM %	N	P_2O_5	Units
Forage Crops (taken as hay) [1, 2]				
Alfalfa, mid-bloom	85	46.2	9.3	lbs./ton
Birdsfoot trefoil	85	43.2	9.0	lbs./ton
Bluestem, mature	85	7.9	2.7	lbs./ton
Bluestem, early heading	85	21.8	5.8	lbs./ton
Bromegrass, smooth, mid-bloom	85	39.2	10.9	lbs./ton
Clover, red	85	40.8	9.3	lbs./ton
Fescue, Tall, full-bloom	85	35.1	12.5	lbs./ton
Millet, foxtail	85	23.4	7.4	lbs./ton
Orchardgrass, late-bloom	85	22.8	11.7	lbs./ton
Prairie hay, mature	85	14.4	5.5	lbs./ton
Reed canarygrass	85	28.0	9.3	lbs./ton
Small grain, boot	85	34.0	11.7	lbs./ton
Small grain, dough	85	21.8	10.9	lbs./ton
Soybean hay	85	45.7	12.8	lbs./ton
Switchgrass	85	21.8	5.8	lbs./ton
Timothy, mid-bloom	85	26.4	9.0	lbs./ton
Vetch, hairy	85	56.6	13.2	lbs./ton
Wheatgrass, western, early-bloom	85	19.9	5.8	lbs./ton
Sugar Crops				
Sugar beet roots	20	3.5	1.6	lbs./ton
Sugar beet tops	18	5.5	1.3	lbs./ton of beets
Food Crops				
Dry Beans	90	4.1	1.1	lbs./cwt.
Popcorn (Grain)	86	1.8	0.6	lbs./cwt.
(Stover)	85	17.7	3.5	lbs./ton
Potatoes [3]	22	7.0	2.5	lbs./ton

[1]When grazing forages, phosphorus removal is limited to that incorporated into the body of the calf, or the milk of a dairy cow. A 500 lb. weaned calf contains about 4 lb. of phosphorus (9 lb. P_2O_5), and backgrounding will add another 0.8 lb. of P (1.8 lb. P_2O_5) per 100 lb of gain. Supplementation of cow and/or calf will partly replace the P removed. (e.g. 0.30% P x 2 lb./day x 60 days = 0.36 lb. P = 0.8 lb. P_2O_5)

[2]Calves will retain about 12% of forage nitrogen (about 2.7 lb. N / 100 lb. live wt.). More N is volatilized from the urine and manure (15% of this N). On average figure about 75% of grazed forage N is retained in the field. Also, creep feed at 15% C.P. x 2 lb./day x 60 days = 2.9 lb. N.

[3]Due to potato disease micro-organisms entering a field in manure, manure applications are discouraged where potatoes are or may be in the rotation.

Table R-2. Calculation of weighted soil nitrate-N credit.

	Example			Your Farm		
	a. Nitrate Nitrogen	b. Sample Depth	a x b	a. Nitrate Nitrogen	b. Sample Depth	a x b
Nitrate Sample 1	11	0 to 8 in.	11 X (8 – 0) = 88			
Nitrate Sample 2	7	8 to 24 in.	7 X (24 – 8) = 112			
Nitrate Sample 3	4	24-36 in.	4 X (36 – 24) =48			
Weighted Nitrate = (sum of a x b) ÷ total sample depth			(88 + 112 + 48) ÷ 36 = 7			

If the soil test report for nitrate-N is in lbs./ac, then divide that value by 0.3 and by the sampling depth in inches to convert to ppm. Use a default value of 3.0 ppm nitrate-N for samples less than 24 inches deep (unless for shallow-rooted crops), or where no samples were taken. If the effective root zone is less than 24 inches deep, prorate the nitrate-N credit on the basis of a full rooting depth, e.g. if the root depth is 18 inches, then divide ppm by 2 (half of 36 inches).

Table R-3. Typical crop available nutrient content of manure. These values may be used when a manure analysis is not available.

Species	NH_4 - N	Org. – N	P_2O_5	K_2O
Solid Manure (lbs. per ton)*				
Beef (dirt lot)	4	7	7	11
Beef (paved lot)	5	9	9	13
Swine	6	10	9	95
Dairy	2	8	3	6
Broiler litter	12	34	53	36
Turkey litter	8	32	50	30
Layer	12	22	51	36
Slurry Manure (lbs per 1,000 gallons)[1]				
Dairy	6	25	15	19
Beef	8	21	18	26
Swine (earthen pit)	24	8	22	20
Swine (deep pit)	33	17	42	30
Layer	37	20	52	33

Species	NH_4 - N	Org. – N	P_2O_5	K_2O
Sludge from anaerobic lagoon (lbs. per 1,000 gal.)				
Dairy	4	17	20	16
Swine	6	19	52	76
Beef (settling basin)	10	42	40	17
Top water from lagoon or holding pond (lbs / ac-in)[2]				
Beef	41	4	10	203
Swine	50	29	17	86
Dairy	27	18	13	113

[1]From "Manure Characteristics," MWPS-18-1.
[2]To obtain pounds per 1,000 gallons, divide by 27.

