

**Sediment Bioaccumulation Test with *Lumbriculus variegatus***  
**(EPA Test Method 100.3)**  
**Effects of Feeding and Organism Loading Rate**

**Lawrence P. Burkhard** (burkhard.lawrence@epa.gov) (US-EPA, Duluth, Minnesota, USA)  
Dylan Hubin-Barrows (hubin-barrows@epa.gov) (US-EPA, Duluth, Minnesota, USA)  
Nanditha Billa (nanditha.billa@gmail.com) (Wildlife International, Easton, MD, USA)  
Terry L. Highland (highland.terry@epa.gov) (US-EPA, Duluth, Minnesota, USA)  
J. Russell Hockett (hockett.russ@epa.gov) (US-EPA, Duluth, Minnesota, USA)  
Dale J. Hoff (hoff.dale@epa.gov) (US-EPA, Duluth, Minnesota, USA)  
David R. Mount (mount.dave@epa.gov) (US-EPA, Duluth, Minnesota, USA) and  
Teresa J. Norberg-King (norberg-king.teresa@epa.gov) (US-EPA, Duluth, Minnesota, USA)

**Background/Objectives.** Sediment bioaccumulation test methodology of USEPA and ASTM in 2000 specifies that the *Lumbriculus variegatus* should not be fed during the 28-day exposure and recommends an organism loading rate of total organic carbon in sediment to organism dry weight of no less than 50:1. It is commonly observed with sediments from Superfund sites that the *L. variegatus* weights decrease over the 28-day exposure period; and that many tests are performed with ratios of total organic carbon in sediment to organism dry weight of less than 50:1. The objectives of this effort are to evaluate the effects of feeding and organism loading rates upon the test, and determine if revisions or adjustments to EPA's test method are warranted.

**Approach/Activities.** Sediments contaminated with polychlorinated biphenyls (PCBs) were tested with a series of ratios of total organic carbon in sediment to organism dry weight, and with additions of slurry and flake foods.

**Results/Lessons Learned.** Feeding with both slurry and flakes increased *L. variegatus* weights in comparison to their unfed counterparts for all sediments tested. On average, weights were approximately 30% and 45% greater for the slurry and flake foods, respectively. Greater weight gains with the flake food occur, we believe, because more of the food is retained within the test beakers during the test. PCB residues were only slightly changed by feeding, i.e., less than a factor of 1.5 of the residues measured at the 50:1 ratio.

Organism weight change was highly correlated with TOC/*L.v.* ratio where with lower ratios, less growth is observed. Most sediments had no trend between residue and TOC/*L.v.* ratio, and the exceptions had decreasing residues with increasing TOC/*L.v.* ratio. For all sediments, residues were well within a factor of 2 of the residues measured at the 50:1 TOC/*L.v.* ratio, and in many cases, much less than a factor of 1.5.

The test results suggest that revisions or adjustments to EPA's sediment bioaccumulation test with *L. variegatus* for not feeding and/or minimum 50:1 TOC/*L.v.* ratio are probably not warranted.