



**BERKS COUNTY
CONSERVATION DISTRICT**

Pennsylvania's Manure Management Manual

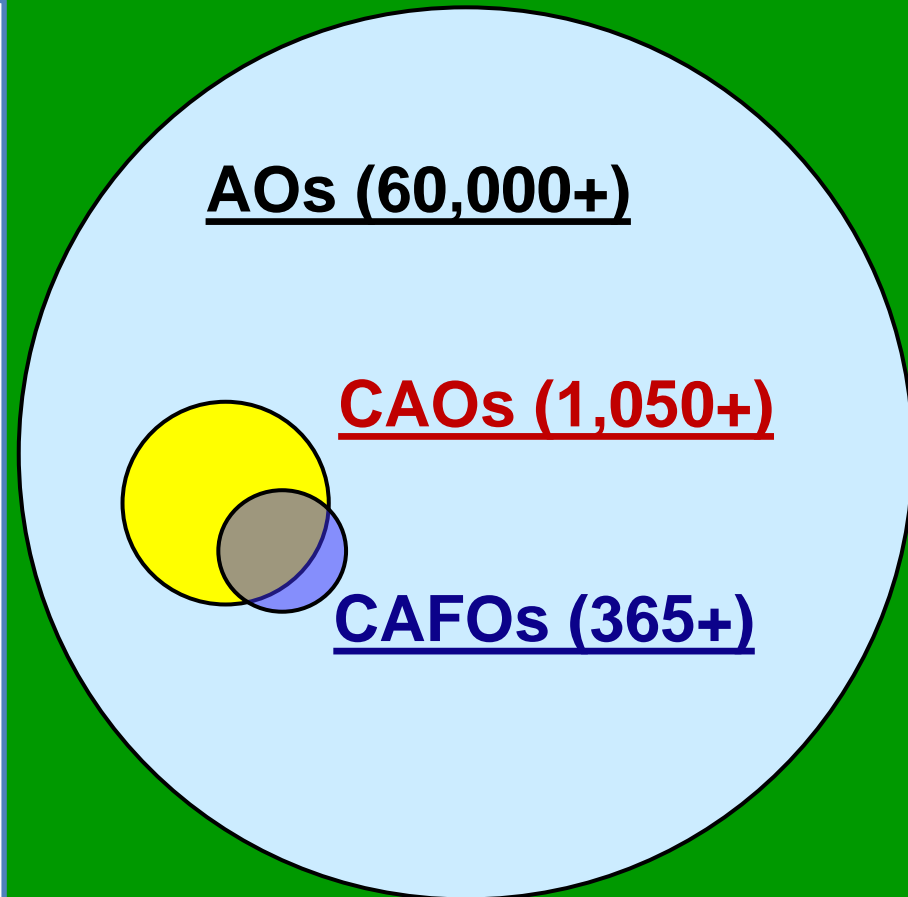
**MANURE MANAGEMENT MANUAL
GUIDANCE SUMMARY**

Manure in Pennsylvania

- All farms or entities in Pennsylvania that generate or land apply manure
 - Produce or use
 - Must meet some type of state requirements
- Regardless of size
 - Includes very small entities
 - One-horse operations
- Regardless of manure origin
 - Includes operations without livestock or poultry
 - If manure is spread on the operation
- Regardless of type of application
 - Not limited to mechanical application
 - Includes direct application by animals on pasture

Animal Operations in Pennsylvania

- **Concentrated Animal Feeding Operations (CAFOs)**
 - Based on animal numbers and/or animal density
 - Farms > 1,000 AEUs, CAOs > 300 AEUs, EPA head numbers
 - Regulated by PA DEP (for US EPA)
 - Approved NMP, DEP CAFO permit, certified planner, public access
- **Concentrated Animal Operations (CAOs)**
 - High animal density farms > 2,000 lbs/acre animal density
 - Act 38 regulated by PA SCC
 - Approved NMP, certified planner, public access
- **All Animal Operations (AOs)**
 - All operations generating or utilizing manure
 - Manure Management Manual regulated by PA DEP
 - Manure Management Plan



