

## **APPENDIX A – TABLES**

**Table 2-1 Flame Retardant Classifications and Production Volumes**

| Classification   | Key Compounds or Elements  | Major Applications  | Global Flame Retardant Production % by Volume |
|------------------|--|---|---|
| Inorganics       | <ul style="list-style-type: none"> <li>• Metal Hydroxides (Aluminum hydroxide &amp; Magnesium hydroxide)</li> <li>• Ammonium phosphates</li> <li>• Boron Salts</li> <li>• Tin</li> <li>• Elemental red phosphorus</li> </ul> | <p>Plastic cable jackets, counter tops, conveyor belts, carpet backing (aluminum hydroxide).</p> <p>Paper, textiles and wood products (ammonium phosphates).</p> <p>Cotton batting; mattresses, furniture (boric acid)</p> <p>Cotton rope, canvas and paper (sodium borates).</p> | 50%   |
| Halogenated      | Chlorine or Bromine  | Synthetic polymers in electronics. Plastic wire and cable jackets. Flexible polyurethane foam (furniture ).   | 25%-30%                                       |
| Organophosphorus | Phosphate esters   | <p>Polyurethane foams (rigid foam insulation for transportation and construction uses).</p> <p>Polyester fabric, rayon fabric, cotton fabric (clothing).</p>  | 20%   |
| Nitrogen-based   | Nitrogen   | Melamine fibers; Unfilled polyamide 6 (melamine cyanurate)  | <5%   |

Sources: IPCS, 1997; SFT, 2009; Weil, 2005.

**Table 2-2 - Global Market Demand for Leading Brominated Flame Retardants, year 1999.**

|          | North and South America |         | Europe      |         | Asia        |         | Total          |         |
|----------|-------------------------|---------|-------------|---------|-------------|---------|----------------|---------|
|          | metric tons             | % total | metric tons | % total | metric tons | % total | metric tons    | % total |
| TBBPA    | 21,600                  | 36.82%  | 13,800      | 44.72%  | 85,900      | 74.83%  | 121,301        | 59.37%  |
| DecaBDE  | 24,300                  | 41.42%  | 7,500       | 24.30%  | 23,000      | 20.03%  | 54,801         | 26.82%  |
| OctaBDE  | 1,375                   | 2.34%   | 450         | 1.46%   | 2,000       | 1.74%   | 3,825          | 1.87%   |
| PentaBDE | 8,290                   | 14.13%  | 210         | 0.68%   | na*         |         | 8,500          | 4.16%   |
| HBBD     | 3,100                   | 5.28%   | 8,900       | 28.84%  | 3,900       | 3.40%   | 15,900         | 7.78%   |
|          | 58,665                  | 100.0%  | 30,860      | 100.00% | 114,800     | 100%    | <b>204,327</b> | 100.00% |
|          |                         |         |             |         |             |         |                | 32.85%  |

Notes: TBBPA, tetrabromobisphenol A. HBBD, hexabromocyclododecane. Na\*, not available.

Source: Watanabe et al., 2003 Table 2 (review of data from Bromine Science and Environmental Forum, BSEF, market report, 2001).

**Table 2-3 Global Annual Production of Major Polymers in 2000 and their Brominated Flame Retardant (BFR) Content**

| Polymer                        | BRF Content (%) | Type of BFR          | Annual Production (1,000 metric tons/yr) |
|--------------------------------|-----------------|----------------------|--|
| Polystyrene foam               | 0.8-4           | HBCDD                | 600                                      |
| High-impact polystyrene (HIPS) | 11-15           | DecaPBDE, Br PS      | 350                                      |
| Epoxy Resin                    | 19-33           | TBBPA                | 300                                      |
| Polyamides                     | 13-16           | DecaPBDE, Br PS      | 200                                      |
| Polyolefins                    | 5-8             | DecaPBDE, DBS        | 200                                      |
| Polyurethanes                  | 10-18           | PentaBDE, Br Polyols | 150                                      |
| Polyterephthalate              | 8-11            | Br PS, der-TBBPA     | 150                                      |
| Unsaturated polyesters         | 13-28           | TBBPA                | 150                                      |
| Polycarbonate                  | 4-6             | Br PS, der-TBBPA     | 100                                      |
| Styrene copolymers             | 12-15           | OctaBDE, Br PS       | 50                                       |

Source: Alaei et al., 2003 (review of Arias, 2001). Notes: HCBDD= hexabromocyclododecane. PBDE= polybrominated diphenylether. TBBPA = tetrabromobisphenol A (der, derivative). Br PS= brominated polystyrene. DBS= propylene dibromo styrene. Br Polyols = esters of TBBPA.

**Table 2-4 PBDE Numbering System: Homologues and Their Congeners**

| <b>Homologue</b> | <b>Number of Bromine Atoms per Molecule</b> | <b>Total # Possible Congeners</b> | <b>Sequential Numbering of Congeners</b> |
|------------------|---|-----------------------------------|--|
| (1) Mono BDE     | 1   | 3                                 | BDE 1 through BDE 3                      |
| (2) Di BDE       | 2   | 12                                | BDE 4 through BDE 15                     |
| (3) Tri BDE      | 3   | 24                                | BDE 16 through BDE 39                    |
| (4) Tetra BDE    | 4   | 42                                | BDE 40 through BDE 81                    |
| (5) Penta BDE    | 5   | 46                                | BDE 82 through BDE 127                   |
| (6) Hexa BDE     | 6   | 42                                | BDE 128 through BDE 169                  |
| (7) Hepta BDE    | 7   | 24                                | BDE 170 through BDE 193                  |
| (8) Octa BDE     | 8   | 12                                | BDE 194 through BDE 205                  |
| (9) Nona BDE     | 9   | 3                                 | BDE 206 through BDE 208                  |
| (10) Deca BDE    | 10  | 1                                 | BDE 209                                  |

Source: IPCS, 1994

**Table 2 - 5 Commercial PBDE Mixtures: Composition by Congeners**

| Commercial Mixture | Homologue   | Congener        | % by Weight |
|--------------------|-------------|-----------------|-------------|
| Penta BDE          | Penta       | BDE- 99         | 35-50       |
|                    | Tetra       | BDE- 47         | 25-37       |
|                    | Penta       | BDE- 100        | 6-10        |
|                    | Hexa        | BDE- 153        | 3-5         |
|                    | Hexa        | BDE- 154        | 2-4         |
|                    | Hepta       | BDE- 183        | 40          |
| Octa BDE           | Octa        | BDE- 197        | 21          |
|                    | Octa        | BDE- 203        | 5-35        |
|                    | Octa        | BDE- 196        | 8           |
|                    | Nona        | BDE- 208        | 10          |
|                    | Nona        | BDE- 207        | 7           |
| Deca BDE           | Hexa        | BDE- 153        | 5-10        |
|                    | Hexa        | BDE- 154        | 1-5         |
|                    | Deca        | BDE- 209        | 0-3         |
|                    | Hepta       | BDE- 190        | 1-3         |
|                    | Nona        | BDE-206         | 2.2         |
|                    | Nona        | BDE-207         | 0.24        |
|                    | Nona        | Bde-208         | 0.06        |
|                    | <b>Deca</b> | <b>BDE- 209</b> | <b>97.5</b> |

Source: US EPA, 2010 Table 2-1. (Review of EU 2001, 2002, 2003; Kemmlein et al., 2005; Peele, 2004; Palm et al., 2004; IPCS, 1994; La Guardia et al., 2006.)