Table R-4. Legume and green manure nitrogen credits.

Previous Crop	Nitrogen Fertilizer Credits (lbs./acre)	
	Medium/Fine Soils	Sandy Soils
Soybeans	45	45
Soybeans < 30 bu./ac. due to season-long stress	1.0 lb./bu.	1.0 lb./bu.
Sugar beet tops, followed by dry beans	100	100
Alfalfa (70-100% stand, >4 plants/ft^2)	150	100
Alfalfa (30-69% stand, 1.5 to 4 plants/ft^2)	120	70
Alfalfa (0-29% stand, <1.5 plants/ft^2)	90	40
Red or Sweet Clover (70-100% stand, >4 plants/ft^2)	120	80
Red or Sweet Clover (30-69% stand, 1.5 to 4 plants/ft^2)	100	60
Red or Sweet Clover (0-29% stand, <1.5 plants/ft^2)	70	30

Table R-5. Nitrogen recommendations for barley.

Expected Yield (bushels per acre)	Soil Organic Matter (%)		
	1	2	3
	Pounds of Nitrogen to Apply Per Acre		
40	50	30	10
60	80	60	40
80	110	90	70

Table R-6. Nitrogen recommendations for corn based on expected yield with adjustments for soil nitrate-nitrogen and soil organic matter.

		Corn Expected Yield (Bu/Acre)									
		60	80	100	120	140	160	180	200	220	240
		Corn Silage Expected Yield (Tons/Acre)									
Residual Soil Nitrate Level		10	13	16	19	22	25	28	31	35	38
ppm	Relative Level	Pounds of Nitrogen to Apply Per Acre									
3% soil organic matter											
3	Low	60	75	90	105	120	135	150	165	185	200
6	Low	35	50	65	80	95	110	125	145	160	175
9	Medium	0	25	40	55	70	90	105	120	135	150
12	Medium		0	15	35	50	65	80	95	110	125
15	High			0	0	25	40	55	70	85	100
18	High					0	15	30	45	65	80
21	High						0	0	25	40	55
24	Very high								0	15	30
27	Very high									0	0
2% soil organic matter											
3	Low	65	85	105	120	140	160	175	195	215	230
6	Low	40	60	80	95	115	135	155	170	190	210
9	Medium	20	35	55	75	90	110	130	145	165	185
12	Medium	0	15	30	50	70	85	105	125	140	160
15	High		0	0	25	45	60	80	100	115	135
18	High				0	20	40	55	75	95	110
21	High					0	15	35	50	70	90
24	Very high						0	0	25	45	65
27	Very high								0	20	40
1% soil organic matter											
3	Low	75	95	115	140	160	180	200	225	245	265
6	Low	50	70	95	115	135	155	180	200	220	240
9	Medium	25	50	70	90	110	135	155	175	195	215
12	Medium	0	25	45	65	85	110	130	150	170	195
15	High		0	20	40	65	85	105	125	150	170
18	High			0	20	40	60	80	105	125	145
21	High				0	15	35	60	80	100	120
24	Very high					0	15	35	55	75	95
27	Very high						0	0	30	50	75
33	Very high									0	25
36	Very high										0
Without a soil test for nitrate-N, assume 3 ppm; without a soil test for organic matter, assume 2%.											

Table R-7. Nitrogen recommendations for dry edible beans. If the previous crop was alfalfa or sugar beets and the sugar beet tops were left in the field, no fertilizer nitrogen should be applied. Ample nitrogen will be present from alfalfa or sugar beet residues to supply the dry bean crop needs.

Residual Soil Nitrate-N (30 inch sample) (ppm)	Nitrogen to apply (Pounds per acre)
<5.6	75
5.6 to 8.2	50
8.3 to 11.0	25
> 11.0	0

Table R-8. Nitrogen recommendations for Nebraska pastures and haylands

	Cool Season Grasses		Warm Season Grasses	
Zone	Pasture	Hayland	Pasture	Hayland
	Nitrogen to Apply*(pounds per acre)			
I	80-120	100-150	60-90	75-100
II	50-80	60-90	40-75	50-80
III	40-60	50-75	25-50	40-60
IV	20-40	30-60	20-40	30-50
* Use the higher rate when a full profile of subsoil moisture is present.				

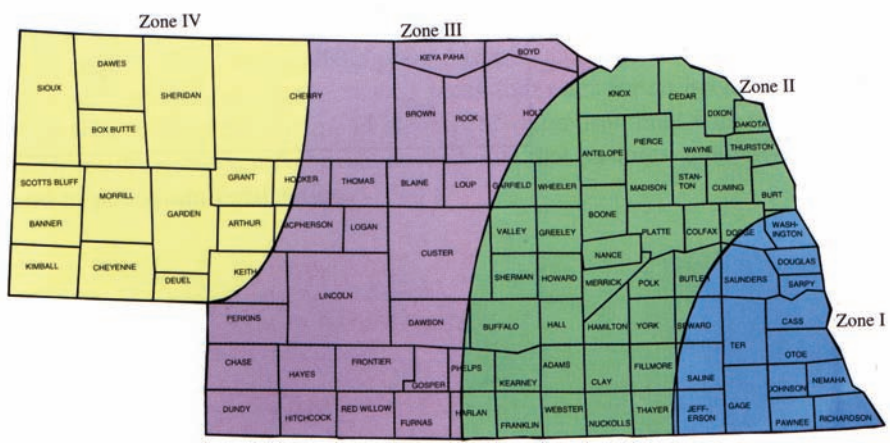


Table R-8. (continued) Recommended nitrogen application rates for Nebraska irrigated pastures based on residual soil nitrate-N.