Revised Manure Management Manual

LAND APPLICATION OF MANURE

A supplement to Manure Management for Environmental Protection

Manure Management Plan Guidance

361-0300-002



- Manure Management Manual for Environmental Protection
 - Since 1972
- Land Application of Manure Revision
 - Released October 29, 2011
- Manure Management Plan Guidance

Manure Management Plan Requirements

- Must be a written plan
- Can be developed by the farmer or other non-certified individual
- Must use the standard format and worksheets in the MMM
 - Unless an alternative is approved by DEP
- Do not need to be submitted for approval
 - But must be available onsite to DEP or Conservation District staff on request for inspection
- Includes more than manure application rates
 - Mechanical manure application setbacks
 - Winter manure application
 - Manure storage and stacking areas management
 - Pasture management
 - Animal concentration areas management
- Records are required to document implementation
 - Must be kept on the farm

Manure Application Rates – 3 Options

- MMM Appendix 1 – Manure Application Rate Tables
 - Easy to use lookup tables
 - Based on averages and limits
- Nutrient Balance Worksheets
 - Based on farm specific information
 - Calculations are required
- Nutrient Balance Worksheets with the PA Phosphorus Index
 - More flexibility
 - Requires a authorized planner
- Phosphorus based rates
 - Crop P removal
 - No soil tests required
 - Options 1 & 2 only
- Nitrogen based rates
 - Crop N requirements
 - Soil tests required
 - Current within three years
 - Mehlich-3 P levels
 - Options 1 & 2
 - P levels must be less than 200 ppm
 - Option 3
 - No soil test P level restrictions

| | MMM Tables P Removal | Balance Sheet P Removal | MMM Tables N Based | Balance Sheet N Based | Balance Sheet P Index | Act 38 NMP |
|---------------------------|----------------------------|-------------------------------|---------------------------|-----------------------------|-------------------------------|-------------------------------|
| Time & Cost | | | | | | |
| Management Flexibility | | | | | | |
| Written By Specialist | No | No | No | No | Yes (Authorized) | Yes (Certified) |
| Soil Tests | No | No | | | Yes (Yes (< 200 ppm P)) | Yes |
| Manure Analysis | No | No | No | No | No | Yes |
| Specific Crop Information | No (based on averages) | Yes | No (based on averages) | Yes | Yes | Yes (plus manure specific) |
| Application Rates | Lower | Lower | Higher (less fields ?) | Higher (less fields ?) | All Fields (N or P) | All Fields (N or P) |

Manure Application Rate Tables

- Rates are based on averages and limits
 - Not based on soil tests or manure analysis
- Includes common manure types and crop groups
 - Other manure types and crops must use the Nutrient Balance Sheets
- Follow the “How to Use” instructions
- Select appropriate table based on:
 - Rate basis N or P
 - Type of manure
- Select the desired crop in the table
- In the crop table:
 - Find the yield at the top
 - Find the application method in the left column
 - Read the rate from the table

