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Cooperatively promoting the environmentally sound recycling of biosolids and other residuals

Information Update: Official Usage of the Term "Biosolids"

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The New England Biosolids and Residuals Association (NEBRA) is a non-profit membership association dedicated to providing technical information and support regarding the recycling of biosolids and other residuals in New England and eastern Canada. The following information is intended to provide background as to why those involved in the management of wastewater, sewage sludge, and other residuals currently use the term "biosolids" and why NEBRA encourages the official adoption of the term by any and all jurisdictions.

"Biosolids" are one variety of municipal wastewater treatment sludge

Wastewater treatment facilities perform two primary functions. They treat water to a level that allows its re-introduction to surface and/or ground waters, and they treat the solids produced in this process to a level where they can either be recycled or disposed of properly. Both are done in a manner to ensure public safety and environmental protection.

Traditionally, the suspended and dissolved solids in the wastewater treatment process have been called "sludge" or "sewage sludge." Wastewater treatment operations require careful management of sludge, not only after removal from the treatment process, but also during the treatment process: sludge is a critical biologically active mix of water, organic matter (derived from human wastes, food wastes, etc.), inorganic solids (including trace elements), dead and alive micro-organisms (including pathogens), and trace contaminants (e.g. chemicals). Routinely, some sludge is recycled within the treatment facility process to optimize operations. However, as sludge builds up, batches of sludge are removed ("wasted") regularly from the effluent treatment operations. This "raw" sludge is typically 2-3 % solids and 97-98% water and must be further treated in order to be utilized in a beneficial manner. Most sludge comes from primary settling tanks ("clarifiers") and/or secondary settling tanks. It is typically a slightly thick, gray-brown liquid. Most often, sludge is treated in either an aerobic or anaerobic digester (maintained for set time intervals within given temperature ranges). This stabilizes the material and reduces pathogens (disease-causing organisms). A variety of additional treatment options exist for sludge in order for it to meet federal and state requirements for beneficial use. At the point it satisfies these requirements, the sludge is called "biosolids."

Note that the solids that settle to the bottom of a typical home septic tank (which, because of the build-up of these solids, must be pumped out every 2-3 years) is also sometimes called "sludge," but is more appropriately called "septage."

According to federal regulations, the sludges from municipal wastewater treatment facilities can be used or disposed of in three ways: landfilling, incineration, or recycling by application to soil. Only some sludges are recycled—and to do so they must be treated and tested (stabilized) in accordance with state and federal laws and regulations. Only these treated and tested sludges are called "biosolids."

The Water Environment Federation (WEF), a leading association of water quality professionals, emphasizes this distinction:
"Sludge is generally used before applicable beneficial recycling criteria have been achieved, which normally occurs at the outlet of the stabilization process. It should be used in tandem with a specific process descriptor, e.g., *primary sludge*, *waste activated sludge*, *secondary sludge*, etc
"Biosolids is generally used after applicable beneficial recycling criteria have been achieved, i.e., at the outlet of the stabilization process…. *Biosolids* is intended to be used in reference to municipal/domestic solids. While there are some industrial residuals that can be beneficially recycled, these residuals are generally referred to as *sludge, solids*, etc., as appropriate."

History of the term "biosolids"
In the early 1990s, WEF held a contest to come up with a more precise term for treated and tested sewage sludge that can be beneficially used. The result of the contest was the term "biosolids." The word came from a University of Arizona professor doing research on trickling filters; his explanation: "you have solids coming into a treatment plant and you put them through a biological treatment process - therefore you have a 'biosolid.'" Data from a national survey (Beecher et al., 2004) suggests that an estimated 30 - 40 million people in the U. S.[1] can fairly accurately define the term.

Because of the difficulty of revising federal law and regulatory language, U. S. EPA has never officially adopted the term "biosolids," but it is, nevertheless, widely used in agency documents and on the EPA website (see references, below). Many states have adopted the term (see examples, below).

Currently, the term "biosolids"is widely used by water quality professionals throughout New England and eastern Canada, North America, and the world. Numerous scientists, scientific papers, and scientific journals use this term, as do many newspapers and magazines.

Distinguishing "biosolids" from "sludge"
It should be noted that "sludge," as defined above, remains a technical term widely used in the wastewater profession. However, "sludge" is a term with many other uses, both in and out of the environmental field:

- At a quick oil change business, a flyer uses "sludge" in reference to engine maintenance: "….if the valve is heavily loaded with sludge…"
- In 1998, the *Manchester Union Leader* (New Hampshire) printed an editorial entitled "Filth Watch;" it was about pornography. It included the following: "The hardcore porn industry long has spewed out even worse sludge…."
- "Sludge" describes a form of modern music.
- A children's book, *Chattanooga Sludge*, is the story of cleaning up toxic industrial waste sludge from the bottom of a creek—"thick, black, stinking, tarry sludge."
- Pokemon playing cards put the gooey, yucky image of the word "sludge" to good use: two of the Pokemon characters are called "sludge" Pokemon: Muk and Grimer. Muk is "thickly covered with a filthy, vile sludge. It is so toxic, even footprints contain poison."