**Table 2 - 6 Physical & Chemical Properties of Commercial PBDE Mixtures**

| Property  | DecaBDE   | OctaBDE  | PentaBDE   |
|---|---|--|--|
| CAS registry  | 1163-19-5   | 32536-52-0   | 32534-81-9   |
| Chemical Formula                                    | C <sub>12</sub> Br <sub>10</sub> O                              | C <sub>12</sub> H <sub>10-y</sub> Br <sub>y</sub> O<br>Where y = 6-9 | C <sub>12</sub> H <sub>10-y</sub> Br <sub>y</sub> O<br>Where y = 4-6 |
| Molecular Weight (g/mol)                            | 959.17  | 801  | 546  |
| Description of substance:<br>Color & Physical State | White powder;<br>83% bromine by weight<br>(Alaee, et al., 2003) | White powder;<br>79% bromine by weight<br>(Alaee, et al., 2003)      | Viscous Liquid;<br>70% bromine by weight<br>(Alaee, et al., 2003)    |
| Melting Point                                       | -7 to -3 °C<br>(ATSDR, 2004)                                    | 85 to 89 °C<br>(ATSDR, 2004)   | 290 to 306 °C<br>(ATSDR, 2004)                                       |
| Boiling Point                                       | 300 °C (decomposition starts at above 200 °C)<br>(ATSDR, 2004)  | Decomposes at > 330 °C<br>(ATSDR, 2004)                              | Decomposes at > 320, > 400 and 425 °C<br>(ATSDR, 2004)               |
| Density (g/ml)                                      | 2.28 at 25 °C<br>(ATSDR, 2004)                                  | 2.8 at 25 °C<br>(ATSDR, 2004)  | 3.0 at 25 °C<br>(ATSDR, 2004)  |
| Solubility in water (µg/L)                          | <0.1<br>(Stenzel and Markley, 1997a)                            | 1.0<br>(Stenzel and Markley, 1997b)                                  | 13.3<br>(Stenzel and Markley, 1997c)                                 |
| Vapor Pressure mm Hg @ 25 °C                        | 3.5 X 10 <sup>-7</sup><br>(ATSDR, 2004)                         | 9.0 X 10 <sup>-10</sup> to 1.7 X 10 <sup>-9</sup><br>(ATSDR, 2004)   | 3.47 X 10 <sup>-8</sup> ; 3.2 X 10 <sup>-8</sup><br>(ATSDR, 2004)    |

|  |  |  |   |
|--|--|--|---|
| <b>Measured Octanol/Water Partition Coefficient (Log K<sub>ow</sub>)</b> | 6.265<br>(MacGregor & Nixon, 1997)   | 6.29<br>(MacGregor & Nixon, 1997b)                               | 6.58<br>(MacGregor & Nixon, 1997)   |
| <b>Estimated Soil Sorption Coefficient (Log K<sub>oc</sub>)</b>          | 6.80<br>(ATSDR, 2004)  | 5.92-6.22<br>(ATSDR, 2004)                                       | 4.89-5.10<br>(ATSDR, 2004)  |
| <b>Henry's Law Constant (atm-m<sup>3</sup>/mole)</b>                     | 1.2 x 10 <sup>-5</sup> ; 1.2 x 10 <sup>-6</sup> ;<br>3.5 x 10 <sup>-6</sup><br>(ATSDR, 2004) | 2.6 x 10 <sup>-7</sup> ; 7.5 x 10 <sup>-8</sup><br>(ATSDR, 2004) | 1.62 x 10 <sup>-6</sup> ; 1.2 x 10 <sup>-8</sup> ;<br>1.93 x 10 <sup>-8</sup> ; 4.4 x 10 <sup>-8</sup><br>(ATSDR, 2004) |
| <b>Autoignition Temperature</b>  | Decomposes above 200 °C<br>(ATSDR, 2004)   | Decomposes above 300 °C<br>(ATSDR, 2004)                         | Not applicable<br>(ATSDR, 2004)   |
| <b>Flash Point</b>   | No Data<br>(ATSDR, 2004)   | No Data<br>(ATSDR, 2004)   | No Data<br>(ATSDR, 2004)  |

Sources: Hardy, 2002; Alaei, et al., 2003; and ATSDR, 2004. Notes: All references with the exception of Alaei, et al. (2003) and ATSDR (2004) are as cited originally by Hardy, 2002.

**Table 2 – 7 Estimated Annual Bromine Refinery Production, By Country**

|                      | <b>2004 yr</b><br>(metric tons) | <b>2006 yr</b><br>(metric tons) | <b>2008 yr</b><br>(metric tons) |
|----------------------|---------------------------------|---------------------------------|---------------------------------|
| <b>United States</b> | 222,000                         | 243,000 <sup>a</sup>            | W                               |
| <b>Israel</b>        | 202,000                         | 179,000                         | 164,000                         |
| <b>China</b>         | 80,000                          | 124,000                         | 135,000                         |
| <b>Jordan</b>        | 46,339                          | 94,500                          | 85,000                          |
| <b>Japan</b>         | 20,000                          | 20,000                          | 20,000                          |

Source: USGS, 2009, Table 5.

Notes: W= Withheld to avoid disclosing company proprietary data. <sup>a</sup> Sold or used by producers.

**Table 2 - 8 Global PBDE Market Demand by Regions of the World, 2001**

|          | North and South America | Europe      | Asia        | Rest of World | Total       |         |
|----------|-------------------------|-------------|-------------|---------------|-------------|---------|
|          | metric tons             | metric tons | metric tons | metric tons   | metric tons | % total |
| PentaBDE | 7,100.00                | 150.00      | 150.00      | 100.00        | 7,500.00    | 11.12%  |
| OctaBDE  | 1,500.00                | 610.00      | 1,500.00    | 180.00        | 3,790.00    | 5.62%   |
| DecaBDE  | 24,500.00               | 7,600.00    | 23,000.00   | 1,050.00      | 56,150.00   | 83.26%  |
|          | 33,100                  | 8,360       | 24,650      | 1,330         | 67,440      | 100.00% |

Sources: ATSDR, 2004; Hites, 2004. Both sources reviewed data from Bromine Science and Environmental Forum (bsef.com) market report for year 2001.

**Table 2-9 Major Uses and Loading Rates of PBDEs**

| Technical Mixture | Loading Rate     | Type of Plastic                       | Major Application/Products   |
|-------------------|------------------|---------------------------------------|--|
| PentaBDE          | 2-3% by weight   | Flexible polyurethane foam (FUF)      | <ul style="list-style-type: none"> <li>• Mattresses</li> <li>• Upholstered Furniture</li> </ul>                  |
| Octa              | 12-18% by weight | Acrylonitrile-butadiene-styrene (ABS) | <ul style="list-style-type: none"> <li>• Personal Computers</li> <li>• Monitors and Hard Drives</li> </ul>       |
| Deca              | 10-15% by weight | High impact polystyrene (HIPS)        | <ul style="list-style-type: none"> <li>• Television cabinets/backings (80%)</li> <li>• Textiles (20%)</li> </ul> |

Source: ATSDR, 2004.

**Table 2 - 10 Historical Applications of PBDEs in Various Resins, by Use**

| <b>Polymer</b>                           | <b>Principal Applications</b>                                | <b>Examples of Final Products</b>  | <b>PBDE</b>    |
|--|--|--|----------------|
| ABS<br>(acrylonitrile butadiene styrene) | Moulded parts  | TV sets/ business machines, computer housings, household appliances (hairdryers, curlers), automotive parts, electronics, telecommunications   | Octa           |
| Epoxy                                    | Circuit boards, protective coatings                          | Computers, ship interiors, electronic parts  | Deca           |
| Paints/Lacquers                          | Coatings   | Marine and industry lacquers for protection of containers  | Deca and Penta |
| Phenolics                                | Printed circuit boards                                       | Paper laminates/glass prepregs for printed circuit boards  | Deca and Penta |
| PAN<br>(polyacrylonitrile)               | Panels, electrical components                                | Lighting panels for elevators and rooms, housing of electrical appliances  | Deca           |
| PA<br>(polyamide)                        | Electrical connectors, automotive interior parts             | Computers, connectors, housing in electrical industry, automotive & transportation industry  | Deca and Octa  |
| PBT<br>(polybutylene terephthalate)      | Electrical connectors and components                         | Switches, fuse, switch box, computer housings, switchboard electrical connectors, stereos, business machines, military electronics   | Deca and Octa  |
| PE/XPE<br>(cross-linked polyethylene)    | Cross-linked wire and cable, foam tubing, weather protection | Major application: power cable with cross-linked low density PE; also used for conduit for buildings with high density PE. Final uses: portable apparatus building control, shipboard, automotive, marine appliances, insulation of heating tubes. | Deca           |
| PET<br>(polyethylene terephthalate)      | Electrical Components  | Boxes, relays, coils, bobbins  | Deca           |
| PP<br>(polypropylene)                    | Conduits, electronic devices                                 | TV & electronic devices, such as yoke, housings, circuit board hangers, conduits. Final uses: electro-mechanical parts TV, hot waste water pipes,  |                |

|  |  |  |              |
|--|--|--|--------------|
|  |  | underground junction boxes   |              |
| PS, HIPS<br>(polystyrene, high impact polystyrene) | TV cabinets and back covers, electrical appliance housings | TV back panels, computer covers and housing of electrical appliances, office machines, smoke detectors   | Deca & Octa  |
| PVC<br>(polyvinylchloride)                         | Cable Sheets   | Wire end cables, floor mats, industrial sheets   | Deca & Penta |
| PUR<br>(polyurethane)                              | Cushioning Materials, packaging, padding                   | Furniture, sound insulation panels, wood imitations, transportation  | Penta        |
| Rubber   | Transportation   | Conveyor belts, foamed pipes for insulation  | Deca & Penta |
| Textiles   | Coatings   | Back coatings, impregnation: carpets, automotive seating, furniture in homes and official buildings, aircraft, undergrounds, tents, trains, and military safety clothing | Deca & Penta |
| UPE<br>(unsaturated polyesters)                    | Circuit boards, coatings                                   | Electrical equipment, coatings for chemical processing plant mouldings, military and marine applications: construction panels  | Deca & Penta |

Source: Table 5, IPCS 1994.

