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What is the Directly Monitored Manure Treatment Technology, MTT19 BMP?

Any Manure Treatment system that utilizes one of more manure treatment technologies described in the Manure Treatment Technology Expert Panel Report (**Pyrolysis, Gasification, Combustion, or Composters**).

This BMP allows MTT facilities to *utilize monitoring data to determine and report the nitrogen load eliminated from the primary manure stream.*

Why are Manure Treatment Technologies BMPs categorized as Manure Transport (MT) BMPs?

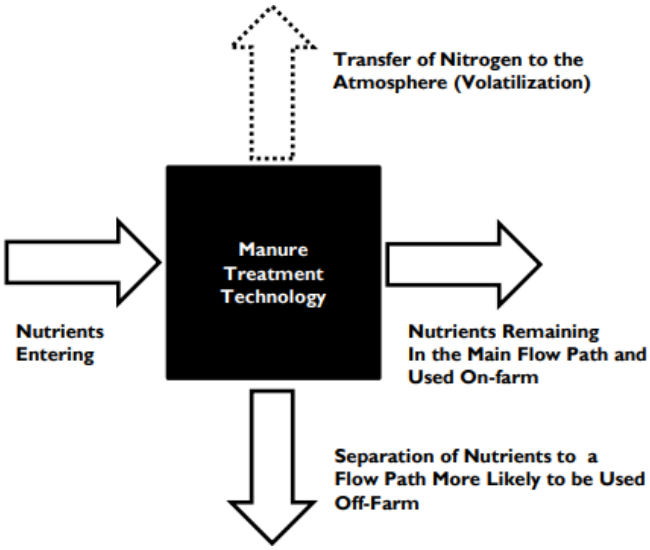
Manure transport BMPs directly influence the amount of manure nutrients available for field application and treatment by other BMPs. Manure transport between counties reduces the manure in the source county and increases it in the destination county.

Similarly, **manure treatment technologies** should be reported with the county the manure comes from [source] and the county the end-product is going to [destination]. The manure is treated in the source county (removing a N load from the manure stream) then the end-product is transported to the destination county, enabling a more cost-effective transport by reducing the organic matter.

**When reporting to the watershed model, if the end product of the treatment is not field applied in the watershed, then the county it is transported to (destination) should be out of the watershed.*

How does MTT19 transfer nutrients?

The Manure Treatment Technologies Expert Panel Report established that manure treatment technology ***would not*** **remove** nutrients but ***would*** **transfer manure nutrients** to three possible flow paths as represented below. **The MTT19 BMP only contributes to a nitrogen transformation, not phosphorus.**



How does MTT19 transfer the nitrogen load?

Farmers/producers apply nutrients to meet crop need. If available manure nutrients cannot meet crop need, inorganic fertilizer will be applied in order to achieve anticipated crop yield. CAST reflects this agronomic reality. Nitrogen from inorganic fertilizer is more readily subject to environmental loss than nitrogen from manure due to increased solubility, per pg 16 of the Expert Panel.

In CAST, manure nitrogen, if remaining in the county, would be applied to the crop need. Crop need will be addressed by organic nitrogen first. Any remaining nitrogen crop need will be fulfilled by inorganic fertilizer. CAST reflects this such that **modeled nitrogen loads may be higher if inorganic fertilizer is applied in lieu of manure.**

Per the Manure BMP Questions Document on CAST, *"Removing manure without also controlling the amount of replacement inorganic fertilizer results in the same rate of inorganic fertilizer being applied as when manure was applied".* Replacement inorganic fertilizer can be controlled by implementing the Nutrient Management Core N BMP.

What kind of data is needed to submit the Directly Monitored, MTT19, BMP?*

- Monitoring Data from the Treatment Facility, *including Manure Sample Analyses and a Description of the Facility's process /Technology within the Facility*
- Amount of manure treated, *or Number of animals present in operation with animal type*
- Nutrient Concentrations of Manure: *TN and Ammonia*
- Moisture Content (%) *or Dry Fraction*
- Total Calculated Nitrogen Reduction from the Facility/BMP
- Air Emissions emanating from the facility

*Section 10, *Data Collection and Reporting Protocols for Reporting Data Driven (Level 3) Transfer Efficiencies,* has more detail on calculating, collecting and reporting transfer efficiencies.

