

## *Hypoxia Glossary of Terms*

*Anaerobic digestion:* Decomposition of biological wastes by micro-organisms, usually under wet conditions, in the absence of air (oxygen), to produce a gas comprising mostly methane and carbon dioxide.

*Animal feeding operation (AFO):* Agricultural enterprises where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland. Winter feeding of animals on pasture or rangeland is not normally considered an AFO.

*Anoxia:* The absence of dissolved oxygen.

*Best Management Practices (BMPs):* BMPs are effective, practical, structural or nonstructural methods that are designed to prevent or reduce the movement of sediment, nutrients, pesticides and other chemical contaminants from the land to surface or ground water, or which otherwise protect water quality from potential adverse effects of agricultural activities. These practices are developed to achieve a cost-effective balance between water quality protection and the agricultural production (e.g., crop, forage, animal, forest).

*Bioenergy:* Useful, renewable energy produced from organic matter - the conversion of the complex carbohydrates in organic matter to energy. Organic matter may either be used directly as a fuel, processed into liquids and gasses, or be a residual of processing and conversion.

*Biogas:* A combustible gas derived from decomposing biological waste under anaerobic conditions. Biogas normally consists of 50 to 60 percent methane. See also landfill gas.

*Biomass:* Any organic matter that is available on a renewable or recurring basis, including agricultural crops and trees, wood and wood residues, plants (including aquatic plants), grasses, animal residues, municipal residues, and other residue materials. Biomass is generally produced in a sustainable manner from water and carbon dioxide by photosynthesis. There are three main categories of biomass - primary, secondary, and tertiary.

*Bioreactor:* A container in which a biological reaction takes place. As used in this report a bioreactor is a container or a trench filled with a biodegradable carbon source used to enhance biological denitrification for removal of nitrate from drainage water.

*Biosolids:* Nutrient-rich soil-like materials resulting from the treatment of domestic sewage in a treatment facility. During treatment, bacteria and other tiny organisms break sewage down into organic matter, sometimes used as fertilizer.

*Cellulosic ethanol*: Ethanol that is produced from cellulose material; a long chain of simple sugar molecules and the principal chemical constituent of cell walls of plants.

*Chlorophyll*: Pigment found in plant cells that are active in harnessing energy during photosynthesis.

*Conservation Reserve Program (CRP)*: CRP provides farm owners or operators with an annual per-acre rental payment and half the cost of establishing a permanent land cover, in exchange for retiring environmentally sensitive cropland from production for 10 to 15 years. In 1996, Congress reauthorized CRP for an additional round of contracts, limiting enrollment to 36.4 million acres at any time. The 2002 Farm Act increased the enrollment limit to 39 million acres. Producers can offer land for competitive bidding based on an Environmental Benefits Index (EBI) during periodic signups, or can automatically enroll more limited acreages in practices such as riparian buffers, field windbreaks, and grass strips on a continuous basis. CRP is funded through the Commodity Credit Corporation (CCC).

*Conservation practices (CPs)*: Any action taken to produce environmental improvements, particularly with respect to agricultural nonpoint source emissions. The term is used broadly to refer to structural practices, such as buffers, as well as nonstructural practices, such as in-field nutrient management planning and application. Conservation Practice standards have been developed by NRCS and are available at: <http://www.nrcs.usda.gov/Technical/Standards/nhcp.html>.

*Corn stover*: Corn stocks that remain after the corn is harvested. Such stocks are low in water content and very bulky.

*Cyanobacteria*: A phylum (or “division”) of bacteria that obtain their energy through photosynthesis. They are often referred to as blue-green algae, although they are in fact prokaryotes, not algae. The description is primarily used to reflect their appearance and ecological role rather than their evolutionary lineage. The name “cyanobacteria” comes from the color of the bacteria, cyan.

*Denitrification*: Nitrogen transformations in water and soil that make nitrogen effectively unavailable for plant uptake, usually returning it to the atmosphere as nitrogen gas.

*Edge-of-field nitrogen loss*: A term that refers to the nitrogen that is lost or exported from fields in agricultural production.

*Effluent*: The liquid or gas discharged from a process or chemical reactor, usually containing residues from that process.

*Emissions*: Waste substances released into the air or water. See also Effluent.

*Eutrophic:* Waters, soils, or habitats that are high in nutrients; in aquatic systems, associated with wide swings in dissolved oxygen concentrations and frequent algal blooms.