**Table 2 – 11 Estimated PBDE Annual Releases and Reservoirs in the U.S.: A life-cycle perspective**

| RELEASES             | Media   | Source  | Release      |                | % Total |
|----------------------|---|---|--------------|----------------|---------|
|                      |   |   | (kg)         | (metric tons)  |         |
| <b>Air</b>           |   | <b>Deca Production &amp; Manufacturing</b><br>(stack and fugitive emissions)                | 19,820       | 19.82          |         |
|                      |   | <b>Plastic Products</b><br>(volatilization)   | 191.9        | 0.19           |         |
|                      |   | <b>EEE Waste</b><br>(incineration)  | 0.094 MT     | 0.09           | 54.05%  |
| <b>Land</b>          |   | <b>Deca Production &amp; Manufacturing</b><br>(land applied waste- treatment, not landfill) | 1,173.40     | 1.17           |         |
|                      |   | <b>Sewage Treatment</b><br>(land applied sludge and fertilizer product)                     | 13,960       | 13.96          | 40.68%  |
| <b>Surface Water</b> |   | <b>Deca Production &amp; Manufacturing</b>  | 766.8        | 0.77           |         |
|                      |   | <b>Sewage Treatment</b><br>(treated effluent discharged to surface water)                   | 1,194.60     | 1.19           | 5.27%   |
| <b>TOTAL</b>         |   |   | <b>37.20</b> | <b>100.00%</b> |         |
| <b>RESERVOIR</b>     | <b>Recycled</b><br>(Octa and Deca, yr 2005)   | EEE Waste<br>(returned to market)   | 211 MT       | 211            |         |
|                      | <b>Landfilled</b><br>(Octa and Deca, yr 2005) | EEE Waste   | 1,747 MT     | 1747           |         |

Source: USEPA, 2010

**Table 2 - 12 TRI Data: Deca Waste Generated by U.S. Industries, 2008**

| Row #        | Industry                             | Recycled On-site | Recycled Off-site | Energy Recovery On-site | Energy Recovery Off-site | Treated On-site | Treated Off-site | Total Quantity Disposed or Otherwise Released On- and Off-site | Total Production-related Waste Managed | % Total     | Non-production-related Waste Managed |
|--------------|--------------------------------------|------------------|-------------------|-------------------------|--------------------------|-----------------|------------------|--|--|-------------|--------------------------------------|
| 1            | 313/314 Textiles                     | 31,536           | 15,573            | 0                       | 12,421                   | 4,500           | 71,532           | 64,733   | 200,295                                | 18.6%       | 4,009                                |
| 2            | 322 Paper                            | 9,870            | 0                 | 0                       | 0                        | 0               | 2,702            | 112,475  | 125,047                                | 11.6%       | 0                                    |
| 3            | 325 Chemicals                        | 9,432            | 2,233             | 0                       | 2,973                    | 10              | 2,523            | 341,607  | 358,778                                | 33.3%       | 0                                    |
| 4            | 326 Plastics and Rubber              | 0                | 2,946             | 0                       | 1,482                    | 0               | 5,589            | 67,379   | 77,396                                 | 7.2%        | 0                                    |
| 5            | 327 Stone/Clay/Glass                 | 0                | 0                 | 0                       | 0                        | 0               | 0                | 5,567  | 5,567                                  | 0.5%        | 0                                    |
| 6            | 331 Primary Metals                   | 0                | 12,980            | 0                       | 0                        | 0               | 0                | 15,635   | 28,615                                 | 2.7%        | 0                                    |
| 7            | 333 Machinery                        | 0                | 0                 | 0                       | 0                        | 0               | 0                | 0  | 0                                      | 0.0%        | 0                                    |
| 8            | 334 Computers/Electronic Products    | 0                | 0                 | 0                       | 0                        | 0               | 269              | 2,354  | 2,623                                  | 0.2%        | 0                                    |
| 9            | 335 Electrical Equipment             | 0                | 129,417           | 0                       | 980                      | 0               | 205              | 48,050   | 178,652                                | 16.6%       | 0                                    |
| 10           | 337 Furniture                        | 0                | 0                 | 0                       | 0                        | 0               | 0                | 5,475  | 5,475                                  | 0.5%        | 0                                    |
| 11           | 339 Miscellaneous Manufacturing      | 0                | 0                 | 0                       | 0                        | 0               | 0                | 3,484  | 3,484                                  | 0.3%        | 0                                    |
| 12           | 562 Hazardous Waste/Solvent Recovery | 0                | 0                 | 0                       | 0                        | 0               | 0                | 91,291   | 91,291                                 | 8.5%        | 0                                    |
| <b>Total</b> |                                      | 50,838           | 163,149           | 0                       | 17,856                   | 4,510           | 82,820           | 758,050  | <b>1,077,223</b>                       | <b>100%</b> | <b>4,009</b>                         |
| % of Total   |                                      | 4.72%            | 15.15%            | 0.00%                   | 1.66%                    | 0.42%           | 7.69%            | 70.37%   | 100.00%                                |             |                                      |

Source: Toxics Release Inventory, US EPA (TRI, 2008) Note: All data reported in pounds.

**Table 2 - 13 TRI Reported Releases of DecaBDE from Massachusetts Facilities**

|                                     |               |        | lbs |     |  | lbs |        |        | lbs    |        |        | lbs    |           |        | lbs    |           |  |
|-------------------------------------|---------------|--------|-----|-----|--|-----|--------|--------|--------|--------|--------|--------|-----------|--------|--------|-----------|--|
|                                     |               |        | lbs | lbs |  | lbs | lbs    |        | lbs    | lbs    |        | lbs    | lbs       |        |        |           |  |
| Alpha Wire Co                       | Leominster    | 335929 |     |     | Communications & Energy Wire Manufacturing | 0   | 25     | 25     | 25     | 25     | 25     | 3,889  | 3,914     | 25     | 3,889  | 3,914     |  |
| Alphagary Corp                      | Leominster    | 325991 | 7   | 22  | Custom Compounding of Purchased Resins     | 29  | 179    | 179    | 179    | 179    | 208    | 851.7  | 1,059.7   | 208    | 851.7  | 1,059.7   |  |
| Draka Cableteq US INC               | North Dighton | 335929 |     |     | Communications & Energy Wire Manufacturing | 0   | 3,255  | 3,255  | 194    | 194    | 3,449  | 3,449  | 3,449     | 3,449  | 3,449  | 3,449     |  |
| Heveatex Corp                       | Fall River    | 325520 |     |     | Adhesive Manufacturing                     | 0   |        |        |        |        | 0      | 0      | 0         | 0      | 0      | 0         |  |
| Key Polymer                         | Lawrence      | 325520 | 4   |     | Adhesive Manufacturing                     | 4   |        |        |        |        | 9      | 13     | 13        | 13     | 13     | 13        |  |
| Lubrizol Advanced Materials         | Lawrence      | 325520 |     |     | Adhesive Manufacturing                     | 0   | 8      | 8      | 8      | 8      | 8      | 8      | 8         | 8      | 8      | 8         |  |
| S & E Speciality Polymers           | Lunenburg     | 325991 | 11  | 5   | Custom Compounding of Purchased Resins     | 16  |        |        |        |        | 1      | 17     | 17        | 17     | 17     | 17        |  |
| Tyco Electronics Corp/Madison Cable | Worcester     | 335929 |     |     | Communications & Energy Wire Manufacturing | 0   | 10,254 | 10,254 | 10,254 | 10,254 | 10,254 | 13,070 | 23,324    | 10,254 | 13,070 | 23,324    |  |
| <b>Total</b>                        |               |        | 22  | 22  | 5  | 49  | 3,255  | 25     | 10,635 | 13,925 | 13,974 | 17,811 | 31,784.70 | 13,974 | 17,811 | 31,784.70 |  |

Source: TRI, 2008 (Toxics Release Inventory, US EPA)

Note: NAICS=North American Industry Classifications System. Other Landfills = Non RCRA Subtitle C

(tons)

6.99

15.89

(metric tons)