There is considerable chance for misunderstanding if the term "sludge" is used to describe "biosolids." It is because of this kind of confusion that water quality professionals use the term "biosolids" to denote a particular kind of sludge – that which has been treated and tested and meets requirements for beneficial use.

Formal documented definitions of the term "biosolids"

Merriam-Webster's Collegiate Dictionary, Tenth Edition (1998): "biosolid n.: solid organic matter recovered from a sewage treatment process and used esp. as fertilizer -- usu. used in pl."

New Oxford Dictionary of English, 1998 edition: "biosolids: plural noun: organic matter recycled from sewage especially for use in agriculture."

National Academy of Sciences, National Research Council, 2002: "In this report, the term *biosolids* refers to sewage sludge treated to meet the land-application standards in the Part 503 rule or any other equivalent land-application standards."

National Biosolids Partnership (2005): "Biosolids are the nutrient-rich organic materials resulting from the treatment of domestic sewage at a wastewater treatment facility."

U. S. EPA, (1994): "Biosolids are a primarily organic solid product produced by wastewater treatment processes that can be beneficially recycled."

U. S. EPA (2005): "Biosolids are the nutrient-rich organic materials resulting from the treatment of sewage sludge (the name for the solid, semisolid or liquid untreated residue generated during the treatment of domestic sewage in a treatment facility). When treated and processed, sewage sludge becomes biosolids which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth."

Alaska Dept. of Environmental Conservation regulations (18 AAC 60.990 (20) – definition adopted in 1996): "'biosolids' means solid, semi-solid, or liquid residue generated during treatment of domestic sewage in a treatment works; 'biosolids' includes domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from biosolids; 'biosolids' does not include ash generated during the firing of biosolids in a biosolids incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works."

California Environmental Protection Agency, State Water Resources Control Board general permit: "*Biosolids*: Sewage sludge that has been treated and tested and shown to be capable of being beneficially and legally used as a soil amendment for agriculture, silviculture, horticulture, and land reclamation activities as specified under 40 CFR Part 503." (In addition, several California counties have adopted (through ordinances) various definitions for the word "biosolids.)

Colorado Department of Public Health and Environment regulation 64 (64.9 (K)): "'Biosolids' means the accumulated treated residual product resulting from a domestic wastewater treatment works. Biosolids does not include grit or screenings from a wastewater treatment works, commercial or industrial sludges (regardless of whether the sludges are combined with domestic sewage), sludge generated during treatment of drinking water, or domestic or industrial septage."

Michigan Dept. of Environmental Quality regulations: "Part 24, R 323.2402 (h): 'Biosolids' means solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. The term 'biosolids' includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids."

Minnesota Pollution Control Agency regulations (Subpart 49): "'Sewage sludge' means solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. Sewage sludge that is acceptable and beneficial for recycling on land as a soil conditioner and nutrient source is also known as biosolids."

New Hampshire Revised Statutes Annotated (laws), Section 485:A-2, XXII (definition adopted in 2000). "'Biosolids' means any sludge derived from a sewage wastewater treatment facility that meets the standards for beneficial reuse specified by the department."

New York State Dept. of Environmental Conservation regulations, Subpart 360-4 (definition adopted in 2003): "*Biosolids* means sewage sludge that can be beneficially used."

Oregon Dept. of Environmental Quality Administrative Rules ((OAR) 340-050-0010(3)): "'Biosolids' means solids derived from primary, secondary, or advanced treatment of domestic wastewater which have been treated through one or more controlled processes that significantly reduce pathogens and reduce volatile solids or chemically stabilize solids to the extent that they do not attract vectors. This term refers to domestic wastewater treatment facility solids that have undergone adequate treatment to permit their land application. This term has the same meaning as the term "sludge" in ORS 468 B.095, and the term "sewage sludge" found elsewhere in OAR Chapter 340. 'Biosolids Derived Products' means materials derived from composting domestic wastewater treatment facility solids or other processes, such as thermal

drying, which result in a material which meets pollutant concentrations in 40 CFR §503.13(b)(3), the Class A pathogen requirements in 40 CFR §503.33(b)(1) to §503.33(b)(8). Biosolids derived products also include any soil amendments which, in part, contain biosolids meeting these criteria. Biosolids derived products are acceptable for distribution to the general public for immediate use."

Pennsylvania Dept. of Environmental Protection general permits for exceptional quality biosolids, biosolids, and residential septage: "Biosolids - Sewage sludge as defined by Title 25 Pa Code 271.1 that meets, at a minimum, the pollutant quality standards listed in Title 25 Pa. Code 271.914(b)(1), one of the Class B pathogen reduction alternatives listed in 271.932(b), and one of the vector attraction reduction options listed in 271.933(1)-(10)." (Biosolids coordinator Denise Uzupis notes: "Basically, this definition means that biosolids are municipal sewage sludge that has been treated to meet land application standards.")

