

Converting Analysis of Organic By-Products to N-P₂O₅-K₂O Application Rates for Nutrient Management Planning

A nutrient management plan should include the fertilizer value of all mechanically applied organic by-products. Applicators should provide the producer and NM planner with an analysis of the nitrogen, phosphorus, potassium and dry matter (solids) content of these materials. Planners can enter Organic by-product analyses into SnapPlus using a process that is similar to that for entering biosolids analyses (see videos **SnapPlus: How to enter lab analysis for solid biosolids** and **SnapPlus: How to enter lab analysis for liquid biosolids**). Often, however, the lab report does not use the format or units required for SnapPlus analysis entry and it can be difficult to figure out how to enter the analysis. If you have one of these reports, follow the steps below to convert it to N-P₂O₅-K₂O per ton or 1000 gallons.

Step 1: Identify % Solids

Look for a number labeled Dry Matter, Solids, or Total Solids with the % sign or the word "Percent". If you find one of those, enter it in the % Solids box.

This calculator converts organic by-products lab analysis reports to the proper units for use in SnapPlus. The results shown in the grid below will be inserted as the available nutrient values for this nutrient source.

Source name: Organic by-Products liquid, year 2019
Source type: Organic by-products, liquid

% Solids

If Dry Matter, Solids, or Total Solids are present but have the units g/L or mg/L, you can convert them easily:

$$\text{g/L divided by 10} = \% \text{ Solids}$$
$$\text{mg/L divided by 10,000} = \% \text{ Solids}$$

If there is no dry matter or solids measurement, look for Moisture %.

$$100 - \% \text{ Moisture} = \% \text{ Solids}$$

If you cannot find anything on the report that has a label containing the word Solids, Dry Matter or Moisture, see **Direct conversion of wastewater analysis to lb/1000 gallons** below.

Step 2. Converting N, P, and K values to % dry matter

Once you have % Solids entered, you need to enter the Total Kjeldahl N (TKN or TN), Ammonia N (NH₃, NH₄, NH₃-N or NH₄-N), Total K (K or TK), and Total P (P or TP) in the units "% dry matter". The units may also be called "as % of Solids" or Solids %.

% Solids	<input type="text" value="3"/>	
Total Kjeldahl Nitrogen (TKN)	<input type="text" value="2.3"/>	% dry matter
Ammonia Nitrogen (NH ₃)	<input type="text" value="0"/>	% dry matter
Organic Nitrogen	<input type="text" value="2.3"/>	% dry matter
Potassium (K), Total recoverable	<input type="text" value="0"/>	% dry matter
Total Phosphorus (P)	<input type="text" value="0.9"/>	% dry matter

On some lab reports, these nutrients are reported as mg/kg solids.

$$\text{mg/Kg divided by 10,000} = \% \text{ dry matter}$$

On other lab reports, these nutrients are reported as mg/L liquid.

$$\text{mg/L divided by \% Solids (as entered in Step 1) divided by 100} = \% \text{ dry matter}$$

Sometimes only one or two these nutrients were measured in a lab analysis. Even if some are missing, the software will compute an available nutrient content for each one that you enter.

Direct conversion of wastewater analysis to lb/1000 gallons

Some wastewater analyses measure N, Ammonia N or total P in mg/L without a solids concentration measurement. In this case, you will have to convert the analysis directly to available lb per 1000 gallon and then apply availability factors before entering these values as a Nutrient type “Other” in the Nutrient Sources tab in SnapPlus.

$$\text{mg/L} \times 0.00834 = \text{lb/1000 gallons}$$

$$\text{ug/L} \times 0.0000834 = \text{lb/1000 gallons}$$

Once you have the nutrients converted to lb/1000 gallons, you need to determine first year availability for N.

$$\text{First year available N (injected)} = \text{NH}_4\text{-N}^* + (0.25 \times (\text{Total N} - \text{NH}_4\text{-N}^*))$$

$$\text{First year available N (incorporated or surface)} = (0.5 \times \text{NH}_4\text{-N}^*) + (0.25 \times (\text{Total N} - \text{NH}_4\text{-N}^*))$$

*Use NH3-N if that is what is reported.

Total P and K rates need to be converted to P2O5 and K2O before entering into SnapPlus.

$$\text{P lb/1000 gallons} \times 2.27 = \text{P2O5 lb/1000 gallons}$$

$$\text{K lb/1000 gallons} \times 1.22 = \text{K2O lb/1000 gallons}$$

Nutrients that weren't on the report and Dry matter % can be left as 0.

Manure/Bio Source Data											
  			N, P2O5, K2O & S values are for first year available nutrients in								
			lbs/unit solid or lbs/1000 gallons								
Source Name	Nutrient Type	N surface	N incorp	N inject	P2O5	K2O	S	Dry matter %			
Wastewater	Other, liquid	1	1	1.5	0.6	0.6	0	0			

If the units on your organic by-products analysis don't match any of the above, send an email to support@snapplus.wisc.edu and attach a copy of the report.