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## News Releases



### Soil Science Society of America

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#### NEWS RELEASE

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#### Landfill Cover Soil Methane Oxidation Underestimated

*A literature review reveals that landfill cover soils oxidize more methane than guidelines suggest.*

**MADISON, WI, APRIL 27, 2009** – Landfilled waste decomposes in the absence of oxygen and results in the production of methane. Landfills are classified as the second-largest human-made source of CH<sub>4</sub> in the U.S. Additionally, landfill gas contains numerous non-methane hydrocarbons that are either volatilized directly from waste materials or produced through biochemical reactions during waste degradation.

Microbial methane oxidation reduces the emissions of methane and other volatile hydrocarbons from landfills. Determining the importance of this process is one of the major uncertainties in estimating national or global CH<sub>4</sub> emissions from landfills. Landfill gas that is not collected passes through landfill cover soils on the way to being released to the environment. Bacteria in the soil consume methane and other volatile hydrocarbons that are produced by decomposition in the underlying waste by reacting it with oxygen.

A value of 0 to 10% oxidation has been recommended by the Intergovernmental Panel on Climate Change guidelines for national greenhouse gas inventories. Currently, for regulatory purposes the USEPA has recommended a default value for landfill cover CH<sub>4</sub> oxidation of 10% due to the uncertainty involved and the lack of a standard method to determine oxidation rate.

Drs. Jeffrey Chanton, David Powelson, and Roger Green of Florida State University and Waste Management Inc. reviewed and compiled literature results from 42 determinations of the fraction of methane oxidized and 30 determinations of methane oxidation rate in a variety of soil types and landfill covers. The results were published in the March-April issue of the *Journal of Environmental Quality*. The means for the fraction of methane oxidized upon transit across the differing types of soil covers ranged from 22% in clayey soil to 55% in sandy soil. The overall mean fraction oxidized across all studies was 36% with a standard error of 6%. For a subset of fifteen studies conducted over an annual cycle the fraction of methane oxidized ranged from 11 to 89% with a mean value of 35 ± 6%, a value that was nearly identical to the overall mean.

The literature summarized in this paper indicates that the fraction of methane oxidized in landfill cover soils is considerably greater than the default value of 10%. Of the 42 determinations of methane oxidation only four reported values of 10% or less. One reported a value of 10%. This particular study was the first to report a well constrained value for the fraction of methane oxidized in a specific landfill, and because of this, it has received undue weight in the determination of regulations. The default value of 10% should be updated based upon technological advancements in soil engineering and state-of-the-practice applications in cover design as well as recent studies detailed journals such as *Journal of Environmental Quality*.

The full article is available for no charge for 30 days following the date of this summary. View the abstract at <http://jeq.scijournals.org/cgi/content/abstract/38/2/654>.

The *Journal of Environmental Quality*, <http://jeq.scijournals.org> is a peer-reviewed, international journal of environmental quality in natural and agricultural ecosystems published six times a year by the American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and the Soil Science Society of America (SSSA). The *Journal of Environmental Quality* covers various aspects of anthropogenic impacts on the environment, including terrestrial, atmospheric, and aquatic systems.

The *Soil Science Society of America (SSSA)* is a progressive, international scientific society that fosters the transfer of knowledge and practices to sustain global soils. Based in Madison, WI, and founded in 1936, SSSA is the professional home for 6,000+ members dedicated to advancing the field of soil science. It provides information about soils in relation to crop production, environmental quality, ecosystem sustainability, bioremediation, waste management, recycling, and wise land use.

SSSA supports its members by providing quality research-based publications, educational programs, certifications, and science policy initiatives via a Washington, DC, office. For more information, visit [www.soils.org](http://www.soils.org).

SSSA is the founding sponsor of an approximately 5,000-square foot exhibition, *Dig It! The Secrets of Soil*, which opened July 19, 2008 at the Smithsonian's National Museum of Natural History in Washington, DC.