6.34

14.42

**Table 2 - 14 PBDES Measured in Sewage Sludge**

| Location    | Description                                   | Congeners                                 | Reported Value        | Units             | Equivalents | Reference             |
|-------------|---|---|-----------------------|-------------------|-------------|-----------------------|
| U.S.        | U.S. biosolids; 11 samples; 4 Regions of U.S. | Sum of BDE-47, -49, -99, -100, -153, -154 | 1,100 - 2,290 (range) | ng/g dry weight * | ppb         | Hale et al., 2001     |
|             |   | BDE - 209                                 | 84.8 - 4,890 (range)  | ng/g dwt *        | ppb         |                       |
| Maine       | Sludge from WWTP in Orono                     | Sum of 8: tetra to hexa                   | 2,320 - 3,530 (range) | ug/kg dwt         | ppb         | Anderson et al., 2004 |
| California  | Sludge from WWTP in Palo Alto                 | Sum of BDE-47, -99, -100, -153, -154      | 1,918 - 2,086 (range) | ug/kg dwt         | ppb         | North, 2005           |
|             |   | BDE- 209                                  | 1,010 - 1,440 (range) | ug/kg dwt         | ppb         |                       |
| Germany     | Sludge from 11 WWTPs                          | Sum of tri through hepta                  | 13 - 288 (range)      | ug/kg dwt         | ppb         | Knoth et al., 2007    |
|             |   | BDE- 209                                  | 97 - 2,220 (range)    | ug/kg dwt         | ppb         |                       |
| Sweden      | Sludge from 50 WWTPS                          | BDE-209                                   | 120 (highest mean)    | ug/kg dwt         | ppb         | deWit et al., 2007    |
| Switzerland | Sludge from 16 WWTPs                          | Deca                                      | 310 (mean)            | ug/kg dwt         | ppb         | Kupper et al., 2008   |
|             |   | Penta                                     | 95 (mean)             | ug/kg dwt         | ppb         |                       |
|             |   | Octa                                      | 17 (mean)             | ug/kg dwt         | ppb         |                       |
|             |   | Sum of 14: tri to octa                    | 109.7 - 558.9 (range) | ug/kg dwt         | ppb         |                       |
|             |   | BDE-209                                   | 138 - 617 (range)     | ug/kg dwt         | ppb         |                       |

Notes: \* Hale reports units of ng/g. WWTP = wastewater treatment plant; dwt = dry weight; ppb = parts per billion. Hale et al., 2001 summarized by Hale et al., 2003; Knoth et al., 2007 and de Wit et al., summarized by Law et al., 2008.

**Table 2 - 15 PBDE Levels in U.S. Abiotic Media**

| Sample Type         | Location                        | Survey Years | Reported Values (Sum of PBDEs)           | Units             | Reference               |
|---------------------|---------------------------------|--------------|--|-------------------|-------------------------|
| <b>Air</b>          | Great Lakes                     | 1997-1999    | range: 5 (rural, remote) to 52 (Chicago) | pg/m <sup>3</sup> | Strandberg et al., 2001 |
|                     | <i>Eastern Central U.S. *</i>   | 2002-2003    |  |                   |                         |
|                     | urban (Chicago)                 |              | range: 15 to 980                         | pg/m <sup>3</sup> | Hoh and Hites, 2005     |
|                     | remote( Michigan)               |              | <2.0 to 60                               | pg/m <sup>3</sup> |                         |
|                     | remote( Louisiana)              |              | 5.0 to 40                                | pg/m <sup>3</sup> |                         |
| <b>Water</b>        | agricultural (Arkansas)         |              | 3.0 to 200                               | pg/m <sup>3</sup> |                         |
|                     | college town (Indiana)          |              | 7.0 to 40                                | pg/m <sup>3</sup> |                         |
|                     |                                 |              | study mean: 100                          | pg/m <sup>3</sup> |                         |
| <b>Water</b>        | San Francisco Estuary           | 2002         | range: 3 to 513                          | pg/L              | Oros et al., 2005       |
|                     | Lake Michigan                   | 2004         | mean 146                                 | pg/L              |                         |
|                     | Washington State Rivers & Lakes | 2005-2006    | range: 0.2 to 10                         | pg/L              | Streets et al., 2006    |
|                     |                                 |              | range: 1 to 926                          | pg/L              | Arnold et al., 2006     |
| <b>Sediment</b>     | San Francisco Bay               | 2002         | average: 91                              | pg/L              |                         |
|                     |                                 |              | average: 9.63                            | dwt               | Oros et al., 2005       |
| <b>Surface soil</b> | U.S.                            | NA           | range: 0.09 to 1,2000                    | ng/g dwt          | EPA, 2010               |
|                     |                                 |              | average: 103                             | ng/g dwt          |                         |
|                     |                                 |              | geometric mean: 5.3                      | ng/g dwt          |                         |
|                     |                                 |              |  |                   |                         |

Notes: \* With the exception of the study mean, reported values for Hoh and Hites (2005) are approximate. NA – not available; date of publication 2006. EPA 2010: review of Offenberg, 2006.

Table 2 – 16 PBDE Levels in U.S. Biotic Media

| Sample Type                               | Location                      | Survey Years | Tissue  | Sum of PBDEs  | Units    | Reference              |
|---|-------------------------------|--------------|---------|---|----------|------------------------|
| <b>Invertebrates</b>                      |                               |              |         |   |          |                        |
| Bivalves (mussels, blue mussels, oysters) | Coastal US and Great Lakes    | 2004-2007    |         | 1 - 270 (range for 80% of samples)  | ppb lwt  | NOAA, 2009             |
|   |                               |              |         | 389 - 8,202 (range for 12% of samples)<br>1 - 8, 202 (national distribution)    | ppb lwt  |                        |
| <b>Fresh Water Fish</b>                   |                               |              |         |   |          |                        |
| Lake Trout                                | U.S. Great Lakes              | 2000-2005    |         | < 15 in 1980  | ng/g lwt | Zhu and Hites, 2004    |
|   |                               |              |         | 58 - 180 (in yr 1990)<br>400 - 1,400 (in yr 2000)                               |          |                        |
| <b>Marine Mammals</b>                     |                               |              |         |   |          |                        |
| California Sea Lion                       | California Coast              | 1993-2003    | Blubber | 570 - 24,240 (range)<br>5,036 (average)   | ng/g lwt | Stapleton et al., 2006 |
| Harbor Seal                               | San Francisco Bay, California | 1989-1998    | Blubber | 88 - 8,325 (range)<br>2,585 (average adult male)<br>449 (average, adult female) | ng/g lwt | She et al., 2002       |
| Killer Whale                              | Puget Sound, Washington State | 2004-2006    | Blubber | 5,275 (average, male)   | ng/g lwt | Krahn et al., 2007a    |

### Fish-Eating Birds

|        |                               |           |      |                       |          |                      |
|--------|-------------------------------|-----------|------|-----------------------|----------|----------------------|
| Osprey | Chesapeake Bay Area           | NA        | Eggs | 9,530 (sum of total)  | ng/g lwt | D. Chen et al., 2009 |
| Terns  | San Francisco Bay, California | 2000-2002 | Eggs | 4,570 – 7,590 (range) | ng/g lwt | She et al., 2003     |

### Birds of Terrestrial Prey

|                   |             |           |      |                               |          |                      |
|-------------------|-------------|-----------|------|-------------------------------|----------|----------------------|
| Peregrine Falcons | New England | 1996-2006 | Eggs | Range: 74.5 - 6,610 (range) * | ng/g ww  | D. Chen et al., 2008 |
| Peregrine Falcons | California  | 1986-2007 | Eggs | 400 (median)                  | ng/g ww  |                      |
| Peregrine Falcons | California  | 1986-2007 | Eggs | 0.08 -53.1 (range)            | ng/g lwt | D. Chen et al., 2008 |

Notes: Source for data for marine mammals from Table 1, Yogui and Sericano (2009).

Values for Killer Whale are one order of magnitude higher than study done in same community, 10 years earlier by Rayne et al., 2004.

PPB = parts per billion. LWT = lipid weight. WWT = wet weight. NA= not available. \* Max value in sample in this study is 94.4 ug/g (PPM) lwt ; authors report this is the "highest PBDE ever reported for wildlife" measured in a peregrine falcon chick.

