

Those Wonderful Microbes!

Microorganisms have long been a major player in environmental remediation. Long before Alexander Fleming discovered the usefulness of a common fungus to provide a life saving antibiotic, microorganisms of all sorts were diligently doing their jobs in waste reduction and nutrient recycle. Throughout the evolution of microbiology, we have determined the advantages and disadvantages of microbes. The disadvantages are obvious. Who hasn't suffered from a bacterial infection or the common cold at some time in their life? However, we tend to forget the abundant advantages of microbes. Without microbes, imagine our environment. The grass clippings from last summer would hang around indefinitely. Our soils would no longer have the self-sufficiency to produce on their own because they would lack nutrients released from decaying organic matter. That certain cold beverage we may consume on a Friday night after a long week would be nonexistent. Frankly, microbes offer us a great deal of essential services!

Indigenous versus Inoculation

In recent years, the science of using microorganisms as a tool for environmental remediation has gained momentum. Two practices predominate how microbes can be used for site cleanup. The first practice is to use microbes that are indigenous (native) to the area. The principle behind this practice is to use microbes that have a competitive advantage because they are already adapted to the site. Furthermore, proponents of indigenous bioremediation argue that natural microbial communities offer great levels of biodiversity. Therefore, it is presumed that the contamination should naturally select for the microbes that have the best degrading capability. The second practice is to inoculate the contaminated site with a variety of microbes with known degrading capabilities. There are two primary advantages with inoculation. First, there is no doubt that microbes are present that can metabolize the contaminant. Second, the site can be inoculated at a high density allowing a greater possibility of microbe-contaminant contact. Opponents cite competitive ability as a disadvantage of inoculation.

So, Which is Best?

At Advanced Microbial Services, we prefer the practice of site inoculation. Under precise control, inoculation can be a cost effective, more reliable, and quicker means of contaminant removal. Why? As mentioned, inoculation gives us the capability of selecting microbes that have known degrading capabilities for a specific contaminant. Furthermore, by inoculating with a diverse culture of microbes, we can ensure that all members of the degrading team are present to completely remove the contaminant. Finally, inoculation provides a large population immediately. Therefore, significant remediation can be seen in a quicker time frame. All of these provide greater control over the system and allow for a more aggressive approach towards cleanup.

Inoculation in Industrial Wastewater Treatment Operations

A common problem encountered in industrial wastewater treatment operations is conditions that are less than desirable to maintain a consistent microbial population. Swings in pH, temperature and waste stream do not allow enough stability for the population to grow and select for the best degraders. This problem can be easily remedied by inoculation. Continuously injecting microbes that are good degraders of a specific substrate (i.e. grease, oil, cellulose, chlorinated hydrocarbons, etc) offers stability for biological treatment. Since the inoculation is constant, system operators can be assured that the proper organisms are present. Once a stable biological treatment program has been established, industrial wastewater generators should experience a new level of efficiency in their treatment operations.

The ability to establish biological treatment for industrial wastewater generators offers many advantages over other forms of treatment (i.e. mechanical or chemical). Biological treatment does not generate additional waste streams like mechanical or chemical treatment programs. The by-products of biological degradation in an optimized setting are carbon dioxide, water and biomass (more bacterial cells). In mechanical and chemical programs, additional waste streams may be generated because a constituent of the waste stream that is removed must be disposed of by other means. For example, oils extracted from water via chemical treatments must now be disposed of in a landfill. In this same example, a biological program would eliminate or at least reduce the secondary waste stream because the oils would be degraded. Thus, disposal costs associated with the secondary waste stream would be eliminated or reduced.

How can this be cost effective if I'm buying microbes?

On the surface it would appear that using indigenous bioremediation would always be the most cost-effective method for wastewater treatment operations. BE CAREFUL! If the indigenous population of degraders has had multiple exposure to a contaminant, the population may be large enough and active enough to reduce lag time and maintain stability. However, if the contaminant is relatively new, the contaminant may move completely through the system relatively untouched. If the contaminant were lethal to the population, the costs of recovery alone would be substantial, not including possible fines. Therefore, the ability to maintain healthy populations of degraders that may not naturally be in the waste flow is a viable economic alternative.

What we can do for you

Advanced Microbial Services has three distinct inoculum formulations that can be used to degrade a variety of contaminants. Each formulation contains a diverse population of organisms to ensure effective remediation. Let us know what contaminant(s) plagues your system and we'll decide on the proper formulation and conduct a pilot study for 30 days to learn what conditions are best to treat the

system and ensure cost effective removal. Why wrestle with contaminant problems? Let those wonderful microbes keep your system clean!