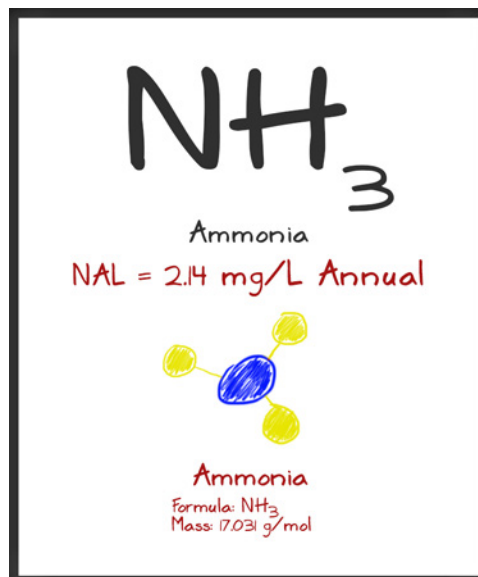


phosphorus 15 P 30.974	oxygen 8 O 15.999	lutetium 71 Lu 174.97	tantalum 73 Ta 180.95	nitrogen 7 N 14.007	tennessine 117 Ts [294]
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Part 11 of a 12-part **exclusive series** on understanding storm water pollutants

You probably recognize the smell – the acrid tingle of smelling salts, or the bracing stench of a vault toilet in need of servicing. That familiar smell is ammonia, a toxic but necessary component of the food cycle. Without ammonia, plants wouldn't grow; and without plants, well, you get the idea. But, ammonia is also toxic to mammals and especially aquatic organisms, and an overabundance of ammonia in one's bloodstream can be fatal. In this month's edition of **The Rain Events**, we're going to take a step back from the "common" storm water pollutants, and look at a pollutant which may be a little less common.

Ammonia is a compound of nitrogen and hydrogen with the formula of NH_3 . It is a colorless gas with a recognizable pungent smell. Although very common in nature as a waste product and widely used as a chemical, ammonia is both caustic and hazardous in concentrated form. Ammonia gas is very soluble in water, and aqueous solutions of ammonia are commonly used for household cleaning tasks. However, the largest use of ammonia (up to 88% in 2014) is in fertilizers – either in salt form, solutions, or anhydrous. Roughly a third of agricultural nitrogen applied in the United States is in the form of anhydrous (literally: "without water") ammonia.



However, in this edition of our Understanding Pollutants series, we're going to do something we haven't done yet – talk about a different chemical that can change into ammonia. Because ammonia is so toxic, our liver automatically converts it into a safer substance – urea. Urea is an organic compound with the formula $\text{CO}(\text{NH}_2)_2$. Urea is formed by the liver when two ammonia molecules are combined with a carbon dioxide molecule. The urea is eventually excreted by the kidneys in urine, and once outside the body, bacteria breaks the urea back down into ammonia (hence the smell).

But aside from a sewer leak, where might ammonia come from on an industrial facility? Table 1 in the Industrial General Permit only lists two

industries that are required to sample for ammonia – hazardous waste facilities, and air transportation facilities (potentially; see footnote 16 on page 42 of the IGP). It's probably not a surprise that there could be ammonia at a hazardous waste facility, but an *airport*? Well, that's where our second chemical comes in. Up until very recently, urea was used as a pavement deicer at many airports. However, because of its propensity to decompose into ammonia, the EPA has prohibited the use of urea at most airports in the United States.

The largest use of ammonia and urea is in fertilizer, but there are many other potential sources of ammonia at an industrial facility – look for ammonia and urea to be used in laboratories, in cleaning chemicals, in refrigeration systems, in automotive systems (as Diesel Exhaust Fluid), and in pharmaceuticals.

So, how can ammonia be removed from storm water runoff? Surprisingly, it may not be as hard as you think. Of course, as we say in every issue, the best way to remove a pollutant from storm water is to not let it come in contact with storm water in the first place – use good housekeeping and containment to keep your industrial materials and waste out of your storm water

runoff. But when it comes to treatment, there are a variety of ways to effectively remove ammonia from storm water runoff: amended compost socks, active treatment systems, passive treatment systems, bioswales, and more.

To sum it up, ammonia and urea are not among the most commonly used chemicals in the industrial world, but ammonia is listed in Table 2 with a Numeric Action Level. There are only two industries required by Table 1 to sample for ammonia, but remember, if your facility uses ammonia or urea products, you'll probably have to add ammonia to your list of industrial activity indicator parameters.

Sources:

1. Wikipedia, s.v., "Ammonia," *Wikipedia The Free Encyclopedia*, last modified July 10, 2018, <https://en.wikipedia.org/w/index.php?title=Ammonia&oldid=849581846>.
2. Wikipedia, s.v., "Urea," *Wikipedia The Free Encyclopedia*, last modified July 13, 2018, <https://en.wikipedia.org/w/index.php?title=Urea&oldid=850055898>.

Biochar – a new (old) treatment technology?