**Table 2 - 17 PBDEs Measured in Wildlife and Humans: Average Concentrations and Doubling Times**

| <b>Matrix</b>                              | <b>Average Concentration<br/>(approximate)</b> | <b>Doubling Time</b> | <b>Comments</b>                        | <b>Reference</b> |
|--|--|----------------------|--|------------------|
| European Human Population                  | 2 ng/g lipid weight                            | 5 years              | Increased by factor of 100 in 30 years | Hites, 2004      |
| U.S. Human Population                      | 35 ng/g lwt                                    | 5 years              | Increased by factor of 100 in 30 years | Hites, 2004      |
| Marine Mammals, Canadian Arctic            | 5 ng/g lwt                                     | 7 years              |  | Hites, 2004      |
| Marine Mammals (excluding Canadian Arctic) | 1,000 ng/g lwt                                 | 5 years              |  | Hites, 2004      |
| Birds' eggs, Sweden                        | 2,000 ng/g lwt                                 | 6 years              |  | Hites, 2004      |
| Herring Gull eggs, U.S. Great Lakes        | 7,000 ng/g lwt                                 | 3 years              |  | Hites, 2004      |
| Fish Levels                                | 10 times lower in Europe than U.S.             |                      |  | Hites, 2004      |

Source: Hites, 2004. "Polybrominated Diphenyl Ethers in the Environment and in People: A Meta-Analysis of Concentrations." Notes: Author (Hites) describes the average concentrations as approximations, using the term "about".

**Table 2 - 18 PBDE Levels in Breast Milk: US Population**

| Sampling Location | # Participants | Sampling Dates | Congeners Measured            | Reported Values  |                            |                   | Reference                     |
|-------------------|----------------|----------------|-------------------------------|------------------|----------------------------|-------------------|-------------------------------|
|                   |                |                |                               | Range (ng/g lwt) | Arithmetic Mean (ng/g lwt) | Median (ng/g lwt) |                               |
| Texas             | 47             | 2002           | Sum of 13 (including BDE 209) | 6.2 - 419        | 74                         | 34                | Schechter et al., 2003        |
| Pacific Northwest | 40             | 2003           | Sum of 12 (BDE32-209)         | 6-321            | 97                         | 50                | She et al., 2007              |
| U.S.              | 20             | 2002-2003      | Sum of 35 BDEs                | 9.5 - 1,078      | 159                        | 58                | Lunder and Sharp, 2004        |
| Massachusetts     | 38             | 2004           | Sum of 17 (BDE 28-209)        | 0.06 - 1,914     | 76.3                       | 19.6              | Johnson-Restrepo et al., 2007 |
| New Hampshire     | 40             | 2004-2005      | Sum of 8 (BDE28-183)          | 6.5 - 166.7      | 35.5                       | 29.9              | Dunn et al., 2010             |
| Greater Boston    | 46             | 2005           | Sum of 12 (BDE 17-209)        | 4.3-263.5        | 42.6 *                     | 30.2              | Wu et al., 2007               |
| North Carolina    | 303            | 2004-2006      | Sum of 9 (BDE28-BDE 183)      | 1 – 2,010        | 89                         | 51                | Daniels et al., 2010          |

Source: references as shown.

Notes: all values reported in units of ng/g lwt, lipid weight. \*No arithmetic mean reported in published study, but a review of the original data included in the supplemental information shows that the arithmetic mean is 42.6 ng/g.

**Table 2 - 19 Summary Hazard Assessment Data and Dose-Response Relationships for PBDEs**

| NON-CANCER EFFECTS  |            |                        |                    |  |               |               |  |
|---------------------|------------|------------------------|--------------------|--|---------------|---------------|--|
| Congener or Product | CASRN      | Principal Studies      | Study Subjects     | Critical Effect(s)                                 | NOAEL (mg/kg) | LOAEL (mg/kg) | Reference Dose (RfD)* (mg/kg) per day    |
| Tetra BDE-47        | 5436-43-1  | Ericksson et al., 2001 | Male mice          | Neurobehavioral                                    | 0.7           | 10.5          | <b>0.0001</b><br>(1 x 10 <sup>-4</sup> ) |
| Penta BDE-99        | 60348-60-9 | Viberg et al., 2004.   | Male & female mice | Neurobehavioral                                    | 0.4           | 0.8           | <b>0.0001</b><br>(1 x 10 <sup>-4</sup> ) |
| Hexa BDE-153        | 68631-49-2 | Viberg et al., 2003.   | Male mice          | Neurobehavioral                                    | 0.45          | 0.9           | <b>0.0002</b><br>(2 x 10 <sup>-4</sup> ) |
| Octa**              | 32536-52-0 | Carlson (1980a)        | Male rats          | Induction of hepatic enzymes; liver histopathology | 2.51          | 5.0           | <b>0.003</b><br>(3 x 10 <sup>-3</sup> )  |
| Deca BDE-209        | 1163-19-5  | Viberg et al., 2003    | Male mice          | Neurobehavioral                                    | 2.22          | 20.1          | <b>0.007</b><br>(7 x 10 <sup>-3</sup> )  |

| CANCER EFFECTS               |           |           |                                       |   |   |
|------------------------------|-----------|-----------|---------------------------------------|---|---|
| DecaBDE (commercial product) | NTP, 1986 | Male rats | Liver neoplastic nodules or carcinoma | Point of Departure (LED <sub>12</sub> ) *** | Drinking Water Unit Risk                              |
|                              |           |           |                                       | 178 mg/kg-day                               | 0.0007 per mg/kg-day<br>2 x 10 <sup>-8</sup> per ug/L |

Source: US EPA Integrated Risk Information System (IRIS) Summary Information and Toxicological Reviews. Notes: \*Ref Dose for Chronic Oral Exposure. \*\*The Octa product tested was a commercial grade mixture. LED<sub>12</sub> -- the 95% lower bound on the exposure associated with a 12% extra cancer risk. Oral slope factor is derived by dividing the risk (as a fraction) by the LED<sub>12</sub> [0.12/178 mg/kg - day = 0.0007 per mg/kg - day].

**Table 2 - 20 U.S. Exposure Concentrations: Representative Exposure Media**

| <b>Media</b> | <b>Concentration</b>  | <b>Equivalent (ppb)</b> |
|--------------|-----------------------|-------------------------|
| Water        | 146.1 pg/L            | ppq                     |
| Surface soil | 82.3 ng/g dry weight  | ppb                     |
| Indoor dust  | 8,275 ng/g dwt        | ppb                     |
| Outdoor air  | 158 pg/m <sup>3</sup> |                         |
| Indoor air   | 447 pg/m <sup>3</sup> |                         |
| (Food)       |                       |                         |
| Shellfish    | 5.7 ng/g wet weight   | ppb                     |
| Finfish      | 0.32 ng/g wwt         | ppb                     |
| Beef         | 0.028 ng/g wwt        | ppb                     |
| Pork         | 0.13ng/g wwt          | ppb                     |
| Poultry      | 0.02 ng/g wwt         | ppb                     |
| Dairy        | 0.79 ng/g wwt         | ppb                     |
| Eggs         | 0.084 ng/g wwt        | ppb                     |

Source: USEPA, 2010: Table 4-5.

**Table 2 - 21 Estimated Daily PBDE Exposure Doses for U.S. and Canadian Populations**

| <b>Infant</b>                              | <b>Child</b><br>(1-5)       | <b>Child</b><br>(6-11)      | <b>Adolescent</b><br>(12-19) | <b>Adult</b>                | <b>Reference</b>                 | <b>RfD</b><br>Tetra-BDE 47  |
|--|-----------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------------|-----------------------------|
| (ng/kg bw per day)<br>(PPT)                | (ng/kg bw per day)<br>(PPT) | (ng/kg bw per day)<br>(PPT) | (ng/kg bw per day)<br>(PPT)  | (ng/kg bw per day)<br>(PPT) |                                  | (mg/kg bw per day)<br>(PPM) |
|  |                             |                             |                              |                             |                                  | (ng/kg bw per day)<br>(PPT) |
| > 100 (427.6 to 153.4)<br>newborn to 9 mos | 124.9 - 38.4                | 16.2 - 9.5                  | 11.8 - 7.5                   | 7.1                         | US EPA (2010)                    |                             |
| 86.4                                       | 13.3                        | 5.3                         | 3.5                          | 2.9                         | Johnson-Restrepo & Kannan (2009) | 0.0001<br>100.0             |
| 280  | 20                          | ND                          | ND                           | 2.2                         | Jones-Olazo et al. (2005)        | 0.0001<br>100.0             |
| ND   | 49.3                        | 14.4                        | 9.1                          | 7.7                         | Lorber (2008)                    | 0.0001<br>100.0             |
| ND   | ND                          | ND                          | ND                           | 16                          | McDonald (2005)                  | 0.0001<br>100.0             |
| 306 <sup>a</sup>                           | 2.6 <sup>a</sup>            | 1.7 <sup>a</sup>            | 1.4 <sup>a</sup>             | 1.0 <sup>a</sup>            | Schechter et al. (2006)          | 0.0001<br>100.0             |
| ND   | 12 to 38                    | ND                          | ND                           | 0.75 to 4.5                 | Wilford et al. (2005)            | 0.0001<br>100.0             |

Sources: Costa and Giordano, 2007 (Table 4); EPA, 2010; Johnson-Restrepo & Kannan, 2009; Lorber, 2008; McDonald, 2005

Notes:

- 1.) PPM = Parts per million. PPT= Parts per trillion.
- 2.) RfD= US EPA IRIS Reference Dose for Chronic Oral Exposure.
- 3.) ND= Not determined. <sup>a</sup> = Exposure through diet only.
- 4.) Jones-Olazo et al. and McDonald estimate exposure doses for persons living in Canada. The other listed studies estimate exposures for the U.S. population.

