

AOB's UNIQUE HYDROCARBON BIOREMEDIATION TECHNOLOGIES

AOB's bioremediation technologies are all based on the concept of **balanced micro and macro ecosystems**. When contaminants are introduced to any system, the natural microbes are stressed and often times unable to recover sufficiently to maintain the balance necessary to degrade or bind out the contaminants. The evolution of the microbes to adapt to these environmental changes is normally not rapid enough to reduce the contaminate level and die-off occurs instead of adaptation. When placed under environmental stress, organisms will adapt, migrate or perish. Our process helps them to adapt.

More than 40 years research has gone into the study of ecosystems and the microbes that populate our natural environments, as well as the macro environments in which they interact, and are an integral component, such as wetlands and surface water systems. Our research has led to development of a unique, proprietary data base of over 14,000 environmental microorganisms, their nutrient requirements, their degradation, reduction, chelation, etc. capabilities, as well as their normal soil, surface water or ground water habitats. We can type in the contaminate and the data base will give us all of the organisms known to degrade that contaminate and the support organisms needed to provide a balanced system for maximum efficiency.

Each habitat is unique and has site-specific microorganisms that have adapted to the climatic and geological conditions of that site. The same basic organisms that degrade, chelate, oxidize, reduce, etc. may be found on many different sites in widely divergent areas, but each organism will have adapted to the environment of that site and therefore will be site-specific and a unique variety of that organism. It is imperative to the success of any project to know all the chemical, geological, hydrogeological and climatic parameters of the site to be bioremediated.

We use no genetically engineered microbes in our bioremediation technologies. We use only natural, site specific microbes that are acclimated to function successfully in sites where contaminants are present. We use bacteria, fungus, algae and protozoans that are site-specific and balanced into a microecosystem that is appropriate to deal with the contaminants on that site. It is, therefore, imperative that we have a full understanding of all of the parameters of any site we bioremediate. These are gained from proper site studies that give us the whole picture of the ecosystem and all of the contaminants known or believed to be impacting that site. ***We also need to understand the local plant and animal environments, especially in surface water clean ups and in situations where wetlands can be employed as filtering systems prior to polluted water entering surface waters.***



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BIOREMEDIATION

There are no "quick fixes" and no "magic microbes" that can realistically bioremediate any site. AOB relies on the intelligent application of good science and proper research methods to develop and apply its technologies in a wide variety of contaminate scenarios. The list includes the following successful applications in soil, ground water and/or surface waters:

1. Treatment of acid mine drainage (both microbial and wetlands systems).
2. Treatment of heavy metals contamination.
3. Degradation of hydrocarbon contamination (gas, oils, diesel fuels, home heating fuels, grease, MTBE, anti-freeze, etc.).
4. Treatment of industrial waste water.
5. Treatment of agricultural waste and run-off, manure lagoons, odor and insects.
6. Degradation of cyanide in contaminated soil and water.
7. Microbial mining of precious metals from placer deposit sands and bio-leaching of tailings (ponds and heaps).
8. Desulfurization of coal fines.
9. Degradation of chlorinated aliphatic compounds.
10. Degradation of pesticides.
11. Degradation of semi-volatile compounds.
12. Denitrification and reductive dichlorination.
13. Treatment of landfill leachate, using microbes and wetlands.
14. Restoration of contaminated surface water systems and soils ("Terra Forming").
15. Land farming of surface and shallow soil contamination using microbes and plants (phytoremediation).

Most of the sites, we have done, have had mixed wastes and we can combine any or all of the technologies shown above to treat multiple contaminants on a site. Very few sites are contaminated by only one pollutant. Each of the technologies have evolved as a result of our research of situations brought to us by companies, often after other conventional approaches have failed to correct the problem, since 1984. Each new technology and the microbes, we discover, adds to our constantly growing data base and culture collection, since we maintain a sample of each microbe used in each job.

Starting in 2017, we can now put together a team of qualified personnel to offer **"Turn Key"** Services from phase II assessments through monitoring and closure or act as your sub-contractor for the Bioremediation, including a Bioremediation corrective action plan.

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