Environmental Leverage INC.
Turning Liabilities into Leverage

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Turning Environmental Liabilities to Leverage !!!

Nowadays major companies are focused on the bottom line - Sustainable development, gaining profitable market share and increasing your customer's loyalty are key issues that management must continually track and improve. Production costs, maintenance costs, environmental liability and operational safety are key areas where improvements and optimization help deliver these goals. Adding value to your operations and hitting on these areas is our goal at Environmental Leverage. Bringing you the latest technology to save you time and money are critical to the success of your operation.

Key Benefits:
Total Cost of Operation Reductions • System Reliability and Sustainability
Environmental Compliance • Decrease Maintenance & Operational Costs
Improve Operational Safety

Toxicity - what causes it and why does it happen in my plant?

This is a key question to many operators. With the right species of bacteria, very rarely is something “toxic”. Usually it is a matter of the right amount of time and sufficient numbers of bacteria to adequately degrade a compound. Bacteria can degrade almost all organic compounds except for triple bond compounds if given the right conditions and the length of time required. Most of the time though, there is not enough bacteria or there is too short of a time in a given system to degrade the compounds sufficiently before it passes out the end of the system. Violations occur or foaming occurs in the system and operators assume their bacteria are dead and there is something toxic. Usually, the case is the opposite and there is too much food but just not enough time. On the other hand, if the loading is inorganic compounds, toxicity can occur. Here are some of the inorganic compounds that may be causing problems to your system.

Inhibition to wastewater treatment by specific compounds (sulfide, sulfur, sulfates, ammonia, nitrite, and nitrate) is usually minor if at all if the biomass in the system has been allowed to acclimate. According to the EPA "Gold Book" (Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program) used by municipalities to set up their permit levels for local industries sending wastewater to the POTW.

Sulfides - for activated sludge use 25 to 30 ppm, for anaerobic digesters use 50 ppm as the maximum tolerated level. The main problem with sulfides, however, is not that they inhibit the biomass so much as that they tend to form acids with water and are, therefore, very corrosive to the concrete and steel. Also, sulfides would react instantly with chorine, consuming 4.2 parts chlorine per part sulfide (expensive).

Sulfates - Again, EPA Gold Book uses 500 ppm as max. level for anaerobic digesters, no limit for activated sludge systems. The only problem that there seems to be in some cases, is where additional salinity sulfates are added to water, and where the salinity is over 6200, it is toxic to some of the fresh water bioassay species such as daphnia.

Sulfur - No data, no experience as to what the level would be, assuming that at some very high level it would inhibit heterotrophic bacteria (carbon degraders), but not autotrophs (sulfur degraders).

Ammonia - The Gold Book says 480 parts of ammonia for a maximum level in an activated sludge system, 1500 parts for an anaerobic digester. However, bacteria acclimate to ammonia levels, and 1,600 ppm is usually considered the actual top end for acclimated toxicity. The toxicity of amines and other N compounds) is highly pH dependent, the higher the pH the more toxic. At a pH of say 6.8 the ammonia is 100% NH_4 (none toxic and very stable). At a pH of 11.0, the ammonia is 100% NH_3-N and is very toxic and will readily air strip (not stable). So, acclimation is the key here. There are cases of systems that normally only see ammonia levels of 10 to 20 ppm react to sudden shock loads of 50 ppm. On the other hand, steel mill coker waste streams will typically see well over 250 ppm all the time and have no problem with nitrification. Also, ammonia will react vigorously with chlorine, using about 10 parts of chlorine per part of ammonia.

Nitrite/Nitrates - No references as to inhibition levels. Usually, not inhibitive.

Amines - Amines can be inhibitive, in particular to nitrification. Even at low levels if the nitrifiers are not acclimated to the particular amine species. Usually, nitrifiers are not killed by amines, but the time required to stabilize the amine byproduct ammonia can be severely extended. Oftentimes, amines are overlooked in the nitrogen balance and will finally break down in the clarifier, thereby not allowing the nitrifiers sufficient time to degrade the ammonia, and violations occur on ammonia not due to toxicity, but due to the time and numbers game. With the right species of bacteria, very rarely is something “toxic”. Usually it is a matter of the right amount of time and numbers of bacteria. Bacteria can degrade almost all organics except for triple bond compounds if given sufficient conditions. Most of the time, there are not enough bacteria or too short of a time in a given system to degrade the compounds sufficiently before it passes out the end of the system.