**Table 2 – 22 Estimated Daily Exposure Doses for U.S. Population By Age and Pathway**

Johnson-Frestrepo and Kannan, 2009

| Exposure Pathways       | Age Groups       |                  | Infant           |                  | Toddler          |                  | Child            |                  | Teenager         |                  | Adult            |                  |
|-------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                         | (ng/kg - bw/day) | % total exposure | (ng/kg - bw/day) | % total exposure | (ng/kg - bw/day) | % total exposure | (ng/kg - bw/day) | % total exposure | (ng/kg - bw/day) | % total exposure | (ng/kg - bw/day) | % total exposure |
| Foodstuffs <sup>a</sup> | 78.2             | <b>90.6%</b>     | 2.76             | 20.8%            | 1.92             | 36.9%            | 1.3              | 38.0%            | 1.11             | 38.4%            | 1.11             | 38.4%            |
| Dust Ingestion          | 6.7              | 7.8%             | 9.5              | <b>71.7%</b>     | 2.6              | <b>49.9%</b>     | 1.6              | <b>46.8%</b>     | 1.3              | <b>45.0%</b>     | 1.3              | <b>45.0%</b>     |
| Dust- Dermal Absorption | 0.77             | 0.9%             | 0.7              | 5.3%             | 0.46             | 8.8%             | 0.34             | 9.9%             | 0.34             | 11.8%            | 0.34             | 11.8%            |
| Indoor Air Inhalation   | 0.6              | 0.7%             | 0.29             | 2.2%             | 0.23             | 4.4%             | 0.18             | 5.3%             | 0.14             | 4.8%             | 0.14             | 4.8%             |
| Total                   | 86.3             | 100.0%           | 13.3             | 100.0%           | 5.2              | 100.0%           | 3.4              | 100.0%           | 2.9              | 100.0%           | 2.9              | 100.0%           |

Notes: <sup>a</sup>= excluded drinking water, fruits and vegetables due to lack of available data.

Units= ng/kg of bodyweight per day.

Table 2- 23 - PBDEs Measured in New England

| Sampling Location                 | Media                               | Sampling Dates         | Congeners Measured                 | Reported Values  | Reference              | Affiliation                               |
|-----------------------------------|-------------------------------------|------------------------|------------------------------------|--|------------------------|---|
| New England                       | Peregrine Falcon Eggs<br>(114 eggs) | 1996-2006              | Sum of total                       | Range: 74.5 - 6,610 ng/g ww<br>Median: 400 ng/g ww   | Da Chen et al., 2008   | New England Env.<br>Regulatory Agencies * |
|                                   |                                     | 2002: August & October | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range of mean<br><br>Range: 800 - 1,810 ng/g lwt (upstream of outfall)<br>Range: 5,750 - 29,000 ng/g lwt (downstream of outfall) | Anderson, et al., 2005 |   |
| Maine                             | Fish Tissue                         | 2004                   | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range: 4.2 - 4.3 ug/L<br><br>Range: 0.31 - 0.90 ug/L<br>Range: 1.32 - 3.8 ug/L<br>Range: 2,320 - 3,530 ug/kg dwt                 | Anderson, et al., 2005 | U of Maine                                |
|                                   |                                     | 2004                   | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range: 4.2 - 4.3 ug/L  | Anderson, et al., 2005 | U of Maine                                |
|                                   |                                     | 2004                   | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range: 0.31 - 0.90 ug/L<br>Range: 1.32 - 3.8 ug/L<br>Range: 2,320 - 3,530 ug/kg dwt  | Anderson, et al., 2005 | U of Maine                                |
| Wastewater Treatment Plant, Orono | Influent                            | 2004                   | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range: 4.2 - 4.3 ug/L  | Anderson, et al., 2005 | U of Maine                                |
|                                   |                                     | 2004                   | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range: 0.31 - 0.90 ug/L<br>Range: 1.32 - 3.8 ug/L<br>Range: 2,320 - 3,530 ug/kg dwt  | Anderson, et al., 2005 | U of Maine                                |
| Massachusetts                     | 15 Coastal Sites                    | 2004-2007              | Sum of 38:<br>mono to<br>hepta     | Range: 11 - 720 ppb lwt  | NOAA, 2009             |   |
|                                   |                                     | 2006                   | Sum of 11:<br>BDE 17 to<br>BDE 209 | Range: 230.2 - 2,684.4 pg/m <sup>3</sup>   | Allen et al., 2007     | BU  |
| Greater Boston                    | Indoor Air                          | 2006                   | Sum of 11:<br>BDE 17 to<br>BDE 209 | Range: 230.2 - 2,684.4 pg/m <sup>3</sup>   | Allen et al., 2007     | BU  |

|                |                          |                            |                                    |  |                       |                      |
|----------------|--------------------------|----------------------------|------------------------------------|--|-----------------------|----------------------|
| Greater Boston | <b>Indoor Dust</b>       | 2006                       | gm: 460.4<br>gm: 1,532.6           | Range: 174.5 - 1,532.6 pg/m <sup>3</sup><br>Range: 224.1 - 3,538.4 pg/m <sup>3</sup> | Allen et al., 2008    | BU                   |
|                | Living room              |                            | Sum of 20:<br>BDE 17 to<br>BDE 209 |  |                       |                      |
|                | Bedroom                  |                            | gm: 13,732.3<br>gm: 6,255          | Range: 3,020 - 192,100 ng/g<br>Range: 197.5 - 48,110 ng/g                            |                       |                      |
|                | Vacuum bag dust          |                            | gm: 4,269                          | Range: 505.4 - 269,200 ng/g  |                       |                      |
| Greater Boston | <b>Indoor Dust</b>       | 2004 & 2005 (April to Jan) | Sum of 8:<br>BDE 47 to<br>BDE 154  | Range : 0.59 - 34.4 ug/g (PPT)<br>Median: 1.91 ug/g                                  | Wu. et al., 2007      | BU                   |
| Cape Code      | <b>Indoor Dust</b>       | June 1999 & Sept 2001      | BDE 47<br>BDE 99<br>BDE 100        | Range: <0.4 - 9.86 ug/g (PPT)<br>Range: <0.4 - 22.5 ug/g<br>Range: <0.4 - 3.4 ug/g   | Rudel et al., 2003    | HSPH & Silent Spring |
| Greater Boston | <b>Human Breast Milk</b> | 2005                       | Sum of 12:<br>BDE 17 to<br>BDE 209 | Range: 4 - 263 ng/g lwt<br>Median: 30.2 ng/g lwt                                     | Wu. et al., 2007      | BU                   |
| Massachusetts  | <b>Human Breast Milk</b> | 2004                       | Sum of 17:<br>BDE 28 to<br>BDE 209 | Range: 0.06 - 1,914 ng/g lwt<br>Mean: 75.0 ng/g lwt                                  | Restrepo et al., 2007 | UMass Amherst        |
| New Hampshire  | <b>Human Breast Milk</b> | 2004-2005                  | Sum of 8:<br>BDE 28 to<br>BDE 183  | Range: 6.5 to 166.7 ng/g lwt<br>Mean: 35.5 ng/g lwt                                  | Dunn et al., 2010     | UNH                  |

Notes: WTP = Wastewater treatment plant; wwt = wet weight; dwt = dry weight; lwt = lipid weight. \* Egg retrieval participants included staff from MA Division of Wildlife. Allen et al., 2008 reports maximum value of 544,000 ng/g in dust sample from 2nd round of sampling as highest level in dust reported in literature.

