

REPORT ON REVISIONS TO
5TH EDITION AP-42
Section 14.2
Termites

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14.2 Termites - Discussion

AP-42 Section 14.2 addresses emissions of methane (CH₄) from termites. Termites are CH₄ sources due to the presence of protozoa and bacteria in their digestive tracts. Methane emission factors for termites are presented in units of lb CH₄/1000 lb termites/hour, and vary by species, which is accounted for by presenting emission factors for six different ecological regions.^{1,2} The emission factors are based on the results of laboratory tests which quantified emission rates per termite mass per hour.

For example, one study removed nests from tropical forests and placed them in chambers.³ The size and weight of the nests were measured, along with the weight of the termites in each nest and the CH₄ generated in the chamber. In another study termites were placed in glass jars, provided wood fiber, and maintained in ambient conditions within the jars in order to monitor CH₄ concentrations.² Methane concentrations were analyzed using flame ionization detector gas chromatographs. Emissions from a living termite mound which was maintained in a steel tank containing sand and soil, and connected to a feeder box were also studied.²

To aid in using the AP-42 emission factors to estimate CH₄ emissions from termites, guidance is provided on the number of termites per acre for 11 major ecological regions⁴ and the average termite density in lb/termite.⁵ Information on termite densities per ecological region (number of termites per acre) based on an extensive literature review has been summarized.⁴ The average termite density of 4.86×10^{-6} lb/worker termite is developed from information shown in Table 1.⁵

Table 1. Termite Densities of Various North American Species^a

Family	Species	Weight Range (lb/termite)		Average (lb/termite)
Rhinotermitidae	R. hageni	2.20E-06	2.64E-06	2.42E-06
Rhinotermitidae	H. aureus	3.96E-06	4.51E-06	4.24E-06
Rhinotermitidae	H. aureus	3.87E-06	4.31E-06	4.09E-06
Rhinotermitidae	R. arenincola	4.40E-06	5.94E-06	5.17E-06
Rhinotermitidae	R. tibialis	4.73E-06	5.89E-06	5.32E-06
Rhinotermitidae	R. virginicus	5.54E-06	7.26E-06	6.40E-06
Rhinotermitidae	R. flavipes	6.51E-06	7.37E-06	6.95E-06
Rhinotermitidae	R. hesperus	5.06E-06	7.92E-06	6.49E-06
Termitidae	A. minimus	2.09E-06	2.64E-06	2.37E-06
Termitidae	A. wheeleri	3.74E-06	4.40E-06	4.07E-06
Termitidae	G. perplexus	4.84E-06	6.93E-06	5.89E-06
Termitidae	G. perplexus	4.44E-06	5.61E-06	5.04E-06
	Range	2.09E-06	7.92E-06	
	Mean			4.86E-06

^aAs presented in Krishna and Weesner (1969) for workers.

References

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3. G. Martius *et al.*, Methane Emission from Wood-Feeding Termites in Amazonia, Presented at the North Atlantic Treaty Organization Advanced Research Workshop on Methane, Mt. Hood, Oregon, October 6-9, 1991.
4. Zimmerman, *et al.*, "Termites: A Potentially Large Source Of Atmospheric Methane, Carbon Dioxide, And Molecular Hydrogen," *Science*, 218(5):563-565, November 1982.
5. K. Krishna and F. M. Weesner, *Biology Of Termites, Volume I*, Academic Press, New York, 1969.