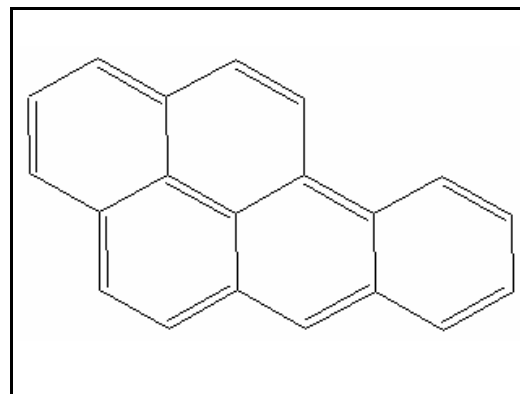




TIER I HUMAN HEALTH CANCER CRITERIA

BENZO(*a*)PYRENE

CAS RN:	50-32-8
Water Solubility:	3.8 µg/L
Log K _{ow} :	5.98
Risk Associated Dose:	1.4 x 10 ⁻⁶ mg/kg/day
Carcinogenicity Weight-of-Evidence Classification:	Class B2; Probable human Carcinogen



Standard

The human health cancer benzo(*a*)pyrene criterion for drinking water sources is 0.032 µg/L. The human health cancer criterion for nondrinking water sources is 0.096 µg/L.

Calculations

Bioaccumulation Factor:

Based on field measured BAF (Great Lakes Environmental Center 2000)

Log K_{ow} = 5.98 (generator-column method), K_{ow} = 954,993

$$f_{fd} = 1/(1+(0.00000024 \text{ kg/L})(K_{ow})) = 0.8135$$

$$\text{Baseline BAF}_{T3} = 2247$$

$$\text{Baseline BAF}_{T4} = 2976$$

$$\text{Human health BAF}_{T3} = [(2247)(0.0182)+1](0.8135) = 34.08$$

$$\text{Human health BAF}_{T4} = [(2976)(0.0310)+1](0.8135) = 75.87$$

Risk Associated Dose:

From the IRIS database:

$$\begin{aligned} \text{RAD} &= 0.00001/\text{q1}^* = 0.00001/7.3 \\ &= 1.4 \times 10^{-6} \end{aligned}$$

Where:

RAD = Risk Associated Dose (mg/kg/day)
 q1^* = Cancer Slope Factor

Calculation of Criteria:

$$\begin{aligned} \text{Non Drinking Water HCC} &= [(1.4 \times 10^{-6})(70)]/0.01 + [(0.0036)(34.08) + (0.0114)(75.87)] \\ &= \mathbf{0.032 \mu\text{g/L}} \end{aligned}$$

$$\begin{aligned} \text{Drinking Water HCC} &= [(1.4 \times 10^{-6})(70)]/2 + [(0.0036)(34.08) + (0.0114)(75.87)] \\ &= \mathbf{0.096 \mu\text{g/L}} \end{aligned}$$

References

1. Great Lakes Environmental Center. 2000. Derivation of Baseline Bioaccumulation Factors (BAFs) from Grand Calumet River Field Measured BAFs for Benzo[a]pyrene. Report prepared for U.S. Steel – Gary Works, Gary, IN.
2. USEPA 1994. Integrated Risk Information System (IRIS database) chemical file for benzo(a)pyrene (50-32-8).
3. Miller, M.M., S.P. Wasik, G.-L. Huang, W.-Y. Shiu, and D. Mackay 1985. Relationships between octanol-water coefficient and aqueous solubility. Environ. Sci. Technol. 19: 522-529. (Reference for the Log K_{ow})

Acronyms

ADE	Acceptable Daily Exposure
BAF	Bioaccumulation Factor
CAS RN	Chemical Abstract Service Registry Number
FCM	Food Chain Multiplier
IRIS	Integrated Risk Information System
K _{ow}	Octanol-Water Partition Coefficient
LOAEL	Lowest observed adverse effect level
NOAEL	No observed adverse effect level
P (superscript)	Predicted value
UF	Uncertainty factor

Revision History

August 19, 1997 - Values first developed

March 28, 2000 – Values rechecked (no modifications). Fact sheet updated.

December 9, 2002 – Field measured BAF incorporated. New Tier I criteria calculated.

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