



It is first important to note that there are other terms that are used to describe a failed septic system. They are: failed cesspool, failed drain field, failed disposal field, failed leach lines, failed leach field, failed leach bed, failed seepage pit, failed dry well, failed sand filter, failed mound, failed aerobic system. There are many other terms that are more local than general and are too numerous to list. Any reference to any term is interchangeable with any other term.

Along with the "The Purpose Of A Septic System And Why They Fail" and "The Description Of An Anaerobic Septic System" combined with this information on the Pirana®, the reader should gain a basic understanding of why septic systems fail and why the Pirana® is the needed solution. If more in-depth information is desired, contact Pirana® Systems and we will see how to help.

In 2000, the Pirana® created a new option for the septic industry: the remediation of failed septic system drain fields. The Pirana® eventually received a US Patent. This was a revolutionary issue for the septic industry: inexpensive remediation vs expensive and property damaging replacement of failed drain fields. Installing a Pirana® without landscape damage into a septic tank to remediate a failed septic system can save the property owner as much as 90% over the limited "business as usual" solutions offered by the septic industry: "You gotta replace your leach field" or "you gotta put in an engineered system".

Biomat is the primary cause of septic system drain field failure based on the results of two exhaustive, in-depth surveys by the Federal EPA in the 1990s. Every jurisdiction that regulates septic systems in the US participated. One of the primary conclusions of these surveys was that 95+% of septic system failures were from biomat clogging of infiltrative soil surfaces. We realized that eliminating the biomat would return failed drain fields to proper function and for far less than replacing failed disposal systems.

This is important because cost is most often the critical issue for the vast majority of property owners with failed septic systems. The Pirana® typically saves homeowners many thousands of dollars, even tens of thousands of dollars. Not having to pay for landscape repair, a cost that is not considered in the cost of replacing a disposal field saves the homeowner even more money.

The reaction of the septic industry to the Pirana® is best explained in this quote by Upton Sinclair, "It is difficult to get a man to understand something when his salary depends on his not understanding it."

It has been 18 years since the Pirana® technology was first introduced and more are being sold and installed every day in 14 countries without the support of the septic industry. The roadblocks that have been placed in the way by the septic industry and government regulators through regulations the septic industry influenced, hasn't kept the Pirana® from helping thousands of people around the world with every kind of septic system whether new or failed, including systems for single family residences, multi-family apartments and

condominiums, hotel / resorts, commercial / industrial, RV Parks and Campgrounds, MHPs, schools, bars / restaurants, denitrifying septic systems.

Unless the local government EHD is made aware of a septic drain field failure the property owner can choose to do nothing about the failure. The majority of property owners choose to do nothing. The Federal EPA estimates a million plus septic systems fail each year and nothing is done to return them to proper function. The only rational reason for this is the septic industry and government's limited solutions are too expensive and destructive. The Pirana® is the simple, inexpensive, non-destructive solution to this problem.

The original design purpose of the Pirana® unit was for a hyper efficient aeration and circulation device to retrofit into the outlet chamber of existing and new two chamber septic tanks to turn the septic tanks into aerobic treatment units without the need to add additional tankage. The idea was to save the homeowner money (hopefully a lot of money) so homeowners could afford to do something about their failed septic systems. The Pirana® unit design had to be one of, if not the most efficient aeration and circulation device for septic systems (and wastewater treatment in general). The efficiency of the Pirana® unit design surpassed our highest expectations. We thought that simply creating an aerobic effluent would reliably restore failed septic systems to proper function. We were wrong. The problem turned out to be about the bacteria. Septic systems depend on intestinal bacteria to provide the treatment. Intestinal bacteria are the wrong bacteria to provide sewage treatment. The obvious solution is the right bacteria.

The Pirana® unit has been described as an "incubator to grow" the proprietary group of powerful, natural, non-toxic, recycling bacteria species and sub-strains making up the Pirana® Blend Bacteria (PBB) using human sewage as nutrients. The PBB species and sub-strains were isolated from grasslands, conifer and broadleaf forest litter and the upper, humus rich, aerobic horizon of native soils. In their natural environments, these powerful bacteria quickly and efficiently digest and recycle the countless tons of difficult to digest plant material and other organic debris that fall on the Earth's surface every day. It is well known to the wastewater industry that these types of natural bacteria are the best bacteria to recycle sewage. Until the Pirana®, these types of bacteria were not able to form survivable communities in liquid sewage, much less thrive as they do inside the Pirana® unit.