**Table 3-1 Indoor Air Data**

Study: Allen et al., 2007

| Congener      | Personal Air<br>(n=20) |                         |  | Bedroom<br>(n=20) |                         |  | Main Living Area (n=20) |                         |  |
|---------------|------------------------|-------------------------|--|-------------------|-------------------------|--|-------------------------|-------------------------|--|
|               | % detect               | GM<br>pg/m <sup>3</sup> | (GSD)<br>Range<br>pg/m <sup>3</sup><br>(min) (max) | % detect          | GM<br>pg/m <sup>3</sup> | (GSD)<br>Range<br>pg/m <sup>3</sup><br>(min) (max) | % detect                | GM<br>pg/m <sup>3</sup> | (GSD)<br>Range<br>pg/m <sup>3</sup><br>(min) (max) |
| BDE 17        | 80                     | 7.6                     | 2.3 <4 58.1  | 75                | 8.1                     | 2.9 <3.4 46.7                                      | 75                      | 7                       | 3 <4 81.5  |
| BDE 28/33     | 100                    | 29.6                    | 1.7 <23.6 98.4                                     | 90                | 27.3                    | 2.3 <11.4 102.3                                    | 90                      | 25.4                    | 3.1 <11.2 166.2                                    |
| BDE 47        | 100                    | 226.8                   | 2.3 <147.6 1393                                    | 95                | 157.9                   | 2.7 <62.4 784.3                                    | 90                      | 145.1                   | 2.6 <61.8 2371.4                                   |
| BDE 49        | 75                     | 9.1                     | 3.2 <3.4 59.5                                      | 65                | 6                       | 2.9 <3.4 35.7                                      | 75                      | 7.2                     | 3.1 <3.4 88.3                                      |
| BDE 66        | 45                     | 3.7                     | 2.1 <3.4 18.9                                      | 45                | 3.5                     | 2.1 <2.8 15.9                                      | 60                      | 3.5                     | 2.3 <3.4 59.6                                      |
| BDE 85/155    | 35                     | 3.8                     | 2.6 <3.4 39.5                                      | 15                | 2.7                     | 1.7 <3.4 16.7                                      | 40                      | 2.5                     | 1.5 <3.4 9.4                                       |
| BDE 99        | 85                     | 110.8                   | 2.8 <41.62 879.4                                   | 90                | 66.9                    | 2.2 <56.8 385.7                                    | 80                      | 60.3                    | 2.1 <49.2 552.6                                    |
| BDE 100       | 85                     | 22.2                    | 2.8 <8.8 177.2                                     | 80                | 14.4                    | 2.4 <8.8 101.2                                     | 75                      | 12                      | 2.3 <10.4 156.3                                    |
| BDE 153       | 75                     | 8.6                     | 3.2 <3.2 73.7                                      | 60                | 4                       | 2.3 <3.2 26.7                                      | 60                      | 3.5                     | 1.8 <3.2 10.9                                      |
| BDE 154       | 75                     | 9.1                     | 3.1 <4.2 78.9                                      | 55                | 6.1                     | 3.1 <4.2 138.7                                     | 60                      | 5.2                     | 2.5 <4.2 60.5                                      |
| BDE 209       | 45                     | 173.6                   | 3.2 <52.4 1635.6                                   | 30                | 94.8                    | 2.0 <51.0 268.6                                    | 45                      | 94.2                    | 2.4 <47.8 651.2                                    |
| Σnon-209 BDEs |                        | 469.1                   | 2.2 151.2 2479.6                                   |                   | 324.7                   | 2.3 92.9 1342.6                                    |                         | 288.6                   | 2.3 82.1 3512.2                                    |
| ΣBDE          |                        | 765.7                   | 2.2 230.2 2684.4                                   |                   | 460.4                   | 2.0 174.5 1532.6                                   |                         | 452.8                   | 1.9 224.1 3538.4                                   |

Source: "Personal Exposure to Polybrominated Diphenyl Ethers (PBDEs) in Indoor Air." (Allen et al., 2007) Table 1, Summary Statistics for PBDE Concentrations in Personal and Room Air.

Notes: GM=Geometric Mean. GSD=Geometric Standard Deviation. ΣBDE includes BDE 209.

**Table 3-2 Indoor Dust Data**

Study: Allen et al., 2008

| Congener   | Main Living Area (n=20) |            |       |                           | Bedroom (n=20) |            |       |                           |
|------------|-------------------------|------------|-------|---------------------------|----------------|------------|-------|---------------------------|
|            | % detect                | GM<br>ng/g | (GSD) | Range<br>ng/g (min) (max) | % detect       | GM<br>ng/g | (GSD) | Range<br>ng/g (min) (max) |
| BDE 17     | 55                      | 1.4        | 12.8  | <0.1 112.4                | 50             | 0.6        | 8.7   | <0.1 28.9                 |
| BDE 28/33  | 95                      | 16.3       | 2.8   | 1.6 120.5                 | 90             | 10.5       | 2.6   | 0.7 119.4                 |
| BDE 47     | 95                      | 1,865      | 2.9   | 445.4 16,840              | 100            | 837.0      | 3.3   | 54.3 15,000               |
| BDE 49     | 100                     | 29.6       | 4.8   | 0.3 372.0                 | 100            | 23.6       | 2.6   | 3.6 343.5                 |
| BDE 66     | 95                      | 17.2       | 4.9   | 0.2 287.1                 | 100            | 15.3       | 2.9   | 1.6 245.8                 |
| BDE 75     | 65                      | 9.3        | 3.1   | 1.3 75.3                  | 60             | 5.3        | 2.8   | 1.0 67.3                  |
| BDE 85/155 | 95                      | 124.0      | 3.1   | 18.0 1,088                | 100            | 51.8       | 4.1   | 2.6 995.8                 |
| BDE 99     | 100                     | 2,460      | 3.0   | 330.6 24,510              | 100            | 1,170      | 4.0   | 56.5 22,850               |
| BDE 100    | 95                      | 436.3      | 3.0   | 71.0 4274                 | 100            | 204        | 3.9   | 11.4 3,786                |
| BDE 138    | 95                      | 20.9       | 5.8   | 0.1 243.2                 | 95             | 12.1       | 5.4   | 0.2 327.8                 |
| BDE 153    | 100                     | 234.4      | 2.9   | 27.7 2,377                | 100            | 124.2      | 4.5   | 4.2 2,870                 |
| BDE 154    | 95                      | 182.8      | 2.9   | 27.4 2,061                | 100            | 94.4       | 4.3   | 4.3 2,332                 |
| pentaBDE*  |                         | 5,462      | 2.9   | 975.2 52,274              |                | 2613       | 3.8   | 141.6 47,590              |
| BDE 183    | 100                     | 27.9       | 3.2   | 1.7 229.7                 | 95             | 32.9       | 6.0   | 0.1 1,617                 |
| BDE-196    | 85                      | 3.6        | 9.0   | 0.1 135.0                 | 50             | 2.6        | 11.8  | 0.1 315.2                 |
| BDE-197    | 95                      | 2.7        | 11.5  | <0.1 84.0                 | 65             | 3.3        | 17.1  | 0.1 802.4                 |
| BDE-203    | 90                      | 3.6        | 6.4   | 0.1 54.4                  | 60             | 3.6        | 10.0  | 0.1 293.6                 |
| octaBDE*   |                         | 49.8       | 3.5   | 6.2 422.3                 |                | 55.1       | 5.8   | 0.4 3,028                 |
| BDE 206    | 85                      | 76.3       | 4.3   | 8.1 1,484                 | 70             | 48.1       | 3.8   | 4.5 803.3                 |

|          |     |           |     |       |         |    |         |     |       |        |
|----------|-----|-----------|-----|-------|---------|----|---------|-----|-------|--------|
| BDE-207  | 95  | 45.9      | 5.0 | 1.2   | 599.8   | 85 | 25.3    | 7.8 | 0.3   | 539.3  |
| BDE 208  | 90  | 35.6      | 5.7 | 1.9   | 536.4   | 70 | 17.5    | 7.1 | 0.7   | 531.4  |
| BDE 209  | 100 | 4,502     | 4.4 | 791.9 | 184,600 | 95 | 1,703   | 6.0 | 24.0  | 36,130 |
| decaBDE* |     | 4,702.2   | 4.4 | 814.4 | 185,600 |    | 1,866.0 | 5.6 | 41.3  | 37,900 |
| Total    |     | 13,732.30 | 3.2 | 3,020 | 192,100 |    | 6,255.0 | 3.8 | 197.5 | 48,110 |

Source: "Critical Factors in Assessing Exposure to PBDEs via House Dust." (Allen et al., 2008) Table 1.

Notes: GM=Geometric Mean. GSD=Geometric Standard Deviation. Ng/g = nanograms, 1 x 10<sup>9</sup> grams. \*Geometric mean of total congeners which are considered markers of commercial PBDE products.