Stocking Rate (yearlings per acre)	Nitrogen to Apply (pounds per acre)		
	0 – 50	50 – 100	100 – 150
	For Soil Residual Nitrate (ppm in soil to 6 ft depth)		
3	8.3	5.6	3.7
4	11.1	8.3	6.5
>4	12.5	11.1	9.3

Table R-9. Nitrate-nitrogen indices and nitrogen recommendations for a three-foot soil sampling depth for millet production.

Residual Soil Nitrate Level		Nitrogen to Apply	
		Following Fallow	Following Wheat
ppm	Relative level	Pounds per acre	
0 to 2.0	Very low	40	80
2.1 to 3.5	Low	20	60
3.6 to 5.0	Medium	10	50
5.1 to 8.0	High	0	30
> 8.0	Very high	0	0
* Average nitrate-N in a three-foot profile			

Table R-10. Nitrogen recommendations for oats.

Expected Yield – Oats	Soil Organic Matter (%)		
	1	2	3
Bushels per acre	Pounds of N to apply per acre		
60	70	50	30
80	90	70	50
100	110	90	70

Table R-11. Nitrogen recommendations for popcorn.

Residual Soil Nitrate Level (ppm)	Expected Yield								
	Hundred weight per acre								
	25	30	35	40	45	50	55	60	70
	Nitrogen to Apply (pounds per acre)								
3% soil organic matter									
2	60	70	75	85	95	100	110	120	135
4	45	55	60	70	75	85	95	100	120
6	30	35	45	55	60	70	80	85	105
8	10	20	30	35	45	55	60	70	85
10		5	15	20	30	40	45	55	70
15							5	15	30
20									
2% soil organic matter									
2	65	75	85	95	105	115	125	135	150
4	50	60	70	80	90	100	105	115	135
6	35	45	55	65	75	80	90	100	120
8	20	30	40	45	55	65	75	85	105
10	5	10	20	30	40	50	60	70	90
15						10	20	30	50
20									10
1% soil organic matter									
2	75	85	95	105	115	125	135	150	170
4	55	70	80	90	100	110	120	130	155
6	40	50	60	75	85	95	105	115	140
8	25	35	45	55	70	80	90	100	120
10	10	20	30	40	50	65	75	85	105
15					10	25	35	45	65
20								5	25
Round to nearest 5 pounds									

Table R-12. Potato. Due to potato disease microorganisms entering a field in manure, manure applications are *strongly discouraged* where potatoes are or may be in the rotation.

Table R-13. Nitrogen recommendations for sorghum.

Soil Nitrate Level (ppm)	Expected Yield (bushels per acre)								
	40	60	80	100	120	140	160	180	200
	Nitrogen to Apply (pounds per acre)								
Organic Matter: 3%									
2	25	50	70	90	115	135	160	180	200
4	0	20	40	65	85	110	130	150	175
6	0	0	10	35	55	80	100	120	145
8	0	0	0	5	30	50	70	95	115
10	0	0	0	0	0	20	45	65	90
12	0	0	0	0	0	0	15	35	60
14	0	0	0	0	0	0	0	10	30
16	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
Organic Matter: 2%									
2	45	70	90	110	135	155	180	200	220
4	20	40	60	85	105	130	150	170	195
6	0	10	30	55	75	100	120	140	165
8	0	0	5	25	50	70	90	115	135
10	0	0	0	0	20	40	65	85	110
12	0	0	0	0	0	10	35	55	80
14	0	0	0	0	0	0	5	30	50
16	0	0	0	0	0	0	0	0	20
18	0	0	0	0	0	0	0	0	0
Organic Matter: 1%									
2	65	90	110	130	155	175	200	220	240
4	40	60	80	100	125	145	170	190	215
6	10	30	50	75	95	120	140	160	185
8	0	1	25	45	70	90	110	135	155
10	0	0	0	20	40	60	85	105	130
12	0	0	0	0	10	30	55	75	100
14	0	0	0	0	0	3	25	50	70
16	0	0	0	0	0	0	0	20	40
18	0	0	0	0	0	0	0	0	10

Table R-14. Nitrogen recommendations for sugar beets in Nebraska

Residual Soil Nitrate Level		Soil Organic Matter (%)			
		0 to 1.4	1.5 to 1.7	1.8 to 2.1	> 2.1
(Lbs. per acre, 6 foot sample)	ppm	Nitrogen to Apply (pounds per acre)			
0 to 5	0 to 0.25	195	185	175	165
6 to 25	0.25 to 1.2	175	165	155	145
26 to 45	1.2 to 2.1	155	145	135	125
46 to 65	2.1 to 3.0	135	125	115	105
66 to 85	3.0 to 3.9	115	105	95	85
86 to 105	3.9 to 4.8	95	85	75	65
106 to 125	4.8 to 5.7	75	65	55	45
126 to 145	5.7 to 6.6	55	45	35	25
146 to 165	6.6 to 7.5	35	25	0	0
> 165	> 7.5	0	0	0	0

Table R-15. Nitrogen recommendations for sunflower.

