

by Terrie Boguski

Landfills and Biochemical Oxygen Demand

When organic matter such as food waste, lawn clippings, or animal waste decomposes, microorganisms such as bacteria and fungi feed upon it and it eventually becomes oxidized combined with oxygen. Biochemical oxygen demand (BOD) is a measure of the amount of oxygen used by these microorganisms as they feed upon organic matter.

Liquid that seeps from landfills is called leachate. Leachate is formed when water passes through the waste in a landfill. The water can be from rain, melted snow, or the waste itself. As the liquid moves through the landfill, many organic and inorganic compounds may be carried in the leachate. If the leachate contains high levels of organic matter, then it will also test high for BOD levels.

Leachate may seep from a landfill and flow into a body of water such as a lake, river, or stream. It may also flow into groundwater, the water flowing beneath the earth's surface through soil and rock. If leachate has high BOD levels and contaminates a body of water, it may cause the BOD of the water to be too high, which may be harmful to fish and aquatic species.

Water samples are often tested for BOD because it is an indicator of water quality. If BOD levels are high, dissolved oxygen in the water decreases because bacteria in the water use the dissolved oxygen as they decompose organic matter. When there is less dissolved oxygen in the water, fish and other aquatic species may not survive.

Organisms more tolerant of lower dissolved oxygen levels may appear and become numerous. Species tolerant of lower dissolved oxygen levels include carp, midge larvae, and sewage worms. Organisms intolerant of low oxygen levels, such as caddisfly larvae, mayfly, and stonefly nymphs, may not survive. As organic pollution increases, ecologically stable and complex relationships present in waters containing a high diversity of organisms is replaced by a low diversity of pollution-tolerant organisms with increasing populations. BOD is monitored to help us know when action is needed to protect the diversity of organisms in a lake, river, or stream.

Modern landfills use liners, caps, and leachate collection systems to reduce the amount of leachate that may seep

from a landfill. A liner keeps leachate from seeping through the bottom of the landfill. The cap or top cover of clay soil and vegetation is shaped to help rain and snowmelt to run off the surface of the landfill instead of percolating down through the waste. Keeping water out of the landfill reduces the amount of leachate. A leachate collection system provides an easy path for leachate to follow and drains it into a collection system for proper handling and disposal. Remediation of old landfills often includes adding a clay soil cap and shallow-root vegetation to reduce the amount of leachate seeping from the landfill.

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Acknowledgement: Although this article has been funded in part by the U.S. Environmental Protection Agency under assistance agreement R-819653, through the Midwest Hazardous Substance Research Center, it has not been subjected to the agency's peer and administrative review and, therefore, may not reflect the views of the agency. No official endorsement should be inferred.



This publication is published by Kansas State University, Midwest Hazardous Substance Research Center as part of their Technical Outreach Services for Communities (TOSC) program series of Environmental Science and Technology Briefs for Citizens. If you would like more information about the TOSC program, contact your regional coordinator.

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