

Decoding Terminology

By Jim Heyen, Wastewater Tech

Okay, visualize this picture: I was sitting at home, king of the remote (with the boys grown & gone), enjoying the plethora of March Madness basketball games and of course flipping back & forth between the Home & Garden channel to appease the wife and reading the Water Environment & Technology magazine and found the perfect inspiration for this issues article. I can be quite the multi-tasker when I want to be!

After 26 years of marriage, I have become pretty good at decoding terminology whether it be wife related or work related! The magazine article didn't help me out with the domestic part but did have an interesting article on decoding nitrogen terminology.

Decoding Nitrogen Terminology

Discharge permits regulate various forms of nitrogen base on the environmental concern related to the specific form. The nitrogen's form dictates how it affects water quality, as the points below show:

- Ammonia and organic nitrogen can result in oxygen depletion in receiving waters, but nitrate does not.
- Ammonia, specifically un-ionized ammonia, can cause aquatic toxicity.
- Nitrite can cause methemoglobinemia (blue baby syndrome), but nitrate is often regulated because it is more prevalent in effluent discharges and can be converted to nitrate in the human digestive system.
- Organic nitrogen can be oxidized progressively by different microorganisms to produce all forms of nitrogen and cause a wide range of environmental impacts.

Multiple environmental impacts might be a concern for some discharges, resulting in permit limits for total nitrogen, total inorganic nitrogen, and other forms.

Knowing the relationships among various forms of nitrogen helps explain the basis for our permit limits, understand the treatment processes used to achieve those limits, and interpret the data for process control and compliance. The table below list symbols, names and components of the various classification of nitrogen.

Nitrogen Terms and Definitions

<u>Acronym/Symbol</u>	<u>Name</u>	<u>Component</u>
NH ₃ -N or NH ₄ ⁺ -N	Ammonia-nitrogen	Ammonia-nitrogen
NO ₃ -N	Nitrate-nitrogen	Nitrate-nitrogen
NO ₂ -N	Nitrite-nitrogen	Nitrite-nitrogen
Organic N	Organic nitrogen	Organic nitrogen
TKN	Total Kjeldahl nitrogen	Sum of: Organic nitrogen Ammonia-nitrogen
TIN	Total Inorganic nitrogen	Sum of: Ammonia-N Nitrate-N Nitrite-N
TON	Total oxidized nitrogen	Sum of Nitrate-N Nitrite-N
TN	Total Nitrogen	Sum of: Ammonia-N Nitrate-N Nitrite-N Organic N

The Nitrogen Map shows the same information graphically.

Nitrogen Map

Total Nitrogen (TN)*

Total Kjeldahl Nitrogen (TKN)	Total oxidized nitrogen (TON)
Organic N	(NH ₃ -N NO ₂ -N NO ₃ -N)
	(Total inorganic nitrogen (TIN))

*Organic N = TKN - NH₃-N.

TIN = NH₃-N + NO₂-N + NO₃-N.

Once the differences among types of nitrogen are known, it's equally important to know which analytical method will yield the desired result.

As always, you know you can give me a call with any questions or concerns about figuring your permit for the nitrogen components. Or even to offer an old dog a new trick on staying out of the dog house with the Mrs!

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