Residual Soil Nitrate Level* (ppm)	Dryland Expected Yield						Irrigated Expected Yield			
	(pounds per acre)									
	1000	1200	1400	1600	1800		2000	2200	2400	2600
	Nitrogen to Apply (pounds per acre)									
0 to 1.0	30	40	50	60	70		80	90	100	110
1.0 to 2.0	15	25	35	45	55		65	75	85	95
2.1 to 3.0		10	20	30	40		50	60	70	80
3.1 to 4.0		0	0	15	25		35	45	55	65
4.1 to 5.0		0	0	0	0		20	30	40	50
5.1 to 6.0							0	15	25	35
> 6.0							0	0	10	20
* Average ppm NO_3-N in a 0 to 3-foot sample										

Table R-16. Nitrogen recommendations for spring wheat.

Expected Yield (bushels per acre)	Soil Organic Matter (%)		
	1	2	3
	Nitrogen to Apply (pounds per acre)		
30	62	42	22
50	110	90	70
70	158	138	118

Table R-17. Recommended nitrogen rates for winter wheat.

Residual Soil Nitrate Level (Average ppm in 3 ft.)	Wheat Price per Bushel						
	$2.50				$3.50		
	Fertilizer price per pound of nitrogen						
	$0.15	$0.20	$0.25		$0.15	$0.20	$0.25
	Nitrogen to apply (pounds per acre)						
3	95	81	66		108	97	87
6	64	49	35		76	66	55
9	32	17	3		44	34	24
12	0	0	0		13	2	0
15	0	0	0		0	0	0

Table R-18. Recommended rates of phosphorus on alfalfa.

Phosphorus Soil Test Level			P_2O_5 to Apply		
Bray-1	Olsen-P	Relative Level	Annually Irrigated[1]	Annually[2]	Applied Every 2 years[3]
				Non-Irrigated	
ppm			Pounds per acre		
0 to 5	0 – 3	Very low (vl)	60	40	80
6 to 15	4 – 10	Low (l)	40	30	60
16 to 25	11 – 17	Medium (m)	30	20	40
> 25	> 17	High (h)			

[1] Established stands where the expected yield is six to eight tons per acre with good water management perform best with annual early spring application. For new seedings of irrigated alfalfa, the farmer should plow down or disk in phosphate fertilizer ahead of seeding at twice the recommended annual rate if soils are low or very low in soil-test phosphorus. This should provide adequate phosphate for the first production year.
[2] Except in calcareous (high lime) soils, the producer should plow down or disk in applications ahead of seeding at three times the recommended annual rate for non-irrigated alfalfa. This should meet phosphorus needs for three to four years.
[3] On calcareous soils in northeast Nebraska (Crofton and Nora soil series), application ahead of seeding following by top dressing every two years is the most profitable method.

Table R-19. Phosphorus recommendations for barley.

Phosphorus Soil Test			P_2O_5 Application Method	
Relative Level	Bray-1	Olsen-P	Broadcast	Band
	ppm		Pounds per acre	
Very low	0 – 5	0 – 3	80	40
Low	6 – 15	4 – 10	60	30
Medium	16 – 25	11 – 17	40	20
High	> 25	> 17	0	0

Table R-20. Phosphorus recommendations for corn.

Phosphorus Soil Test			P_2O_5 to Apply	
Bray-1*	Olsen P*	Relative Level	Broadcast	Band**
ppm			Pounds per acre	
0 to 5	0 to 3	Very low (vl)	80	40
6 to 15	4 to 10	Low (l)	40	20
16 to 24	11 to 16	Medium (m)	0	†
25 to 30	17 to 20	High (h)	0	†
> 30	> 20	Very high (vh)	0	0

*Phosphorus tests: Bray-1 for acid and neutral soils; Olsen P for calcareous soils (pH 7.3 or greater).
** Applied in a band preplant or beside the row at planting.
† Applying 10 to 20 pounds per acre P_2O_5 with 5 to 10 pounds per acre nitrogen in a band at planting may increase early growth on these soils. See NebGuide G77-361, "Using Starter Fertilizers for Corn, Grain Sorghum and Soybeans."

Table R-21. Phosphorus recommendations for dry edible beans.

Phosphorus Soil Test				P_2O_5 Application Rate	
Relative Level	Bray-1	Olsen-P		Broadcast	Band
	ppm			Pounds per acre	
Low	0 – 5	0 – 3		20	40
Medium	6-15	4 – 7		10	20
High	>15	>7		0	0

Table R-22. Phosphorus recommendations for dryland and irrigated grasslands.

