

TECHNICAL NOTES

NATURAL RESOURCES CONSERVATION SERVICE – WYOMING

AGRONOMY TECHNICAL NOTICE 19

May 18, 2011

SUBJECT:

Nutrient Management and Comprehensive Nutrient Management Plans

All Nutrient Management Plans must be reviewed and approved by a certified Nutrient Management Specialist or a CNMP Nutrient Management Specialist.

The Nutrient Management Plan is a single component of an overall conservation plan. All other Essential Practices and the associated supporting documentation/quality criteria should also be included in the case file.

But Nutrient Management is just one of the components of a Comprehensive Nutrient Management Plan (CNMP) for Animal Feeding Operations (AFO) and permitted Confined Animal Feeding Operations (CAFO).

Nutrient Management Plans will include the following items and jobsheets, as applicable:

- NRCS Field Office Technical Guide (eFOTG), Section I, Reference Lists/11. Tech Notes by Discipline/
 - Agronomy Technical Notice 3-Nitrogen Fixation and Legume Inoculation
 - Agronomy Technical Notice 10-University of WY Guide to Fertilizer Recommendations B-1045 Extension Offices or online at University of Wyoming
 - Agronomy Technical Notice 11.7-Nutrient Management Design Form Instructions WY-ECS-44
 - Agronomy Technical Notice 12.2-Instructions for the WY-ECS-45a Waste Utilization Excel Worksheet
 - Agronomy Technical Notice 12.7-Liquid Waste Utilization WY-ECS-45b Instructions
 - Agronomy Technical Notice 13-Soil Testing and Fall/Snow Manure Application Guidelines
 - Agronomy Technical Notice 15-Phosphorus Index
 - Agronomy Technical Notice 25-Nitrogen Leaching Index
 - **Agronomy Technical Notice 19-Nutrient Management and Comprehensive Nutrient Management Plan Components and Checklist**
- NRCS (eFOTG), Section IV, Conservation Practices: 590 Nutrient Management WY-ECS-44 Nutrient Management Balance Sheet for Commercial Fertilizer and Manure Fertilizer, WY-ECS-58 Nutrient Management Planning Work Sheet
WY-ECS-60 AFO/CAFO Inventory Sheet
WY-ECS-45a, Solid Waste Worksheet and/or WY-ECS-45b Liquid Waste Worksheet
WY-ECS-86 Comprehensive Nutrient Management Plan (CNMP) Template
- NRCS (eFOTG), Section IV, Conservation Practices: 328 Conservation Crop Rotation, WY-ECS-62
- NRCS RUSLE2 program for profile predicting soil loss by water erosion and calculating soil quality index (SCI).
- NRCS WEPS program for predicting soil loss by wind erosion

NUTRIENT MANAGEMENT PLANS

Nutrient Mgmt Plan	Comprehensive Nutrient Management Plan
	BACKGROUND & SITE INFO: Detailed summary of operation, Owner/Operator Information, Facility Location, Type and Size of Operation WY-ECS- 60 and WY- ECS- 86
	MANURE & WASTEWATER HANDLING & STORAGE: Maps of Production Area, Biosecurity, Production Area, Conservation Practices, Manure Storage, Animal Inventory, Mortality Management, Manure Exports, Imports, Internal Transfers of Manure
NUTRIENT MANAGEMENT: Crop rotation of crops and yields, Soil tests, Manure tests, Manure Application setback distances, Planned crops and fertilizer recommendations, Planned nutrient applications, manure inventory, fertilizer material summary, Farm nutrient balance of acres planned for nutrient application. WY-ECS-44 Nutrient Balance-Fertilizer/Manure WY-ECS- 45a Solid Waste, WY-ECS-45b Liquid Waste. Agronomy Note 15 and 25.	FARMSTEAD SAFETY AND SECURITY: Emergency Response Plan, Biosecurity Measures, Catastrophic Mortality Management, Chemical Handling and Fuel Containment data
	LAND TREATMENT CONSERVATION PRACTICES: Aerial maps of land application areas, fields delineated with setbacks, buffers, irrigation ditches, sensitive areas, property boundaries. Land treatment conservation practices: Conservation buffers, IWM data, Emergency Designated Area, Vegetated Treatment Areas.
	SOIL EROSION, NITROGEN & PHOSPHORUS RISK ASSESSMENTS, AIR QUALITY ASSESSMENTS: Soil maps, soils reports, predicted soil erosion, Nitrogen and Phosphorus Risk Assessment ratings , Air Quality Best Management Practices.
	NUTRIENT MANAGEMENT: Crop rotation of crops and yields, Soil tests, Manure tests, Manure Application setback distances, Planned crops and fertilizer recommendations, Planned nutrient applications, manure inventory, fertilizer material summary, Farm nutrient balance of acres planned for nutrient application WY-ECS-44 Nutrient Balance-Manure/Fertilizer, WY-ECS- 45a Solid Waste, WY-ECS-45b Liquid Waste. Agronomy Technical Note 15 and 25
	FEED MANAGEMENT: Not applicable in Wyoming as it is not a Feed Management conservation practice in Wyoming
	OTHER UTILIZATION OPTIONS: ie: Composting; if odors will be addressed
	RECORDKEEPING FORMS: Annual crop records, manure application records, results of soil and manure analysis, other commercial fertilizer records, irrigation water application records, Manure export off the farm, manure export onto to farm, internal transfers of manure, inspection/monitoring records of the facilities, other records required by Federal, State, local regulations.
	REFERENCES:

**Comprehensive Nutrient Management Plans (CNMP) must be reviewed and signed by a NRCS Certified Nutrient Management and Land Treatment Specialist.
 CNMP Manure and Wastewater Handling and Storage must be reviewed and signed by a NRCS Certified CNMP Engineer.**

Agronomy Technical Note 19

WY- CNMP (Comprehensive Nutrient Management Plan) Folder Arrangement

Agronomy Tech Note 19		
COVER #1		COVER #2
DEQ Annual Reports CNMP Permit (Producer folder only) Facility Location Maps		WY-ECS-86 – CNMP Documentation of Producer’s operation summary and objectives, Manure Handling and Storage Practices, Land Treatment Practices. Nutrient Management, Recordkeeping, Feed Management. Other Utilization Options
COVER #3		COVER #4
Conservation plan maps showing location of manure application, soils maps, soils legend, soils reports. Topography map of farm fields and facility.		Dead Animal Disposal, Conservation Buffer and Planned Emergency Location Site Map(s), WY-ECS-60 AFO/CAFO Inventory Manure and Soil Sampling Guidelines, Air Quality Assessment. Conservation plan, Inventory of Resource Concern checklist, and Alternatives
COVER #5		
Nutrient Management Plan: Manure Production (WY-ECS – 45A/B) and Nutrient Balance (WY-ECS – 44) of manure and/or commercial fertilizer. The Nutrient Management Plan component of a CNMP MUST be reviewed and approved by a certified CNMP Nutrient Management Planner. Use Land University Recommendations (WY-B-1045). Copy of current soil analysis (within last five years) and manure analysis, if not permitted; book values in WY-ECS-45.. Phosphorus Index (Agronomy Tech Note 15) Nitrogen Leaching Index (Ag Tech Note 25)		Inventory of Herd Size, Average Animal Size, Days of Confinement, Average Manure Moisture Content, Crop/Fields Receiving Manure, Recommended Nutrients to Achieve Yield (WY-ECS – 45A/B for manure), Nutrient Balance of Manure and Commercial Fertilizer (ECS-44). Nitrogen/Phosphorus–based Application Rate Commercial Fertilizer use: Nitrogen and Phosphorus Index if soil test N is >50# or 25 ppm and/or P is >15 ppm.
COVER #6		
<p>Manure Handling and Storage Clean Water Diverted, Leakage prevented from production area: all retention structures and silage storage areas. Verify containment of dirty water, Verify adequate storage.</p> <p>Provide documentation to the producer that their feedlot (does/does not) have containment? (See EPA’s 40 CFR 412.37 (b) (5).)²</p> <p>Inventory and Evaluation for the feedlot’s waste handling facility, consisting of but not limited to;</p> <ul style="list-style-type: none"> • Soils, Hydrology, (Recommend using the SCS method to analyze the existing facilities), Hydraulics, etc. • Write an engineering report explaining how the feedlot’s waste handling facility (does/does not) provide containment for the required storage period and the 25-yr 24-hr storm. Describe how the clean and dirty water are diverted as applicable. This report becomes a part of the producer’s CNMP. The report will be delivered and reviewed with the producer. CNMP is required with the DEQ Discharge permit application. 		