| Liquid Dairy | | | | | | | | | |
|---|----------------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--|
| Nitrogen Based Manure Application Rates | | | | | | | | | |
| Corn Grain | Yield Groups (bu/A) | | | | | | | | Manure Application Rate Adjustment For each 1000 gal/A less than the rate in the table, apply lbs. N fertilizer listed below. |
| | 100-130 | | 131-160 | | 161-190 | | 191-220 | | |
| | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | |
| Spring Incorporation within 1 day | 8000 | 0 | 10000 | 0 | 12000 | 0 | 14000 | 0 | 14 |
| Spring Incorporation within 1 week | 11000 | 0 | 14000 | 0 | 16000 | 15 | 16000 | 45 | 10 |
| Spring No Incorporation | 16000 | 20 | 16000 | 50 | 16000 | 80 | 16000 | 110 | 6 |
| Fall | 16000 | 20 | 16000 | 50 | 16000 | 80 | 16000 | 110 | 6 |
| Winter with cover crop | 5000 | 55 | 5000 | 85 | 5000 | 115 | 5000 | 145 | 11 |
| Winter No cover crop | 5000 | 80 | 5000 | 110 | 5000 | 140 | 5000 | 170 | 6 |
| Corn Grain after Alfalfa | Yield Groups (bu/A) | | | | | | | | For each 1000 gal/A less than the rate in the table, apply lbs. N fertilizer listed below. |
| | 100-130 | | 131-160 | | 161-190 | | 191-220 | | |
| | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | |
| Spring Incorporation within 1 day | 4000 | 0 | 5000 | 0 | 6000 | 0 | 8000 | 0 | 14 |
| Spring Incorporation within 1 week | 5000 | 0 | 7000 | 0 | 9000 | 0 | 11000 | 0 | 10 |
| Spring No Incorporation | 9000 | 0 | 13000 | 0 | 16000 | 0 | 16000 | 20 | 6 |
| Fall | 9000 | 0 | 13000 | 0 | 16000 | 0 | 16000 | 20 | 6 |
| Winter with cover crop | 4000 | 0 | 5000 | 15 | 5000 | 35 | 5000 | 55 | 11 |
| Winter No cover crop | 5000 | 20 | 5000 | 40 | 5000 | 60 | 5000 | 80 | 6 |
| Corn Grain after Soybeans | Yield Groups (bu/A) | | | | | | | | For each 1000 gal/A less than the rate in the table, apply lbs. N fertilizer listed below. |
| | 100-130 | | 131-160 | | 161-190 | | 191-220 | | |
| | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | |
| Spring Incorporation within 1 day | 5000 | 0 | 6000 | 0 | 8000 | 0 | 9000 | 0 | 14 |
| Spring Incorporation within 1 week | 7000 | 0 | 9000 | 0 | 11000 | 0 | 13000 | 0 | 10 |
| Spring No Incorporation | 13000 | 0 | 16000 | 0 | 16000 | 20 | 16000 | 40 | 6 |
| Fall | 13000 | 0 | 16000 | 0 | 16000 | 20 | 16000 | 40 | 6 |
| Winter with cover crop | 5000 | 15 | 5000 | 35 | 5000 | 55 | 5000 | 75 | 11 |
| Winter No cover crop | 5000 | 40 | 5000 | 60 | 5000 | 80 | 5000 | 100 | 6 |
| Corn Silage | Yield Groups (ton/A) | | | | | | | | For each 1000 gal/A less than the rate in the table, apply lbs. N fertilizer listed below. |
| | 17-21 | | 22-25 | | 26-29 | | 30-33 | | |
| | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | |
| Spring Incorporation within 1 day | 9000 | 0 | 11000 | 0 | 14000 | 0 | 16000 | 0 | 14 |
| Spring Incorporation within 1 week | 13000 | 0 | 16000 | 0 | 16000 | 35 | 16000 | 65 | 10 |
| Spring No Incorporation | 16000 | 40 | 16000 | 70 | 16000 | 100 | 16000 | 130 | 6 |
| Fall | 16000 | 40 | 16000 | 70 | 16000 | 100 | 16000 | 130 | 6 |
| Winter with cover crop | 5000 | 75 | 5000 | 105 | 5000 | 135 | 5000 | 165 | 11 |
| Winter No cover crop | 5000 | 100 | 5000 | 130 | 5000 | 160 | 5000 | 190 | 6 |
| Corn Silage after Alfalfa | Yield Groups (ton/A) | | | | | | | | For each 1000 gal/A less than the rate in the table, apply lbs. N fertilizer listed below. |
| | 17-21 | | 22-25 | | 26-29 | | 30-33 | | |
| | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | Manure gal/A | Fert N lb/A | |
| Spring Incorporation within 1 day | 5000 | 0 | 6000 | 0 | 8000 | 0 | 9000 | 0 | 14 |
| Spring Incorporation within 1 week | 7000 | 0 | 9000 | 0 | 11000 | 0 | 13000 | 0 | 10 |
| Spring No Incorporation | 13000 | 0 | 16000 | 0 | 16000 | 20 | 16000 | 40 | 6 |
| Fall | 13000 | 0 | 16000 | 0 | 16000 | 20 | 16000 | 40 | 6 |
| Winter with cover crop | 5000 | 15 | 5000 | 35 | 5000 | 55 | 5000 | 75 | 11 |
| Winter No cover crop | 5000 | 40 | 5000 | 60 | 5000 | 80 | 5000 | 100 | 6 |