Phosphorus Soil Test			Dryland P_2O_5 to Apply	Irrigated P_2O_5 to Apply	
Relative Level	Bray-1	Olsen-P		Grass	Grass-legume
	ppm			Pounds per acre	
Very Low	0 – 5	0 – 3	40	60	90
Low	6 – 15	4 – 10	20	40	60
Medium	16 – 25	10 – 17	10	20	30
High	>25	>17	0	0	0

Table R-23. Phosphorus recommendations for millet.

Phosphorus Soil Test			P_2O_5 to Apply	
Bray-1 P	Olsen-P	Relative Level	Broadcast	Band
ppm			Pounds per acre	
<10	< 5	Very low	80	40
10 to 15	5 to 8	Low	40	20
16 to 20	8 to 12	Medium	20	10
> 20	> 12	High	0	0

Table R-24. Phosphorus recommendations for oats and other spring small grains.

Phosphorus Soil Test			P_2O_5 Application Method	
Relative Level	Bray-1 P	Olsen-P	Broadcast	Band
	ppm		Pounds per acre	
Very low	0 – 5	0 – 3	80	40
Low	6 – 15	4 – 10	60	30
Medium	16 – 25	11 – 17	40	20
High	>25	>17	0	0

Table R-25. Phosphorus recommendations for popcorn.

Phosphorus Soil Test			P_2O_5 to Apply	
Bray-1 P*	Olsen-P*	Relative Level	Broadcast	Band **
ppm			Pounds per acre	
0 to 5	0 to 3	Very low (vl)	80	40
6 to 15	4 to 10	Low (l)	40	20
16 to 24	11 to 16	Medium (m)	0	†
25 to 30	17 to 20	High (h)	0	†
>30	>20	Very high (vh)	0	0

* Phosphorus tests: Bray-1 for acid and neutral soils; Olsen-P for calcareous soil (pH 7.2 or greater).
** Applied in a band preplant or beside the row at planting.
† Applying 10 to 20 pounds per acre P_2O_5 with 5 to 10 pounds per acre nitrogen in a band at planting may increase early growth on these soils. See NebGuide G77-631, "Using Starter Fertilizers for Corn, Grain Sorghum and Soybeans."

Table R-26 Potato. Due to potato disease microorganisms entering a field in manure, manure applications are *strongly discouraged* where potatoes are or may be in the rotation.

Table R-27. Phosphorus recommendations for sorghum.

Phosphorus Soil Test	P_2O_5 to Apply	
Bray-1 P	Broadcast	Band
ppm	Pounds per acre	
0 to 5	80	40
6 to 15	40	20
16 to 25	0	0
> 25	0	0

Table R-28. Phosphorus recommendations for soybean.

Phosphorus Soil Test		P_2O_5 to Apply Pounds per acre
Bray-1 P	Olsen-P	
ppm		
0 to 4	0 to 3	65
6 to 8	4 to 5	40
9 to 12	6 to 8	20
> 12	> 8	0

Table R-29. Phosphorus recommendations for sugar beets.

Phosphorus Soil Test			P_2O_5 to Apply Pounds per acre
Bray-1 P	Olsen-P*	Relative Level	
ppm			
0 to 5	0 to 3	Very low	100
6 to 10	4 to 7	Low	75
11 to 15	7 to 10	Marginal	50
>15	>10	Adequate	0

* For Mitchell soils with an Olsen P level between 11 and 16 ppm, apply 25 pounds P_2O_5 per acre.

Table R-30. Phosphorus recommendations for sunflower.

Phosphorus Soil Test		P_2O_5 to Apply	
Bray-1 P*	Olsen-P*	Broadcast	Band
ppm		Pounds per acre	
0 to 5	0 to 4	60	30
6 to 15	5 to 10	40	20
16 to 25	11 to 15	20	10
>25	>15	0	0
* Phosphorus tests: Bray-1 for acid and neutral soils; Olsen-P for calcareous soils.			

Table R-31. Phosphorus recommendations for spring wheat.

Phosphorus Soil Test			P_2O_5 Application Method	
Relative Level	Bray-1 P	Olsen-P	Broadcast	Band
	ppm		Pounds per acre	
Very low	0 – 5	0 – 3	80	40
Low	6 – 15	4 – 10	60	30
Medium	16 – 25	11 – 17	40	20
High	>25	>17	0	0

Table R-32. Most profitable phosphorus application rates for winter wheat in Nebraska for different application methods and expected yield.

Phosphorus Soil Test		Yield Level (bushels/acre)		
Bray-1 P	Olsen-P	40	50	70
ppm		P_2O_5 to apply pounds/ac*		
		Broadcast		
5	3	50	60	70
10	7	20	25	40
15	10	0	10	25
20	13	0	0	10
25	17	0	0	0
30	20	0	0	0
		Row or dual application		
5	3	35	50	70
10	7	10	25	45
15	10	0	10	30
20	13	0	0	20
25	17	0	0	15
30	20	0	0	10
* Based on $4 per bushel wheat and 30 cents per pound of P_2O_5 and a soil pH of 7.0 (broadcast only).				