Agronomy Technical Note 19

	<p>Recommend Analysis program reports:</p> <ul style="list-style-type: none"> ○ Animal Waste Management (AWM) ○ Win SRFR for infiltration analysis ○ SPAW Hydrology; or SCS method (not rational method) for runoff curve # ○ EFM-2 ○ NOAA Atlas 2, Volume 2, WY Peak Discharge Design Storm = 25-year 24-hour storm frequency
	<p>References:</p> <ol style="list-style-type: none"> 1. WY DEQ Regulations - http://deq.state.wy.us/wqd/WQDrules/Chapter_11.pdf 2. Solid/Liquid Waste Separation Facility Standard 632 ,Vegetated Treatment Area (VTA) Standard 635, Waste Storage Facility Standard 313 – WY eFOTG, Section IV, Conservation Practices: http://efotg.sc.egov.usda.gov/efotg_locator.aspx 3. EPA's 40 CFR - http://www.epa.gov/npdes/regulations/cafo_final_rule2008_comp.pdf 4. Heartland Water Quality document - http://www.heartlandwq.iastate.edu/ManureManagement/AlternativeTech/Avtsguidance/ 5. Implementation Guidance on CAFO Regulations - http://www.epa.gov/npdes/pubs/cafo_manure_guidance.pdf

<p>CNMP Components Addressed and Documented in WY-ECS-86</p>
<p>a. Manure and Wastewater Handling and Storage –<u>Divert Clean Water</u> – Siting and management practices should divert clean water from contact with feed lots and holding pens, animal manure, or manure storage systems. Clean water can include rainfall falling on roofs of facilities, irrigation tailwater, run off from adjacent lands or other sources. <u>Prevent Leakage</u> – Construction and maintenance of buildings, collection systems, conveyance systems, and permanent and temporary storage facilities should prevent leakage of organic matter, nutrients, and pathogens to ground or surface water. <u>Provide Adequate Storage</u> – Liquid manure storage systems should safely store the quantity and contents of animal manure and wastewater produced, contaminated runoff from the facility, and rainfall. Dry manure, should be stored in such a way as to prevent polluted runoff. This can include dry stacking in the feeding facility or other appropriate storage locations. Location of manure storage systems should consider proximity to water bodies, floodplains, and other environmentally sensitive areas. Large buildup of solid manure outside of pens should be exported to cropland or other sources to reduce the risk of contamination. <u>Manure Treatments</u> – Manure should be handled in such a way as to reduce the loss of nutrients to the atmosphere during storage and application by incorporation within 3 days of application and when conditions are cool and dry.</p>
<p>b. Land Treatment Practices –control erosion and runoff from facility. May consider relocation of facility, conservation buffers, designed vegetative treatment areas, livestock water tanks, pipelines, wells, obstruction removal, fence, temporary retention facility, waste water treatment strip, windbreaks, clean water diversion, etc. Land management practices will include a nutrient balance for crop needs, method of application rates and timing.</p>
<p>c. Nutrient Management - Use University of Wyoming Fertilizer Recommendation Guide B-1045 to develop crop use needs or use the recommendations from a NAPT-PAP lab.</p>

CNMP DEVELOPMENT CHECKLIST

PRODUCER: Soil tests per 20 acres - 40 acres if soils and crops are similar, all within the last 5 years for all farm fields; recommend new soil samples tested from certified lab (Univ of WY, NAPT-PAP) Manure test analyzed from certified lab (Minnesota Dept of Ag)

- ✓ WY-ECS-60 Animal Waste Inventory
- ✓ WY-ECS-56,58 - Planning documents - Farming operations for WEPS, RUSLE2
- ✓ Intended crops for next year and planned manure application areas
- ✓ Application records of manure application for last two years; where and rate

FSA

- ✓ EZ 156
- ✓ 578 Crop report with aerial maps of last 2 years for all farms, tracts, and fields

Nutrient Mgmt Specialist (TSP or NRCS) for all CNMPs

- ✓ Plan view map detailed production site, feed storage, site enlarged on 8 x 11 page
- ✓ Field boundaries of all fields on EZ 156, location of any surface water, wells
- ✓ Topography map of all farm and fields to designate sensitive areas and buffers
- ✓ Soils map and legend of all fields. NRCS- Web Soil Survey/Soil Data Mart
- ✓ Soils reports: Non-Technical and Physical Properties
- ✓ CPA 52 Environmental Assessment (NRCS completed)

