



Center for Environmental & Human Toxicology

PO Box 110885
Gainesville, FL 32611-0885
352-392-2243, ext. 5500
352-392-4707 Fax

March 16, 2009

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Irrigation water risk-based criteria for acenaphthene, acenaphthylene, anthracene, and benzene

Dear Ms. Mora-Applegate:

At your request we calculated groundwater cleanup target levels for acenaphthene (CAS# 83-32-9), acenaphthylene (CAS# 208-96-8), anthracene (CAS# 120-12-7), and benzene (CAS# 71-43-2) that are protective of human health under an irrigation scenario (IGCTLs). In the irrigation scenario, receptors are exposed to contaminated groundwater outdoors while irrigating lawns, ornamental beds, and vegetable crops. From this scenario, separate criteria were developed based upon: 1) exposure for residents using contaminated water for lawn and ornamental bed irrigation, including exposure from recreational use of the lawn sprinklers by children; 2) exposure for landscape maintenance workers using contaminated water for the irrigation of lawns and ornamental beds at commercial facilities; and 3) exposure for residents who use contaminated water to grow fruit and vegetables for personal consumption.

IGCTLs for these chemicals are listed in Table 1 and the chemical-specific variables used for their derivation are listed in Table 2. A description of the methodology used for the calculation of these IGCTLs was provided in a letter dated January 14, 2009. For watering of lawns and ornamentals in a residential setting, the IGCTLs are: 11,000 µg/L for acenaphthene, 7,400 µg/L for acenaphthylene, 27,000 µg/L for anthracene, and 490 µg/L for benzene. In an industrial setting, where the exposed individual might be a landscape maintenance worker, the IGCTLs are somewhat higher: 800,000 µg/L for acenaphthylene and 1,300 µg/L for benzene. This scenario is not of concern for acenaphthene and anthracene (the calculated criterion for each of these chemicals exceeds 1,000,000 µg/L). Using the Briggs model, the homegrown produce IGCTLs are: 4,500 µg/L for acenaphthene, 1,700 µg/L for acenaphthylene, 11,000 µg/L for anthracene, and 26 µg/L for benzene.

Please let us know if you have any questions regarding these calculations.

Sincerely,

Stephen M. Roberts, Ph.D.

Leah D. Stuchal, Ph.D.

Table 1 – Irrigation water risk-based criteria for acenaphthene, acenaphthylene, anthracene, and benzene

Chemical	Residential IGCTL (µg/L)	Industrial IGCTL (µg/L)	Produce IGCTL (µg/L)
Acenaphthene	11,000	NC	4,500
Acenaphthylene	7,400	800,000	1,700
Anthracene	27,000	NC	11,000
Benzene	490	1,300	26

NC - not of concern for this scenario

Table 2 – Chemical-specific variables for acenaphthene, acenaphthylene, anthracene, and benzene

Chemical	log Kow	Koc (L/kg)	HLC (atm-m³/mol)	Kp (cm/h)	Kp Source*
Acenaphthene	3.9	2,580	1.55E-04	1.3E-01	DERMWIN
Acenaphthylene	4.1	3,100	1.13E-04	1.8E-01	DERMWIN
Anthracene	4.5	29,500	6.50E-05	2.4E-01	DERMWIN
Benzene	2.1	59	5.55E-03	1.5E-02	RAGS E

* - The preferred source for Kp values is RAGS E. When Kp values are not available from RAGS E, they are estimated using DERMWIN