How do jurisdictions submit MTT19 to NEIEN?*

Per pg 127 of the Manure Treatment Technologies Expert Panel Report, to submit to NEIEN, the following must be included:

- **BMP Name**: Practice name (MTT19)
- **Measurement Names:**
  - Animal Type - the unit for this will be lbs of TN, but you will be asked to report the measurement name as an animal type (e.g., "Broilers")
  - County From – FIPs code associated with the county in which the manure was generated
  - County To – FIPs code associated with the county to which manure was transported after treatment by the technology
- **Geographic Location:** Qualifying NEIEN geographies including: Latitude/Longitude; or County; or Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4); or State
- **Date of Implementation:** Year the manure treatment was done
- **Land Uses:** Permitted feeding operation, non-permitted feeding operation, feeding operation

Any jurisdiction reporting MTT19 **must document its data collection and reporting requirements for that system in its Quality Assurance Project Plan (QAPP)** submitted to and reviewed by EPA. If there are variations in requirements or data collection between individual facilities reported under MTT19, the jurisdiction will need to clarify those differences in its QAPP.

*Section 10, *Data Collection and Reporting Protocols for Reporting Data Driven (Level 3) Transfer Efficiencies,* has more detail on calculating, collecting and reporting transfer efficiencies.

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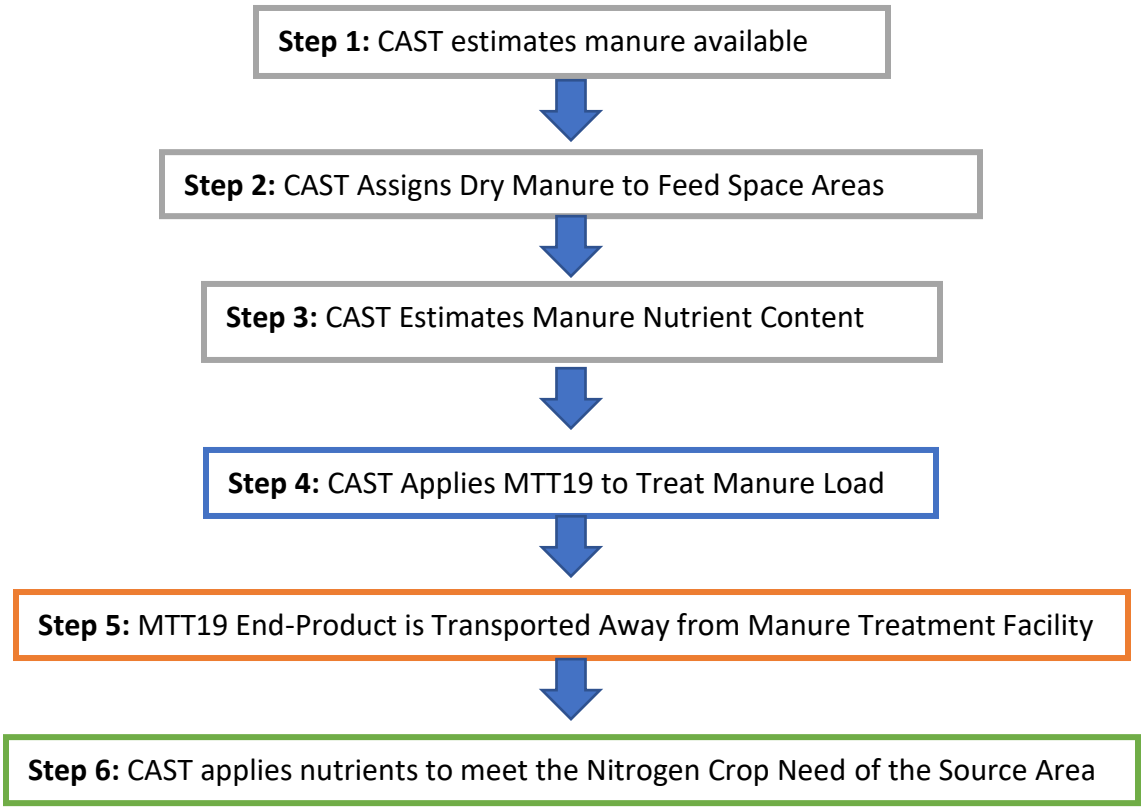
The CAST Process Flow for Direct-Monitoring Manure Treatment Technology (MTT19)



Step 1: CAST estimates manure available

Calculation:

lbs wet manure = # of animals X manure lbs excreted (wet manure) per day X 365 days

lbs dry manure = lbs wet manure X manure dry fraction

Ex. Manure Dry Fraction for layers = 0.2579 (From Source Data)

Step 2: CAST Assigns Dry Manure to Feed Space Areas

Confined manure is the manure excreted in the feed space areas.