#1

- ✓ WY-ECS-62 Conservation Crop Rotation to gather crops and yields
- ✓ Enter data in WY-ECS-86 as you go along. Farm fields, soils, animal inventory...
- ✓ Complete WY-ECS-45A (Agronomy Tech Note 12.1) Solid waste for potential feedlot

#2

capacity for each age class and enter into WY ECS 86. Use the largest number of age class confined and complete form twice with representative soil test. Use a representative soil test to incorporate three Wyoming six crops (corn, barley, sugarbeets, beans, alfalfa, and millet or sunflowers). Repeat with the three other crops. Use U of WY Fertilizer crop yields if necessary. Make nutrient requirements (step 10) for each. Never average soil test values but use a soil test with values that are average - representative to the farm. Unpermitted facilities; use book values recommended in corner of manure test values if no manure test is available.

#3

- ✓ Phosphorus Index –Agronomy Tech Note 15 enter each field index in WY-ECS - 86
- ✓ Nitrogen Leaching Index – Agronomy Tech Note 25 enter index in WY-ECS – 86

#4

Complete WY-ECS-44 (Agronomy Tech Note 11.7) for each field, considering a 20 Ton application rate for all fields, 6 Ton for corral relocations. Include fertilizer applications and legume credits on those fields where annual crops follow alfalfa in the rotation. Complete for fields that have soil tests in the last five years and the representative soil test for those without a soil test.

#5

- ✓ Complete erosion prediction: WEPS for crop rotation (includes several years) and WEPS or RUSLE2 report for most erosive crop on all fields (one year). No report for corral relocation.
- ✓ For small corral relocations, use 1Ton native range recommendations of 25#N, 25-45# P₂O₅, 0#K₂O

#6

- ✓ Complete all sections of the WY-ECS – 86. Use information contained from previous worksheets, jobsheets and reports. Note to see attached Engineer “Inventory and Evaluation” and Program reports.

Land Treatment Specialist (TSP) Locate on aerial plan map.

- Buffer
- Tillage and Erosion
- Vegetative Land Stabilization

Manure & Wastewater Handling & Storage Specialist (Engineer with State License)

INVENTORY and EVALUATION of existing facility

Provide documentation to the producer that their feedlot (does/does not) have containment? (*See EPA's 40 CFR 412.37 (b) (5).*)²

Inventory and Evaluation for the feedlot's waste handling facility, consisting of but not limited to;

1. Soils
2. Hydrology, (Recommend using the SCS method to analyze the existing facilities)
3. Hydraulics, etc.
4. Write an engineering report explaining how the feedlot's waste handling facility (does/does not) provide containment for the required storage period and the 25-yr 24-hr storm. Describe how the clean and dirty water are diverted as applicable. This report becomes a part of the producer's CNMP. The report will be delivered and reviewed with the producer. CNMP is required with the DEQ Discharge permit application.

Follow NRCS Ag waste Conservation Practices (Storage Facilities, Manure Transfer, Vegetated Treatment Area, Conservation Buffers) calculations and designs, as applicable, to calculate runoff volume, manure volume if not dry stacked, clean water volume if not diverted; 25 year, 24 hour runoff event.

Recommend Analysis program reports:

- Animal Waste Management (AWM)
- Win SRFR for infiltration analysis
- SPAW Hydrology; or SCS method (not rational method) for runoff curve #
- EFM-2
- NOAA Atlas 2, Volume 2, WY Peak Discharge Design Storm = 25-year 24-hour storm frequency

References:

WY DEQ Regulations - http://deq.state.wy.us/wqd/WQDrules/Chapter_11.pdf

Solid/Liquid Waste Separation Facility Standard 632 ,Vegetated Treatment Area (VTA) Standard 635, Waste Storage Facility Standard 313 – WY eFOTG, Section IV, Conservation Practices:
http://efotg.sc.gov.usda.gov/efotg_locator.aspx

EPA's 40 CFR - http://www.epa.gov/npdes/regulations/cafo_final_rule2008_comp.pdf

Heartland Water Quality document -
<http://www.heartlandwq.iastate.edu/ManureManagement/AlternativeTech/Avtsguidance/>

Implementation Guidance on CAFO Regulations
http://www.epa.gov/npdes/pubs/cafo_manure_guidance.pdf