One treatment that has been gaining interest in the storm water community is a product that has been around for a while – biochar. Biochar is a form of charcoal that is produced from biomass (wood and plant material), and is typically used as a soil amendment. It is a stable solid, and can endure in soil for upwards of a thousand years. It is different than activated carbon, but still possesses a high surface area and porosity, making it a very effective adsorbent material.

Biochar is gaining interest because of its promising ability to remove pollutants from storm water runoff, including nitrates/nitrites and ammonia. When used in a passive filtration system or mixed in as a soil amendment in a bioswale, it has generated some impressive results.

finding the

sulfur 16 S 32.066	oxygen 8 O 15.999	uranium 92 Ur 238.029	cerium 58 Ce 140.116	sulfur 16 S 32.066
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We know from the main article that ammonia could come from fertilizer or deicing operations, but where else could this pollutant originate from? Here's a short list:

- In manufacturing plywood – urea-formaldehyde resins
- In explosives – urea nitrate, and in nitrocellulose explosives
- In automobiles as Diesel Exhaust Fluid
- In the laboratory – virtually all synthetic nitrogen compounds are derived from ammonia, including nitric acid, nitric oxide, phenol, and urea.
- In pharmaceuticals (urea containing creams, tooth whitening products)
- In food (baker's ammonia, urea for browning pretzels)
- As a cleanser – ammonium hydroxide.
- As a refrigerant in industrial refrigeration and hockey rinks (usually anhydrous ammonia)
- In woodworking (ammonia fuming)

Have questions about the Industrial General Permit?

Give us a call at (209) 334-5363, ext. 114

"To Do List" for August:

- ☁ Perform the August monthly inspection
- ☁ Start getting ready for the rain season. Yes, we know it's early, but now's the time to check your sample kit and make sure you have everything you need.



Baker's ammonia?

Ammonium carbonate, or baker's ammonia, was the precursor to today's baking powder. It can be found in many traditional recipes, especially those from northern Europe and Scandinavia.

It is sometimes referred to as *hartshorn*, harkening back to when it was originally made from ground-up deer antler.

Though the ammonium carbonate powder has an overwhelming smell, the ammonia vaporizes when heated and does not affect the flavor of the baked goods. However, it should only be used with thin dry baked goods like crackers and cookies, since thicker baked products may trap some of the ammonia gas, leaving a strong astringent taste.

Baker's ammonia is prized for its ability to make an especially crisp yet tender cookie, without the soapy taste of baking powder or the salty taste of baking soda.

It is available for purchase on [amazon.com](https://www.amazon.com).

Please contact us if you have any questions ...

The Rain Events

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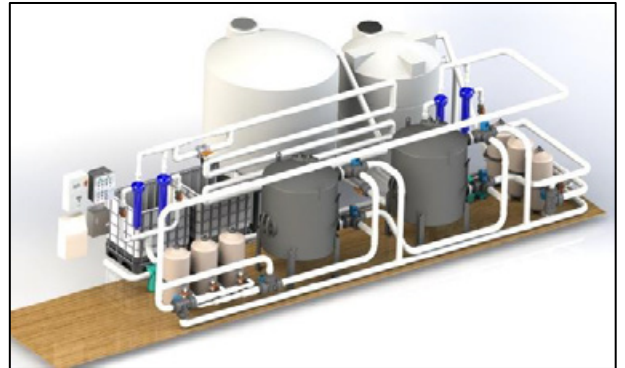
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Part #	Description	Spill Cap. gal. (L)
61EN5200-YE	Spill Cart 66.5 x 29 x 43.9	57 gallons
61EN5200-YE-A	Spill Cart All Terrain Dolly (ATC)	57 gallons



POLY DOLLY

Part #	Description	Spill Cap. gal. (L)
61EN5300-YE	Polly Dolly 69 x 31 x 26.5	70 gallons
61EN5300-YE-A	Polly Dolly All Terrain Dolly (ATD)	70 gallons



SPILL SCOOTER

Part #	Description	Spill Cap. gal. (L)
61EN5205-YE	Scooter 35 x 8.75	11 gallons
61EN5205-BK	Handle 36.62 x 10	N/A



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Storm Water Contest...

Each month, we invite our readers to participate in a contest to test their knowledge of the Industrial General Permit and their storm water compliance program. We enter all submittals to our monthly newsletter question into a drawing, and one person is selected at random to receive a \$25 gift card. Last month's question was:

Are vegetated swales an effective treatment BMP for removing aluminium or other dissolved metals from storm water runoff?

Good job, **Jennifer Malcolm**, you're correct! As a general rule, vegetated swales are effective at reducing aluminium and other dissolved metals from storm water runoff. However, there are many factors that can influence their effectiveness - including vegetation type and density, slope steepness, and flow velocities.

This Month's Contest Question:

Do all airports need to include ammonia as a Table 1 sampling parameter?

By September 14, 2018, submit your response to the above question by sending an email to jteravskis@wgr-sw.com. All persons submitting the correct answer will be placed in a drawing. The winner will receive a \$25 gift card to Starbucks.



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