Nutrient Balance Sheets

- Rates are based on farm and crop specific information
 - May use soil test recommendations
 - May use manure analysis results
 - No limits except for nutrient balance
- Benefits
 - Better utilize manure to meet crop nutrient needs
 - Reduces need to purchase fertilizer
- Use the MMP Balance Sheet User Guide
 - Complete one worksheet for each crop group
 - Select rate basis option – N or P
- Can also use an Excel spreadsheet
 - Developed for Act 38 Nutrient Balance Sheets

**Manure Management Plan
Nutrient Balance Worksheet**

| | Crop Group | Yield | Fields where this crop group and manure group can be used. | |
|--|---|---------------------------|---|--|
| Manure Rate Planning Basis (check planning option) | OPTION 1 P Removal | | OPTION 2 N Based | OPTION 3 P Index |
| | <ul style="list-style-type: none"> • Crop Phosphorus Removal Rates • No soil tests required or • Fields with soil tests > 200 ppm P | | <ul style="list-style-type: none"> • Nitrogen Based Rates • Soil tests required • Fields with soil test < 200 ppm P | <ul style="list-style-type: none"> • P Removal or N Based Rates • Soil tests required • Determined by required P index evaluation of each field |
| | (Use the P ₂ O ₅ column to determine acceptable rate) | | (Use the N column to determine acceptable rate) | (Use appropriate column based on the P index to determine acceptable rate) |
| | Manure Group | Application Season | | Incorporation Timing |

Completion of N column required for all options; P₂O₅ column is optional for N based rates; K₂O is optional for all rates.

| | N | P ₂ O ₅ | K ₂ O |
|--|---|-------------------------------|------------------|
| A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-6;1.2-8) P ₂ O ₅ & K ₂ O – Soil Test or Table 3 (AG Table 1.2-9) | | | |
| B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter) | | | |
| C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure) | | | |
| D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B) | | | |
| E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-7) or Soil Test Report | | | |
| F) Net Nutrient Requirement (lb/A) (A – B – C – D – E) | | | |
| G) Manure Nutrient Content (lb/ton or lb/1000gal) Table 6 (AG Table 1.2-13) or Manure Analysis Report | | | |
| H) Nitrogen Availability Factor Table 7 (AG Table 1.2-14A) | | | |
| I) Available Nitrogen (lb/ton or lb/1000gal) (G x H) | | | |
| J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G) | | | |
| K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate for the Manure Rate Planning Basis being used | | | |
| The "Nutrient Balance at Planned Rate" below is used to determine additional fertilizer needs at the planned manure rate. The N column must be completed to determine additional nitrogen (N) fertilizer needs. Completion of the P ₂ O ₅ and K ₂ O columns is optional and should be used to determine additional P ₂ O ₅ and K ₂ O fertilizer needs ONLY if soil test recommendations were used in (Row A). | | | |
| L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G) | | | |
| M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess) | | | |

Manure Application Setbacks

- No mechanical manure application within 100 feet of:
 - Streams, lakes and ponds
 - During times when water flows in the stream
 - Existing open sinkholes
 - Private and public drinking water
 - Unless public authority requires greater distances
- Setback for streams, lakes and ponds can be reduced
 - These options are not applicable for winter application
 - Option 1: Within 50 feet of streams, lakes and ponds if related fields:
 - Have soil tests current within the last three years
 - Soil test phosphorus (Mehlich 3-P) levels are less than 200 parts per million (ppm)
 - No-till practices are used
 - When residue is removed, a cover crop must be planted
 - Option 2: Within 35 feet of streams, lakes and ponds
 - A permanent vegetated buffer is established and maintained along the water body