Confined manure is split into stored and storage loss manure.

Stored manure is spread on crops. Only stored manure is eligible for manure transport and manure treatment. Ex. Animal Waste Management System (AWMS) practice is installed, which increases the amount of manure moved into the stored manure category.

Storage loss manure is left in the feed space area and becomes the load for the permitted and non-permitted feeding space land uses.

Step 3: CAST Estimates Manure Nutrient Content

Ex. Nutrient Concentrations for Layers

Nutrient Type	Concentration	Unit
Ammonia for Field Volatilization	0.00359740	Lbs/animal unit
Non-Mineralized Organic Nitrogen	0.00719480	Lbs/animal unit
Non-Mineralized Organic Phosphorus	0.00000000	Lbs/animal unit
Ammonia	0.02758007	Lbs/animal unit
Phosphate	0.00557190	Lbs/animal unit
Mineralized Organic Nitrogen	0.02158440	Lbs/animal unit
NO3	0.00000000	Lbs/animal unit
Mineralized Organic Phosphorus	0.01300110	Lbs/animal unit

(Example from Source Data; 1000 lbs / animal)

Factors that Effect the Nutrient Concentration of Manure:

1) Concentrations are adjusted if feed additive BMPs are submitted.
2) Ammonia is volatilized.
   Ammonia emission BMPs are also eligible to reduce the amount of ammonia volatilized.

   (IF ammonia emission BMPs, other than biofilter BMPs, are applied, the ammonia in the manure is increased. The ammonia not released into the air reduced the feed space load at edge of tide [EOT].)

3) Animal Waste Management Systems will increase the amount of manure that moves into stored manure and out of storage loss. Stored manure is available to be treated by manure treatment technologies.

Step 4: CAST incorporates the MTT19 BMP to Treat Manure Load

1) The N reduction achieved by the direct monitoring BMP, MTT19 is input into CAST. *This BMP does not contain a P reduction per the September 2016 Manure Treatment Technologies Expert Panel.*

2) The N reduction efficiency of MTT19 is dependent on the type of manure treatment technology and the monitoring data available from the facility.

3) An added N load is applied EOT to the county feed space load due to ammonia volatilization (N removed from the manure to the atmosphere through the process of volatilization) via this equation per pg 130 of the expert panel report: *Nitrogen lost as gaseous emissions = (lbs-N of all inputs) – (sum of lbs-N remaining in all solid and liquid outputs)*

4) The amount of N reduced is highly variable and depends on the number and type of animals in a county, crop need, and acres of manure-receiving land uses.

   For Example, an estimated average load reduction for gasification, combustion, and pyrolysis MTTs (technologies applied to MTT19) in PA is 4.8 pounds of nitrogen per dry ton of manure. This estimate is available by downloading the Cost Profiles spreadsheet under the heading Cost Effectiveness of BMPs here.

Step 5: MTT19 End-Product is Transported Away from Manure Treatment Facility

Nutrients remaining in the MTT end-product are transported elsewhere for application.

The MTT19 end-product will have a N nutrient concentration that is lower than the manure from which it was generated. One or more end-products may be produced for subsequent transport or application to the field. If the end-product is field applied, the receiving farm will apply the end-product (ex. commercial fertilizer) to the field in addition to the existing nutrient sources on the recipient farm. An example of an end-product that is transported "out of the watershed" and not field applied would be livestock feed supplements.

Step 6: CAST applies nutrients to meet the Nitrogen Crop Need of the Source Area

Per the *Manure Treatment Technologies Panel Final Report Appendix for Calculating Nutrient Reductions for Trading*, replacement nutrients of inorganic fertilizers are applied at the same rate as the manure application to meet crop N need.

Crop need is the *amount of nutrients a crop is designated* to need to produce a typical crop yield.

The crop nutrient (N) need in the county/geographic area where the manure treatment technology is applied **remains unchanged.** Regardless of the nitrogen load removed from the manure stream via MTT, the area the facility is located in will still have a crop N need. If this crop need cannot be filled by organic fertilizer, like manure, other sources of nutrients, like inorganic fertilizer, will make up the difference in the crop need automatically.

The **CBP Nutrient Management Core N BMP** is the most effective practice for reducing modeled N loads because it assumes a reduced crop need.