After hundreds of "real life residential septic systems," not testing sites with artificial septic systems, we discovered the design and construction of the Pirana® created a unique gaseous non-depletable oxygen environment within the unit while circulating between 30,000 gpd to 50,000 gpd of effluent through a Pirana® unit (depending on the Pirana® model). This unique oxygen environment within the Pirana® allowed the powerful recycling PBB to colonize, survive and prosper within a Pirana® that sits on the bottom of the alien, hostile liquid environment of the inlet or solids chamber of septic tanks, or suspended in the like environment of a cesspool / seepage pit.

Through observation and subsequent testing, the Pirana® taught us about septic systems in ways no one had ever considered before. Septic industry "experts", engineers and government regulators accepted as given, the limitations and the lack of capabilities of their septic system designs. The Pirana® proved them all to be false. The combination of the hyper efficient Pirana® design and the ability to maintain the metabolically efficient community of PBB within the Pirana®, we realized we had changed the purpose and potential

for septic systems. This led us to realize the Pirana® is the first new and most efficient technology and understanding for septic systems in 100 years.

"If Nature can't work for you, you have to work for Nature. And it's very expensive." Septic system owners know this full well. We found the more you mimic Nature the less it will cost. The way the Pirana® mimics Nature is being able to continuously grow and reproduce some of Nature's most efficient bacteria (PBB) that move throughout the entire septic system where the PBB digest and recycle the organic component of sewage and most important, biomat. If a septic system design is not able to use Nature's most efficient recycling bacteria, the efficiency of that septic system will be low and therefore expensive and damaging to property.

Bacteria do the ultimate digestion and recycling in Nature. Humans do not digest or recycle anything. We don't even digest the food we eat. Our gut microbes do that for us and we reap the harvest of the nutrients they secrete in their metabolites and secondary metabolites. Humans can only build "machines" that depending on their functions are able to support particular bacteria and not others. All other aerobic treatment systems depend on, and can only support, weak intestinal bacteria because all they provide is a limited dissolved oxygen aerobic environment in the effluent. An aerobic dissolved oxygen liquid environment will not support the continued survival of Nature's most efficient bacteria.

Only the Pirana® has been able to provide the unique oxygen environment Nature's recycling bacteria require. The metabolic efficiency of the bacteria used in treatment systems determines the efficiency of the treatment system. This ability to provide the required oxygen environment for PBB makes the Pirana® the most efficient treatment process for septic systems.

The Pirana® device and PBB simply, easily and inexpensively solved nearly all the problems and issues surrounding septic systems. The Pirana® returns failed leach fields to proper function. The Pirana® solves the problem of organic matter accumulation within and through out a septic system - in the septic tank (no more pumping), in the drain field construction and in the native soil. The Pirana® eliminates septic odors. The Pirana® can denitrify anaerobically and aerobically in the septic tank and in the drain field soils. The Pirana® helps keep organic matter from accumulating in the waste pipes in the house by the vented air from the Pirana® tank carrying PBB throughout the waste lines. The Pirana® stops the acid destruction of concrete, concrete block, metal or wood septic tanks, and any components of a septic system that are reactive to acids, by completely eliminating hydrogen sulfide gas within a septic system This can save homeowners thousands of dollars not having to replace acid weakened or collapsed septic tanks and other components of septic systems. **

Efficiency in unit technology design and the highly efficient metabolic capabilities of the PBB means "small size"; allows for a modular design with multiple models that can be configured to provide any desired treatment goal; lowest cost to install and maintain; retrofits into any size or design of septic tank whether existing or new; no landscape damage; lowest energy costs to operate; lowest non-technical maintenance requirements, recycles the organic component of sewage in the septic tank (no pumping), can both anaerobically and aerobically denitrify; continually remediates the entire septic system as long as the Pirana® is properly operated in the septic tank.

The Pirana® effluent in the septic tank has no odors, no floating or settled solids and the effluent is translucent and clarified. Pirana® effluent can look like lightly "stained" water, to very weak tea, to even clear drinking water. No solids. No pumping. Not having to pump the septic tank saves the homeowner even more money in the future, along with reducing environmental pollution.

For the first time, the Pirana® allows the organic component of sewage as well as the water component of sewage to be recycled on the site where the sewage originates. For the first time, the Pirana® makes a septic system a truly independent treatment and disposal system. A septic system is no longer an extension of wastewater plant. The organic matter entering and concentrating in a septic tank no longer needs to be periodically removed by pumping and transported to wastewater plant for some level of treatment and disposal (unless the pumper has a favorite out of the way place to dump his truck's load). With the Pirana®, the organic component of sewage that are the biological pollutants and the water component of sewage never leave the property where the septic system is installed.

Requiring an anaerobic septic tank or chamber in a septic system design before discharge to a disposal field, or before any aerobic treatment prior to discharge to a disposal field, clearly indicates the septic system has a single purpose: to dispose of and recycle the water component of sewage on site.