Manure Application Setbacks

- No mechanical manure application for winter application within 100 feet from an above ground inlet to an agricultural drainage system
 - Such as inlet pipes to piped outlet terraces
 - Where surface water flow is toward the above ground inlet
- No mechanical manure application within the channel of a non-vegetated concentrated water flow area
 - Swale, gully or a ditch
- Manure application setbacks are required
 - Regardless of the slope of the land or the ground cover
 - Only for mechanical application
 - No setbacks for pastures

Winter Manure Application

- Winter is anytime one of the following is true:
 - December 15 through February 28; or
 - Anytime the ground is frozen at least 4 inches; or
 - Anytime that the ground is snow covered
- The maximum application rate for the winter season
 - 5000 gallons per acre of liquid manure
 - 20 tons per acre of dry non-poultry manure per acre
 - 3 tons of dry poultry manure per acre
- Must have at least 25% crop residue at application time or an established and growing cover crop
- Manure may not be applied on fields with slopes greater than 15%
 - NRCS soil survey slope designations of “A”, “B” or “C” slopes are acceptable for winter application determinations

Manure Storage Management

- MMP must assure proper and safe storage of manure and agricultural process wastewater
- Liquid or semi-solid manure storage facilities must be evaluated by the farmer monthly
 - No evidence of overtopping or leakage from the manure storage facility
 - Maintain a minimum 12-inch freeboard for all ponds at all times
 - Maintain a minimum 6-inch freeboard for all other manure storage facilities at all times
 - No visible cracking, rodent holes, tree or shrub growth on the berms or other problems with manure storage facilities that would lead to leakage
 - No visible slope failures, visible deterioration or tears of any liner, or knowledge of any local water pollution issues associated with the storage facility
- Monthly documentation required for liquid and semi-solid storages
 - Not required for solid storages
 - Written records must be maintained
- Liquid or semi-solid manure storage facilities built in the year 2000 and later
 - Must be designed by a licensed Pennsylvania Professional Engineer
 - Copy of engineer's certification that the storage facility was built according to the appropriate standards must be maintained

In-Field Manure Stacking

- Requirements for manure stacking at the farmstead
 - Manure stacking in the farmstead must use an improved stacking pad or covered area
- Requirements for temporary stacking in non-farmstead areas such as crop fields:
 - Keep at least 100 feet from streams, lakes, ponds, open sinkholes, drinking water wells
 - Divert upslope water away from the stacking area
 - Place on areas with less than 8% slope
 - Manure must be dry enough to allow for stacking at least 4 feet in height
 - Stack must be covered if it will be in place longer than 120 days
 - In-field stacking areas should not be in the same location each year
 - Cannot be placed within an area of concentrated water flow
 - Swale, ditch or waterway

Pasture Management

- All pastures on the farm must be included in the plan
- Two pasture management options
 - Option 1: Grazing plan that meets the requirements of the PA Tech Guide Prescribed Grazing (528) standard (or)
 - Option 2: Assure that pasture management:
 - Maintains dense vegetation in the pasture throughout the growing season
 - Minimizes bare spots
 - Maintains an average vegetation height across the pasture during the growing season at least 3 inches high
- Pastures which are overgrazed and do not meet one of the two management options must:
 - Implement one of the two options to restore dense vegetation (or)
 - Designate the pasture an Animal Concentration Area (ACA)
 - Meet ALL the management requirements for ACAs

Animal Concentration Areas (ACAs)

- Also called “Animal Heavy Use Areas”
- Barnyards, feedlots, loafing areas, exercise lots or other similar animal congregation areas within pastures that will not maintain dense vegetation
- Does not include pastures meeting the pasture requirements
- ACAs may exist within pastures
 - Walkways, feeding areas, watering areas, shade areas
 - Not considered ACAs if water from or precipitation onto these areas does not result in runoff of manure or sediment to streams, lakes, ponds, or sinkholes