Rhode Island Dept. of Environmental Management regulations (Regulation #12-190-008, Rule 5): "(E) 'Class A Biosolids' means any composted sludge or treated sludge which meets the metals and pathogen limits established in Appendix 7 of these rules and regulations. (F) 'Class B Biosolids' means any composted sludge or treated sludge which meets the metals limits established in Appendix 8 of these rules and regulations. (G) 'Class C Biosolids' means any composted sludge or treated sludge which does not meet the metals limits in Appendices 7 and 8 of these rules and regulations.

Virginia Dept. of Health Biosolids Use regulations (12 VAC 5-585): "'Biosolids' means a sewage sludge that has received an established treatment for required pathogen control and is treated or managed to reduce vector attraction to a satisfactory level and contains acceptable levels of pollutants, such that it is acceptable for use for land application, marketing or distribution in accordance with this chapter."

Washington Department of Ecology regulations, Chapter 173-308-080 WAC: "'Biosolids' means municipal sewage sludge that is a primarily organic, semisolid product resulting from the wastewater treatment process, that can be beneficially recycled and meets all applicable requirements under this chapter. Biosolids includes a material derived from biosolids, and septic tank sludge, also known as septage, that can be beneficially recycled and meets all applicable requirements under this chapter. For the purposes of this rule, semisolid products include biosolids or products derived from biosolids ranging in character from mostly liquid to fully dried solids." (Additional notes from Daniel Thompson, biosolids coordinator: "Biosolids is specifically distinguished from 'sewage sludge.' The former must meet the quality criteria defined in the state rule and is considered a commodity to be managed for a beneficial purpose; the latter does not meet the quality criteria and is considered to be solid waste not suitable for beneficial use.")

Wisconsin Dept. of Natural Resources regulations (NR 204.03(55)): "'Sewage sludge' or 'sludge' or 'biosolids' means the solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes scum or solids removed in primary, secondary, or advanced wastewater treatment processes and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works." (Greg Kester, biosolids coordinator notes: "All three terms defined are interchangeable and recognized by the department, as they are all in common use. In hindsight, I would have defined them differently.")

Wyoming Dept. of Environmental Quality Water Quality Rules and Regulations (Ch. 3), adopted 1997: "'Biosolids' means solid, semi-solid, or liquid residues generated during the treatment of domestic sewage in a treatment works. Biosolids include, but are not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from biosolids. Biosolids do not include ash generated during the firing of biosolids in a biosolids incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works."

Examples of states with active biosolids recycling programs that have not officially adopted or defined the term "biosolids" in law or regulation:

- Florida (Maurice Barker, biosolids coordinator notes: "We have been using the term 'residuals.' However, we are in the process of making rule changes and one proposed change is to use the term 'biosolids' to replace 'residuals.'")
- Louisiana ("However," notes DEQ coordinator J. Kilren Vidrine, "we are utilizing the term interchangeably with 'treated sewage sludge' in correspondences and permit matters.")
- Massachusetts
- Mississippi
- New Jersey
- Nevada (Bruce Holmgren, NV Division of Environmental Protection notes "Division of Environmental Protection issues permits and guidance documents, etc. based on Part 503 using the word biosolids.")
- Ohio
- Utah (Mark Schmidt, biosolids coodinator notes: "When we public notice a permit or write a permit we usually start with 'The _____ [utility] will land apply biosolids (sewage sludge)….' then we use 'biosolids' throughout the document.")
- Vermont (The term "biosolids" is used on the VT Dept. of Environmental Conservation website.)

Sources

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New Oxford Dictionary of English, 1998

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U. S. EPA website (http://www.epa.gov/owm/mtb/biosolids/index.htm, July 20, 2005)

U. S. EPA, 1994: *A Plain English Guide to the EPA Part 503 Biosolids Rule*, Sept. 1994

Various state regulations and state environmental agency websites (July 20-21, 2005)

Water Environment Federation, 1995: Terminology guidelines for federation publications.

Note:
1. Documentation of this estimate: the population surveyed in 2002, as reported in Beecher et al., was home owners and house renters, which census data shows totals about 100 million people. Thus, there are definitely about 14 million individuals in that population who are fairly savvy about what 'biosolids' means. Beecher et al. assumed that, in the rest of the population (mostly urban dwellers), there would be fewer people who would know much about gardening and farming (which is why the survey was not targeted at them). It was also assumed that fewer of that population would know about "biosolids" - which may or may not be a valid assumption. If it is valid, then a conservative (low) estimate of the rate of familiarity with the term "biosolids" in that population would be *half* as many as in the surveyed population, which means another 13 million (1/2 of 14% of about 185 million). If the assumption is wrong, and the urban population that was not surveyed has the *same* rate of familiarity with the term as does the surveyed population, then we would get to a total of about 40 million in the entire U. S. population. Thus the estimate above: "30 – 40 million people in the U. S. can fairly accurately define the term."