*Eutrophication:* An increase in the rate of supply of organic matter to an ecosystem.

*Greenhouse gases:* Gases that trap the heat of the sun in the Earth's atmosphere, producing the greenhouse effect. The two major greenhouse gases are water vapor and carbon dioxide. Other greenhouse gases include methane, ozone, chlorofluorocarbons, and nitrous oxide.

*Hydrogen sulfide:* A chemical, toxic to oxygen-dependent organisms, that diffuses into the water as the oxygen levels above the seabed sediments become zero.

*Lignocellulose:* A combination of lignin and cellulose that strengthens woody plant cells.

*Nitrate:* An inorganic form of nitrogen; chemically  $\text{NO}_3$ .

*Nitrogen fixation:* The transformation of atmospheric nitrogen into nitrogen compounds that can be used by growing plants.

*Nonpoint source:* A diffuse source of chemical and/or nutrient inputs not attributable to any single discharge (e.g., agricultural runoff, urban runoff, atmospheric deposition).

*Nutrients:* Inorganic chemicals (particularly nitrogen, phosphorus, and silicon) required for the growth of plants, including crops and phytoplankton.

*Point source:* Readily identifiable inputs where treated wastes are discharged from municipal, industrial, and agricultural facilities to the receiving waters through a pipe or drain.

*Pre-sidedress-nitrate test (PSNT):* A soil nitrate-N test determined in surface soil samples (usually 0 to 30 cm or 0 to 12 in deep), collected between corn rows when the corn is about 15 cm (6 in) tall. Adjustments in the rate of side-dressed N can be made if the soil test indicates elevated nitrate-N levels, based upon calibrations that vary among growing regions. When successfully calibrated, the test results can be used as an index of the amount of N that may be released during the course of the growing season by organic sources such as soil organic matter, manure, and crop residues.

*Productivity:* The conversion of light energy and carbon dioxide into living organic material.

*Recoverable manure:* The portion of manure as excreted that could be collected from buildings and lots where livestock are held, and thus would be available for land application.

*Recoverable manure nutrients:* The amounts of nitrogen and phosphorus in manure that would be expected to be available for land application. They are estimated by adjusting the quantity of recoverable manure for nutrient loss during collection, transfer, storage, and treatment; but are not adjusted for losses of nutrients at the time of land application.

*Respiration:* The consumption of oxygen during energy utilization by cells and organisms.

*Riparian floodplain:* Area adjacent to a river or other body of water subject to frequent flooding.

*Soil tilth:* The physical condition of the soil as related to its ease of tillage, fitness as a seedbed, and impedance to seedling emergence and root penetration. A soil with good “tilth” has large pore spaces for adequate air infiltration and water movement, and holds a reasonable supply of water and nutrients. Soil tilth is a factor of soil texture, soil structure, and the interplay with organic content and the living organisms that help make up the soil ecosystem.

*Sustainable:* An ecosystem condition in which biodiversity, renewability, and resource productivity are maintained over time.

*Urease and nitrification inhibitors:* Urease is a ubiquitous soil microbial enzyme that facilitates the hydrolysis of urine and urea to form ammonia. In the soil, ammonia readily hydrolyzes to ammonium. Soil ammonium also is formed by the mineralization of soil organic matter and manures. Ammonium is then oxidized or “nitrified” first to nitrite ( $\text{NO}_2$ ) and then to nitrate ( $\text{NO}_3$ ), which is highly soluble and subject to movement in the soil with the moisture front, or leaching under certain conditions. Under anaerobic conditions,  $\text{NO}_3$  can be “denitrified” to the gases nitrous oxide ( $\text{N}_2\text{O}$ ) and nitrogen ( $\text{N}_2$ ), and released to the atmosphere. Urease inhibitors are chemicals applied to fertilizers or manures to reduce urease activity. Under certain environmental conditions urease inhibitors can temporarily inhibit or reduce ammonia loss (volatilization) to the atmosphere from urea-containing fertilizers or manures. Nitrification inhibitors are chemicals which can temporarily inhibit or reduce nitrification of anhydrous ammonia, ammonium-containing or urea-containing fertilizers applied to the soil; which may indirectly help to reduce denitrification losses of N. Under certain environmental conditions, urease and nitrification inhibitors help improve soil retention and crop recovery of applied N, which may reduce potential environmental N losses.

*Voluntary programs:* Voluntary conservation programs that have no significant financial incentive (positive or negative) to encourage the adoption of conservation practices.

*Watershed:* The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.