ACA Requirements

- Divert clean water flow from upslope fields, driveways, barn roofs, etc. away from the ACA
- Direct polluted runoff or allow it to flow from the ACA area into a storage facility or best management practice such as a correctly sized and well maintained vegetative filter strip
- Limit animal access to surface waters to only properly implemented livestock crossings
 - Animals may not have free access to streams adjacent to or within ACAs
- Minimize the size of denuded areas such as sacrifice lots
- Keep areas where animal congregation areas as far away from water bodies as practical
 - Relocate movable structures creating animal congregation areas annually where appropriate and practical
- Remove manure routinely from ACAs, where practical
 - Generally four times per year

Farm Maps

- Boundaries of the farm
 - Location and names of all roads adjacent to or within the farm
- Field information for all fields included in the plan
 - Individual field boundaries
 - Identifiers (name or number)
 - Acreage
- Field information for all fields being used for winter application
 - Identification of average slopes or the average NRCS slope designation
- Location of all the following:
 - Environmentally sensitive areas and setbacks
 - Proposed or existing manure storage facilities
 - Manure stockpiling or stacking areas
 - Pastures
 - Animal concentration areas

Recordkeeping

- Two types of files must be maintained on the operation
 - Manure Management Plan
 - Completed worksheets and farm map
 - Records that demonstrate that the MMP is being implemented
 - These records must be retained for 3 years
- All records must be made available to DEP or the county conservation district upon request
- Two types of MMP implementation records
 - Manure and crop records for each crop year
 - Manure Application Rate Record
 - Crop Yield Record
 - Manure Transfer Record
 - Manure Storage Facility Record
 - Monthly Inspection Form (Liquid & Semi-Solid Storages)
- Farmers can use their own recordkeeping system
 - As long as it contains the required information
 - Forms are provided in the Manure Management Manual

Start Now

- Obtain a copy of Land Application of Manure
 - Contact your county Conservation District
 - Pennsylvania Nutrient Management Program website
- Become familiar with the manual
 - Instructions, plan worksheets, and recordkeeping sheets
 - Contact your county Conservation District regarding possible MMP writing workshops
- Obtain the basic required planning information
 - Farm map
 - Hand drawn, Ag E&S or Conservation Plan, PA OneStop
 - Take soil tests
 - Calibrate you manure spreader (Agronomy Facts 68)
- Get evaluation and planning help with storages, pastures and ACAs
 - Conservation district, NRCS, private planners, etc.
- Begin to keep required records

Resources

Pennsylvania
Nutrient
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Pennsylvania Nutrient Management Program

... protecting our resources and supporting our farmers

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Nutrient Management Specialists



Welcome to the Pennsylvania Nutrient Management Program web site !

This web site provides a comprehensive source of information about Pennsylvania's Nutrient Management Act (Act 38, 2005) Program, and associated technical guidance and educational information. It also provides limited information concerning related programs.

The web site has been developed and is maintained through a workgroup representing various partnering agencies actively involved with the Pennsylvania Nutrient Management Act Program. Contributions to this site represent the collective efforts of that workgroup.

What's New

- ▶ [Manure Management Manual Page Added](#)
- ▶ [November 2011 New Letter](#)
- ▶ [November 2011 Spreadsheet Online Assistance Schedule](#)
- ▶ [Spring 2012 Trainings Posted](#)
- ▶ [Manure Spreader Calibration Webinar Posted](#)
- ▶ [NM Tech Manual Updates Posted](#)
- ▶ [Track NM Technical Manual Changes with Activity Log](#)

PAPlants User's Guide

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<http://panutrientmgmt.cas.psu.edu/>

Penn State Extension Crop Management Team

<http://Extension.psu.edu/CMEG>

Penn State Extension Nutrient Management Program

<http://panutrientmgmt.cas.psu.edu>

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