

## What's Coming UP Your Sewer Drain?

What??, I'm sorry, don't you mean "What's going Down the Drain?"

To help answer that question, maybe we should "What went down the drains in the first place?" And how confident are you that it'll stay there?

Far too many facilities seem to forget about the vital part their drainage system plays in facility safety.

It's typical, most people give little to no thought to what is going down their sewer drains. You push the handle and magically "it's" gone. Out of sight, out of mind. In a residential setting this is clearly understandable. But in a food manufacturing facility, things may not be so simple.

Consider what goes down the drain in a typical food processing plant.

In an Industrial food manufacturing facility, a lot of water that goes down the drain. Let me be more specific, I'm talking about Sanitary Sewer Drains. All water drains inside a facility are tied to the sanitary sewer; or at least, they should be. Please note, there is huge difference between sanitary sewer drains and storm drains. Storm drains are designed to direct rain water to surface drainage, IE, creeks, streams, rivers, lakes and eventually to the ocean. The rule of thumb about storm drains is "if it didn't fall from the sky "rain", or if it isn't something that you would drink, DON'T put it down a storm drain.

As an example, a Refrigeration Operator that was doing a pump-down on an Ammonia cooled Ice Maker. The Ice Maker had some residual ammonia, so instead of allowing a compressor to draw the machine down, then connect a venturi; he decided to "bubble" Ammonia vapor into a barrel of water. The water in the barrel became saturated with Ammonia, so he stuck a water hose in it and proceeded to flood the parking-lot with a few hundred gallons of Ammonia Water. The parking lot drain fed directly into a storm drain and within an hour the water reached the out-fall to a local scenic River. OMG, the preverbal - - - hit the fan. There were representatives from the City Public Works, the Fire Chief and a whole bunch of stuffed suits all wanting to know why the facility was killing fish in a public waterway.

You won't find any evidence of this incident, but you can find this one:

### From the Dayton Daily News:

Toxic spill at Ohio ██████████ plant kills 8,000 fish

██████████ | A caustic cleaning solution released. wiped out the ██████████ factory's waste pretreatment system over the weekend, creating a potent discharge that overwhelmed ██████████ village's wastewater treatment plant and killed at least 8,000 fish in the ██████████ Canal.

Sunfish, large- and small-mouth bass, channel and bullhead catfish, suckers, carp, minnows, shad and crawfish were among the casualties along a two-mile stretch of

*the canal downstream of the wastewater plant, said Joel Buddelmeyer, lead investigator of the pollution incident for the state Division of Wildlife.*

*The value of the fish killed exceeds \$1,000, but the exact value won't be established until investigators finalize the number of fish killed, which could exceed 10,000, Buddelmeyer said.*

*██████████, which accounts for about half of the 900,000 gallons of waste treated daily by ██████████'s wastewater plant, immediately stopped production and discharging waste after the spill was detected Monday, company spokesman ██████████ said.*

*While the company has since resumed some production, it is having the waste hauled away under a temporary arrangement, ██████████ said. Meanwhile, the village is trying to restore its capability to treat sewage after the potent brew of ██████████ products and 4,000 gallons of cleaning solution discharged ██████████ killed much of the bacteria that digest waste, said ██████████, superintendent of water and wastewater treatment for the village of 2,800.*

*He said 17,000 gallons of "activated sludge" have been trucked in from the nearby village of ██████████ to help raise bacteria levels.*

*Ohio Environmental Protection Agency officials expect it will take another day or two before the plant can sufficiently treat its sewage to meet Clean Water Act requirements and begin discharging into the canal, agency spokeswoman Dina Pierce said.*

No facility wants to be subjected to this type of citation

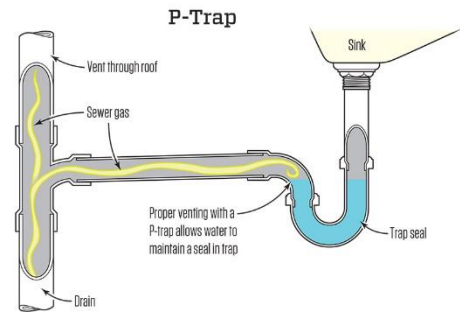
Process water, sanitary water and wash down water, are all pretty benign. Lots and lots of water, a little debris, maybe some spilled product, a small amount of cleaning fluids. No big deal. Now consider CIP cycles. Hot solutions of up to 140F water. Along with the water there are cleaning, disinfection and rinse chemicals. CIP chemicals that may contain acids, caustics, buffers and sanitizers. COP tanks also discharging to a drain, and that's just on the Product side of the plant.

Now consider water from the utility side of the plant; Boiler blow-downs "very hot water". Cooling tower overflow, sanitary water system with lots of "stuff" all going down the same Sanitary Sewer System and comingling beneath the floor of your plant.

We learned in Highschool chemistry, that Acids and Caustics don't really like each other. When they get all mixed together, they will tend to off-gas. Heat from blow-downs and process hot water flushes compound the problem. We end up with a chemical soup that off-gasses.

Over a period of time, the plastic pipes installed (????) years ago when the plant was first built, will break down and erode. PVC pipe, or even worse metal pipes don't last forever. Thermal expansion, turbulent flow, chemical reactions and age, all play a factor in, not if pipes will wear-out and fail, but when they fail.