Being a multi-purpose technology sets the Pirana® apart from all other septic systems and distinctly apart from all other aerobic systems. Unfortunately government lumps all septic systems that use air into a single definition as if they were the same model of a car but merely painted with different colors. This is fallacious reasoning. The use of tires for vehicles doesn't mean all vehicles are the same or have the same purpose and capability. Example: A tractor vs a Ferrari. One goes slow and pulls a huge plow and one goes fast and can't pull anything. The use of air to change the anaerobic condition of septic sewage doesn't mean all technologies that use air are the same or have the same purpose and capability. The multi-purpose, multiple capability of the Pirana® truly antiquates all other septic systems and technologies.

Conventional anaerobic septic systems are essentially a series of filters. The septic tank is the first filter, the drain field construction is the second filter and the infiltrative soil surfaces and undisturbed native soil the third filter. If a filter becomes partially clogged, the flow through will be diminished. This is essentially what occurs in the second filter of a septic system, the leach field, and the third filter, the infiltrative soil surfaces. When a filter becomes clogged, you either clean it or replace it. See: "Purpose of a Septic System and Why They Fail" and "Description of Anaerobic Septic Systems".

In simple terms, the Pirana® "biologically cleans" the second and third filters of clogging biomat and other organic matter. The Pirana® is a simple process. The PBB living and thriving within the Pirana® unit digest and recycle the organic solids that are retained within the septic tank, as well what enters the septic tank, and exponentially double their population every twenty minutes as long as there is sufficient sewage as nutrients. No more pumping. A percentage of the PBB become suspended in the effluent in the Pirana® septic tank. Every day the PBB enter the drain field in the highly treated aerobic effluent leaving the Pirana® septic tank.

In the drain field and infiltrative soil surfaces, the PBB continue to digest and recycle organic matter and biomat as they did in the septic tank. With the Pirana, a septic system changes from a series of separation/retention, settling and surface filters to a series of digesting and recycling environments and zones. By this ability to digest and recycle the organic component of sewage throughout the septic system, the Pirana® eliminates all of the limitations and issues surrounding onsite waste treatment and disposal. This is how Nature recycles organic matter. Not filtration. Digestion.

The savings from not having to pump eventually repays the homeowner all or part of the cost for installing the Pirana® to say nothing of the savings in the hidden costs we all pay from the various points of pollution surrounding the pumping, transportation, treatment and disposal of concentrated septic waste off site. The Pirana® has the lowest pollution and carbon footprint of any septic or wastewater treatment system.

The Pirana® does not change the purpose of a septic tank. The septic tank continues to function as a means to remove the organic solids from the waste stream before discharging liquid effluent to a disposal field or other process before the disposal field. The Pirana® removes the organic solids by digestion and recycling not by filtration. No other aerobic system can do this.

The PBB enter the disposal field, and for the first time, the function, not the purpose, of the disposal field changes. It is no longer a secondary settling filter that retains settled sludge, coagulated soluble organic matter and trapped bacteria. With the Pirana®, the physical disposal field becomes a digestion and recycling environment. The PBB digest and recycle any organic matter existing within, or that enters a disposal field along with the biomat that forms on any of the surfaces within the disposal field.

The PBB also change the function of the third filter. The infiltrative soil surfaces become a digestion and recycling zone not a surface filter. This digestion and recycling removes the clogging biomat and retained organic solids from the second and third filters (that's why we say the Pirana® cleans the second and third filters of a septic system) allowing the retained contaminated water in a failed disposal field void spaces to be absorbed into the native soil returning the failed disposal field to proper function. By continually operating a Pirana® in the septic tank, the leach field cannot fail from biomat clogging in the future.

The ability to constantly grow and generate some of the most efficient natural bacteria to digest and recycle sewage allows the Pirana® to remediate failed disposal fields, digest and recycle the organic component of sewage in the septic tank, eliminating the need to pump, and turns the entire septic system from a filtering process to a digestion process. Digestion to recycle, not filtration and storage, is Nature's process for dealing with organic matter and waste. Pirana® is simply the best, most efficient septic system technology of our time.

** NOTE: Naturally occurring *Acidithiobacillus thiooxidans* (aka Thiobacillus) colonize the damp surfaces above the liquid effluent in anaerobic septic tanks and any component of a septic system that maintains a continuous level of anaerobic effluent. They continually alter hydrogen sulfide in sewage gas by oxidizing the sulfur to sulfuric acid. The continued creation of sulfuric acid on these surfaces breaks down any acid reactive material (examples: concrete septic tanks, septic tanks made of wood, non-stainless steel metal septic tanks and components, Orangeburg distribution pipe).



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