MANURE APPLICATOR CALIBRATION GUIDE

1. Spreader Capacity is Known. From chart below, select 1) Spreader Capacity: _____ lbs. or gallons; 2) Distance traveled (length) to empty spreader: _____ feet; and 3) Spread pattern width or distance between individual passes: _____ feet. 4) Intersection indicates application rate:_____. If appropriate values cannot be found in table below: Rate per acre = Spreader Capacity x 43560 / (Width X Length). *Example: 3000 gallon tank spreader that makes a pass every 4 30"corn rows (10 feet) and empties spreader in 1200 feet is applying 11,000 gallons per acre.*

Spead Width→	2000 Gallon tank						2500 gallon tank						3 3000 gallon tank					1	3500 gallon tank						4000 gallon tank						4500 gallon tank					
	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'	10'	15'	20'	30'	40'	50'	10'	15'	20'	30'	40'	50'	10'	15'	20'	30'	40'	50'	10'	15'	20'	30'	40'	50'
Length	*Liquid manure application rate (1000's of gallons per acre)*																																			
600'	15	10	7	6	5	4	18	12	9	7	6	5	22	15	11	7	5	4	25	17	13	8	6	5	29	19	15	10	7	6	33	22	16	11	8	7
800'	11	7	5	4	4	3	14	9	7	5	5	4	16	11	8	5	4	3	19	13	10	6	5	4	22	15	11	7	5	4	25	16	12	8	6	5
1000'	9	6	4	3	3	2	11	7	5	4	4	3	13	9	7	4	3	3	15	10	8	5	4	3	17	12	9	6	4	3	20	13	10	7	5	4
2 1200'	7	5	4	3	2	2	9	6	5	4	3	3	11	7	5	4	3	2	13	8	6	4	3	3	15	10	7	5	4	3	16	11	8	5	4	3
1400'	6	4	3	2	2	2	8	5	4	3	3	2	9	6	5	3	2	2	11	7	5	4	3	2	12	8	6	4	3	2	14	9	7	5	4	3
1600'	5	4	3	2	2	2	7	5	3	3	2	2	8	5	4	3	2	2	10	6	5	3	2	2	11	7	5	4	3	2	12	8	6	4	3	2
1800'	5	3	2	2	2	1	6	4	3	2	2	2	7	5	4	2	2	1	8	6	4	3	2	2	10	6	5	3	2	2	11	7	5	4	3	2
2000'	4	3	2	2	1	1	5	4	3	2	2	2	7	4	3	2	2	1	8	5	4	3	2	2	9	6	4	3	2	2	10	7	5	3	2	2
2500'	3	2	2	1	1	1	4	3	2	2	1	1	5	3	3	2	1	1	6	4	3	2	2	1	7	5	3	2	2	1	8	5	4	3	2	2
3000'	3	2	1	1	1	1	4	2	2	1	1	1	4	3	2	1	1	1	5	3	3	2	1	1	6	4	3	2	1	1	7	4	3	2	2	1

Spead Width→	5000 Gallon tank						5500 gallon tank						6000 gallon tank						3 ton spreader (90 bushel)						4 ton spreader (120 bushel)						6 ton spreader (175 bushel)					
	10'	15'	20'	30'	40'	50'	10'	15'	20'	30'	40'	50'	10'	15'	20'	30'	40'	50'	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'
Length	*Liquid manure application rate (1000's of gallons per acre)*																		*Solid manure application rate (tons per acre)*																	
600'	36	24	18	12	9	7	40	27	20	13	10	8	44	29	22	15	11	9	22	15	11	9	7	6	29	19	15	12	10	8	44	29	22	17	15	12
800'	27	18	14	9	7	5	30	20	15	10	7	6	33	22	16	11	8	7	16	11	8	7	5	5	22	15	11	9	7	6	33	22	16	13	11	9
1000'	22	15	11	7	5	4	24	16	12	8	6	5	26	17	13	9	7	5	13	9	7	5	4	4	17	12	9	7	6	5	26	17	13	10	9	7
1200'	18	12	9	6	5	4	20	13	10	7	5	4	22	15	11	7	5	4	11	7	5	4	4	3	15	10	7	6	5	4	22	15	11	9	7	6
1400'	16	10	8	5	4	3	17	11	9	6	4	3	19	12	9	6	5	4	9	6	5	4	3	3	12	8	6	5	4	4	19	12	9	7	6	5
1600'	14	9	7	5	3	3	15	10	7	5	4	3	16	11	8	5	4	3	8	5	4	3	3	2	11	7	5	4	4	3	16	11	8	7	5	5
1800'	12	8	6	4	3	2	13	9	7	4	3	3	15	10	7	5	4	3	7	5	4	3	2	2	10	6	5	4	3	3	15	10	7	6	5	4
2000'	11	7	5	4	3	2	12	8	6	4	3	2	13	9	7	4	3	3	7	4	3	3	2	2	9	6	4	3	3	2	13	9	7	5	4	4
2500'	9	6	4	3	2	2	10	6	5	3	2	2	10	7	5	3	3	2	5	3	3	2	2	1	7	5	3	3	2	2	10	7	5	4	3	3
3000'	7	5	4	2	2	1	8	5	4	3	2	2	9	6	4	3	2	2	4	3	2	2	1	1	6	4	3	2	2	2	9	6	4	3	3	2