Sewer systems are designed with traps in them to prevent the backflow of sewer gasses. This device is called a P-trap. P-traps are U shaped pipe that traps a small amount of water, and forms a “seal”, preventing backflow of gasses into the facility. P-traps failure takes place in two primary ways. One is by physical erosion and or damage, lots of water flowing down the drain pipe and the other by chemical erosion / deterioration of the pipes and P-traps.



I was recently talking with a maintenance manager at a fluid milk plant. He was telling about a drain that was draining too slow. An employee decided to use a piece of pipe to help clear the clog. The water finally started to drain away. Undenounced to the employee they had knocked a hole on the P-trap. Water drained, but instead of going into the sewer, water accumulated under the slab.

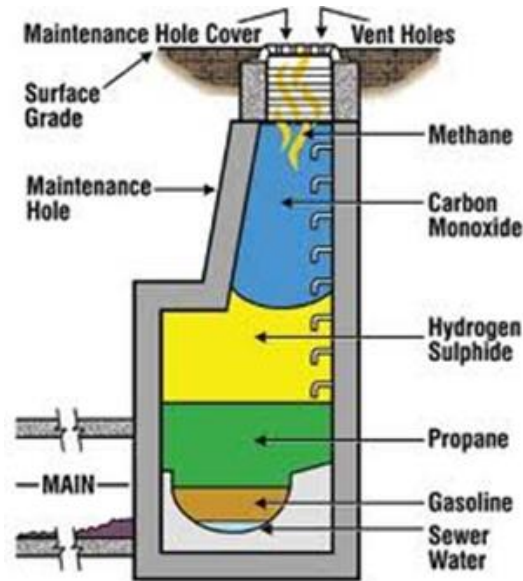
Once the piping and P-traps are compromised, sewer gasses can back up into the facility. Sewer gas consists of several different compounds depending on the facilities' cleaning agents and the off-gassing this “sewer soup”.

Raw sewage or “potty water” contains, let’s call it “bio-mass”. As bio-mass naturally breaks down in the system, it releases 2 hazardous gasses. Both gasses are can be harmful to humans. One gas is Hydrogen Sulfide “H<sub>2</sub>S” and the other is Methane.

**Hydrogen sulfide, H<sub>2</sub>S**, is a highly toxic and flammable, colorless gas with a pungent odor, some people say it smells like rotten eggs. H<sub>2</sub>S is heavier than air, therefore it tends to accumulate at the bottom of less ventilated spaces. Although very pungent at first, it quickly deadens your sense of smell. H<sub>2</sub>S occurs naturally as a result from bacterial breakdown of organic bio-mass, including human and animal wastes.

**Methane**, colorless, odorless gas that occurs abundantly in nature and is a byproduct of the decomposition of bio-mass. Methane is the simplest member of a series of hydrocarbons and is among the most potent of the greenhouse gases. Methane is lighter than air, and so it will rise into the air. It burns readily in air; the flame is pale, and very hot. Methane in general is very stable, but mixtures of methane, air and other flammable gasses, it may create an explosive atmosphere.

See the diagram below of where other sewer gasses may accumulate.



Additionally, other gasses will be produced by the chemical reaction of the “sewer soup”. Heat “hot water” can help accelerate the chemical reaction between acidic cleaning agents and caustic neutralizing agents. Both of these chemicals are commonly used during a CIP cycle. The outcome can result in a toxic, slightly flammable sewer soup gasses.

Imagine the repercussions of inadvertently mixing ammonia discharge from your purger, with chlorinated cleaner from your process area.

Over time, a condition known as “Sick Building Syndrome” may occur.

Per the EPA:

*The term "sick building syndrome" (SBS) is used to describe situations in which building occupants experience acute health and comfort effects that appear to be linked to time spent in a building, but no specific illness or cause can be identified. The complaints may be localized in a particular room or zone, or may be widespread throughout the building. In contrast, the term "building related illness" (BRI) is used when symptoms of diagnosable illness are identified and can be attributed directly to airborne building contaminants.*

*Reference: (Indoor Air Facts No. 4 (revised) Sick Building Syndrome) United States Air and Radiation (6609J) Research and Development Environmental Protection (MD-56) Agency February 1991*

“Sick Building Syndrome” is not an easily curable condition. It takes extensive research and, in most cases, massive amounts of cash to remedy. If remediation is even possible.

In closing, drain and drain maintenance is a vital part of the overall safety of any industrial facility. If you haven’t given this thought before, you should give this thought now.

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**Additional Information:**

For more information on topics discussed in this Fact Sheet, contact your state or local health department, a non-profit agency such as your local American Lung Association, or the following: National Institute for Occupational Safety and Health

US Department of Health and Human Services 4676 Columbia Parkway (Mail Drop R2)  
Cincinnati, Ohio 45226 Public Relations Office. [www.cdc.gov/niosh/homepage.html](http://www.cdc.gov/niosh/homepage.html)

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) 1791  
Tullie Circle, NE, Atlanta, Georgia 30329. [www.ashrae.org](http://www.ashrae.org)

Building Owners and Managers Association International 1250 Eye Street, NW, Washington, DC  
20005 [www.boma.org](http://www.boma.org)

[Or contact your Safety Consultant.](#)