Spread Width→	8 ton spreader (230 bushel)						10 ton spreader (290 bushel)						12 ton spreader (350 bushel)						14 ton spreader (410 bushel)						16 ton spreader (470 bushel)						18 ton spreader (530 bushel)					
	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'	10'	15'	20'	25'	30'	35'
Length	*Solid manure application rate (tons per acre)*																		*Solid manure application rate (tons per acre)*																	
600'	58	39	29	23	19	17	73	48	36	29	24	21	87	58	44	35	29	25	102	68	51	41	34	29	116	77	58	46	39	33	131	87	65	52	44	37
800'	44	29	22	17	15	12	54	36	27	22	18	16	65	44	33	26	22	19	76	51	38	30	25	22	87	58	44	35	29	25	98	65	49	39	33	28
1000'	35	23	17	14	12	10	44	29	22	17	15	12	52	35	26	21	17	15	61	41	30	24	20	17	70	46	35	28	23	20	78	52	39	31	26	22
1200'	29	19	15	12	10	8	36	24	18	15	12	10	44	29	22	17	15	12	51	34	25	20	17	15	58	39	29	23	19	17	65	44	33	26	22	19
1400'	25	17	12	10	8	7	31	21	16	12	10	9	37	25	19	15	12	11	44	29	22	17	15	12	50	33	25	20	17	14	56	37	28	22	19	16
1600'	22	15	11	9	7	6	27	18	14	11	9	8	33	22	16	13	11	9	38	25	19	15	13	11	44	29	22	17	15	12	49	33	25	20	16	14
1800'	19	13	10	8	6	6	24	16	12	10	8	7	29	19	15	12	10	8	34	23	17	14	11	10	39	26	19	15	13	11	44	29	22	17	15	12
2000'	17	12	9	7	6	5	22	15	11	9	7	6	26	17	13	10	9	7	30	20	15	12	10	9	35	23	17	14	12	10	39	26	20	16	13	11
2500'	14	9	7	6	5	4	17	12	9	7	6	5	21	14	10	8	7	6	24	16	12	10	8	7	28	19	14	11	9	8	31	21	16	13	10	9
3000'	12	8	6	5	4	3	15	10	7	6	5	4	17	12	9	7	6	5	20	14	10	8	7	6	23	15	12	9	8	7	26	17	13	10	9	7

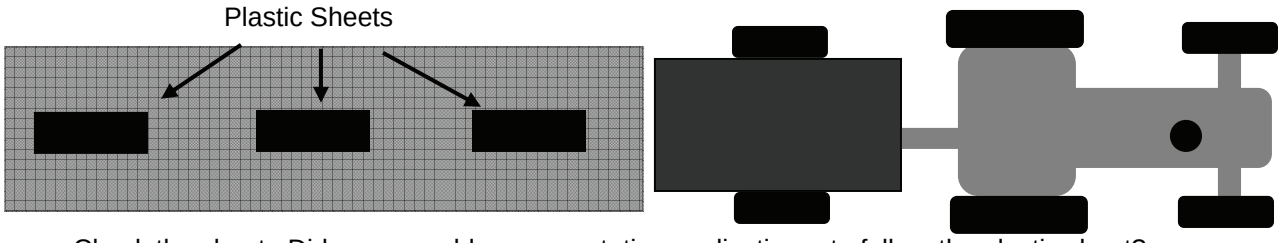
2. Spreader Capacity is Unknown.

a. Cut three or more sheets of equally sized plastic. 22 square feet (3' x 7'4" or 4' X 5'6") is preferred size.

b. Weigh empty 5 gallon bucket plus one plastic sheet on a scale: _____ lbs.

c. Lay sheets in field with edges secured by stones or other heavy objects.

d. Drive tractor at normal speeds and discharge manure at typical rates over plastic sheets. Record tractor gear: _____, engine RPM: _____ , and spreader settings: _____



e. Check the sheet. Did a reasonably representative application rate fall on the plastic sheet?

f. Carefully fold individual sheets without losing manure and place each sheet in separate buckets.

Weigh each bucket. Bucket 1: _____lbs. Bucket 2: _____lbs. Bucket 3: _____lbs.

g. Subtract weight of empty bucket and plastic (step b) to determine net manure weight is each bucket.

Net manure weight for Bucket 1: _____lbs. Bucket 2: _____lbs. Bucket 3: _____lbs.

h. Calculate average weight of buckets. Average Net Manure Weight: _____lbs.

i. Calculate application rate. Tons per Acre = (Net Manure Weight X 22) ÷ area of plastic sheet (ft^2)

If plastic sheet = 22 ft^2, then Tons per Acre = Net Manure Weight

3. Pivot Calibration

A. If Pivot Flow Rate Is Known:

a. Estimate pumping time: _____ hours

b. Estimate water flow rate: _____ gallons per minute

c. Estimate acres covered: _____ acres

d. Estimate application rate:

$$\text{Inches (or ac–in/ac)} = \frac{\text{Pumping Time X Flow Rate}}{\text{Acres X 450}} = \frac{\text{X}}{\text{X 450}} = _____ \text{ in.}$$

B. If Pivot Flow Rate Is NOT Known:

a. Place 4 to 6 rain gauges (pans or straight sided plastic cups will also work) in line with the pivot center point at roughly equally spaced intervals. Placement on access road away from crop canopy is preferred.

b. Measure depth in rain gauges and calculate average.

Gauge #1: _____ in. #2: _____ in. #3: _____ in. #4: _____ in. #5: _____ in. #6._____ in.

Average Depth: _____inches

OR

a. Identify Rated Pump Pressure and Flow Rate: _____ psi at _____ gpm

b. Identify Actual Pump Pressure:_____ psi

c. Estimate Actual Flow Rate.

$$GPM_{actual} = GPM_{rated} \times \sqrt{P_{actual} / P_{rated}}^{*} = _____ \times \sqrt{_____ / _____} = _____ \text{ gpm}$$

d. Substitute actual Flow Rate from c. into the Flow Rate space in d. of "A. If Flow Rate Is Known" and complete calculation of application rate.

* Square Root

Nebraska Department of Environmental Quality

ENVIRONMENTAL GUIDANCE DOCUMENT

00-046 April, 2000

Comprehensive Nutrient Management Plan

Comprehensive nutrient management plan (CNMP) requirements can be found in Title 130, Chapters 3, 10, and 11. There may be additional requirements based on the actual construction, operation, and maintenance of a particular livestock waste control facility. Sludge management, odor, equipment capacity limitations, and closure concerns should also be considered.

Land Application Area

- Legal description of the planned waste application areas.
- Number of useable acres.
- Slope and soil type.
- Cropping practices and historic yields.
- Distance to surface water.
- Location of wetlands.
- Use by other operations.
- Easements as necessary with landowner(s)' name, address, site legal description, number of acres, and use agreement signed by the landowner(s). Easements or access agreements are also required when access to an application site requires waste to be conveyed across property not owned by the operation, including county right-of-ways.

Sampling, Analysis, and Application Plan

- Waste sampling methods, frequency of sampling, and analysis procedures.
- Soil sampling methods, frequency of sampling, and analysis procedures with a description of sample areas (generally no more than 40 acres per sample), sample depth (generally 6 to 8 inch composite for phosphorus and 24 inches or greater for nitrogen). Include test methods (such as Bray 1, Olson, Mehlich, etc. for phosphorus).
- Planned application rates, application methods, and frequencies. Plan must include the method used to determine the agronomic rate for nitrogen.
- If an irrigation system, the plan must include the type and location of any mechanical devices (pipe, pumps, valves, etc.). Plan must indicate if system will be disconnected from the irrigation water source during livestock waste application.

Record Keeping

- Locations where livestock waste applied.
- Estimates and analyses of nutrient value of livestock waste used to determine application rates.
- Quantities of livestock wastes applied to application areas.
- Record of sample results.
- Record of any livestock waste sold or given away.
- Location of wetlands (determined by NRCS) on the operation or application areas.

- Maintain records for 5 years (or longer if required in approved CNMP). Longer periods may be required in some instances due to the type of livestock waste control facility or other relevant concerns.

Best Management Practices (BMP)

- Facilities dewatered to maintain required minimum storage.
- Land application or stockpiling in a manner that will not contribute to water pollution.
- Sample application area for available phosphorus prior to use and as scheduled.
- A plan describing BMP to minimize odor is required of all Class II, III, and IV facilities.

Reporting and Setback Requirements

- Report to the NDEQ all land application area soil analyses in which available phosphorus exceeds 150 parts per million. An alternative level for reporting may be required by NDEQ based on sampling and analysis methods.
- Restrict livestock waste application within 30 feet of any streams, lakes, and impounded waters.
- NDEQ may require additional restrictions for waste application within 100 feet of stream, lakes, or impounded waters.

Other Considerations

Monitoring of irrigation distribution system and other waste handling equipment.

- Application methods suitable to the operation including the storage capacity of the facility, weather, type of waste, soils, cropping practices, and facility management.
- Dead animals or carcasses shall not be placed in livestock waste control facilities or land applied with livestock waste.

NDEQ regulations for livestock waste control facility permits are contained in Title 130. A full copy of title 130 is available at http://www.deq.state.ne.us/, under "Rules and Regulations" option.

NDEQ fact sheets and guidance documents for livestock waste control facility permits can be found at http://www.deq.state.ne.us/, under "Publications and Forms" option and "Livestock Program" option.

Questions? Contact: Nebraska Department of Environmental Quality, Agriculture Section, P.O. Box 98922, Lincoln, NE 68509-8922; phone (402) 471-4239. Visit our web site at ***http://www. deq.state.ne.us.***