**Table 3-3 Breast Milk Data**

Study: Wu et al., 2007

**Summary Statistics**

| <b>Congener</b> | <b>Median<br/>(ng/g lipid)</b> | <b>Min<br/>(ng/g<br/>lipid)</b> | <b>Max<br/>(ng/g<br/>lipid)</b> | <b>%<br/>Detect</b> |
|-----------------|--------------------------------|---------------------------------|---------------------------------|---------------------|
| BDE 17          | < DL                           | < DL                            | 0.1                             | 50                  |
| BDE 28          | 0.9                            | 0.1                             | 6.0                             | 100                 |
| BDE 47          | 13.9                           | 2.0                             | 126.6                           | 100                 |
| BDE 66          | 1.0                            | < DL                            | 2.1                             | 93                  |
| BDE 85          | 0.3                            | < DL                            | 7.1                             | 98                  |
| BDE 99          | 2.4                            | 0.4                             | 84.3                            | 100                 |
| BDE 100         | 2.4                            | 0.4                             | 26.8                            | 100                 |
| BDE 138         | 0.03                           | < DL                            | 0.8                             | 67                  |
| BDE 153         | 3.0                            | 0.4                             | 91.7                            | 100                 |
| BDE 154         | 0.2                            | 0.04                            | 4.6                             | 100                 |
| BDE 183         | 0.1                            | < DL                            | 0.5                             | 72                  |
| BDE 209         | < DL                           | < DL                            | 10.9                            | 24                  |
| <b>Σ PBDE</b>   | <b>30.2</b>                    | <b>4.3</b>                      | <b>263.5</b>                    |                     |

Source: "Human Exposure to PBDEs: Associations of PBDE Body Burdens with Food Consumption and House Dust Concentrations." (Wu et al., 2007) Table 1.

Notes: < DL = below the detection limit.

**Table 3 - 4 Contaminants of Concern**

| <b>Running Total</b>       | <b>Congener</b> | <b>Homologue</b> |
|----------------------------|-----------------|------------------|
| 1                          | BDE 15          | Tri              |
| 2                          | BDE 17          | Tri              |
| 3                          | BDE 20          | Tri              |
| 4                          | BDE 25          | Tri              |
| 5                          | BDE 28/33       | Tri              |
| 6                          | BDE 39          | Tri              |
| 7                          | BDE 47          | Tetra            |
| 8                          | BDE 49          | Tetra            |
| 9                          | BDE 62          | Tetra            |
| 10                         | BDE 66          | Tetra            |
| 11                         | BDE 75          | Tetra            |
| 12                         | BDE 85/155      | Penta            |
| 13                         | BDE 99          | Penta            |
| 14                         | BDE 100         | Penta            |
| 15                         | BDE 138         | Hexa             |
| 16                         | BDE 153         | Hexa             |
| 17                         | BDE 154         | Hexa             |
| 18                         | BDE 183         | Octa             |
| 19                         | BDE-196         | Octa             |
| 20                         | BDE-197         | Octa             |
| 21                         | BDE-203         | Octa             |
| 22                         | BDE 206         | Nona             |
| 24                         | BDE-207         | Nona             |
| 24                         | BDE 208         | Nona             |
| 25                         | BDE 209         | Deca             |
| <b>Total: 25 Congeners</b> |                 |                  |

**Table 3-5 Exposure Equations**

$$(L)ADD \text{ ingestion} = \frac{EPC \times IR \times RAF \times EF \times ED \times EP \times C}{BW \times AP}$$

$$(L)ADD \text{ inhalation} = \frac{EPC \times VR \times RAF \times EF \times ED \times EP \times C}{BW \times AP}$$

$$(L)ADD \text{ dermal} = \frac{EPC \times SA \times AF \times ABS \times EF \times ED \times EP \times C}{BW \times AP}$$

**Key:**

|      |   |   |
|------|---|---|
| ADD  | = | Average Daily Dose for non-cancer risk, in mg/kg per day                  |
| LADD | = | Lifetime Average Daily Dose for cancer risk, in mg/kg per day             |
| EPC  | = | Exposure Point Concentration, in mg/kg or mg/ m <sup>3</sup>              |
| IR   | = | Ingestion Rate, in mg/day   |
| VR   | = | Ventilation Rate, in m <sup>3</sup> /day                                  |
| RAF  | = | Relative Absorption Factor, unit-less                                     |
| EF   | = | Exposure Frequency, in days per week                                      |
| ED   | = | Exposure Duration, in weeks per year                                      |
| EP   | = | Exposure Period, in total years   |
| C    | = | Conversion Factor, (1.0 mg = 1.0E <sup>-6</sup> kg)                       |
| BW   | = | Body Weight, in kg  |
| AP   | = | Averaging Period, total days  |
| SA   | = | Surface Area of skin in contact with soil/dust                            |
| AF   | = | Adhesion Factor (amount of soil/dust that adheres to skin surface area)   |
| ABS  | = | Absorption Factor (percent of contaminant in soil/dust absorbed by skin). |

Table 3 - 6 Exposure Pathways and Factors for Calculating Average Daily Dose and Lifetime Average Daily Dose

| Exposure Factors   | Reference/Comments |                |                 |                |                  |              |              |              |               |                |                |  |
|--|--------------------|----------------|-----------------|----------------|------------------|--------------|--------------|--------------|---------------|----------------|----------------|--|
|  | Adult              | Child          |                 |                |                  |              |              |              |               |                |                |  |
| Age  | ≥21 yrs            | 0 to < 1 month | 1 to < 3 months | 3 to < 6 month | 6 to < 12 months | 1 to < 2 yrs | 2 to < 3 yrs | 3 to < 6 yrs | 6 to < 11 yrs | 11 to < 16 yrs | 16 to < 21 yrs | Age categories recommended in US EPA 2008  |
| Body Weight, kg  | 70                 | 4.8            | 5.6             | 7.6            | 9.2              | 11.4         | 13.8         | 18.6         | 31.8          | 56.8           | 71.6           | US EPA 1997 value for adults; US EPA 2008 values for children                                    |
| Soil/Dust Ingestion, mg/d  | 50                 |                |                 |                |                  |              |              |              |               |                |                | US EPA 1997 value for adults; US EPA 2008 values for children                                    |
| Surface Area of skin in contact with soil/dust, cm <sup>2</sup> (SA) | 5700               |                |                 |                | 1425             | 1690         | 1825         | 2545         | 3410          | 5100           | 6080           | US EPA 2008 values for children; US EPA 2004 value for adult                                     |
| Soil Adherence Factor (SAF), mg/cm <sup>2</sup>                      | 0.07               |                |                 |                | 0.2              | 0.2          | 0.2          | 0.2          | 0.2           | 0.07           | 0.07           | US EPA 2004; assume 0.2 for child 6 < 12 mos.  |
| Dermal Absorption Fraction from Soil (ABS)                           | 0.03               |                |                 |                | 0.03             | 0.03         | 0.03         | 0.03         | 0.03          | 0.03           | 0.03           | US EPA 2004; Lorber 2008   |
| Relative Absorbancy Factor (RAF), Ingestion and Inhalation           | 0.9                |                |                 |                | 0.9              | 0.9          | 0.9          | 0.9          | 0.9           | 0.9            | 0.9            | Lorber 2008; McDonald 2005   |
| Inhalation, m <sup>3</sup> /day                                      | 13.3               | 3.6            | 3.8             | 4.1            | 5.4              | 8            | 9.5          | 10.9         | 12.4          | 15.1           | 16.5           | US EPA 1997 value for adults; estimated value for ages 1-<3 mos; US EPA 2008 values for children |
| Time Spent Indoors, hr/day for adults; minutes/day for children      | 21                 | 1,440.0        | 1,432.0         | 1,414.0        | 1,301.0          | 1353.0       | 1316.0       | 1278.0       | 1244.0        | 1266.0         | 1248.0         | US EPA 1997 value for adults; US EPA 2008 values for children                                    |
| Fraction of Day Spent Indoors  | 0.88               | 1.00           | 0.99            | 0.98           | 0.90             | 0.94         | 0.91         | 0.89         | 0.86          | 0.88           | 0.87           |  |
| Time Spent Outdoors, hrs/day adults; minutes/day                     | 1.5                | 0              | 8               | 26             | 139              | 36           | 76           | 107          | 132           | 100            | 102            | US EPA 1997 value for adults; US EPA 2008 values for children                                    |

| for children  |      |      |      |      |      |      |      |      |      |      |      |      |             |  |  |
|---|------|------|------|------|------|------|------|------|------|------|------|------|-------------|--|--|
| <b>Fraction of Day Spent Outdoors</b>   | 0.06 | 0.00 | 0.01 | 0.02 | 0.10 | 0.03 | 0.05 | 0.07 | 0.09 | 0.07 | 0.07 | 0.07 |             |  |  |
| <b>Ingestion of Breast Milk, mL/day</b>   | 510  | 690  | 770  | 620  |      |      |      |      |      |      |      |      | US EPA 2008 |  |  |
| <b>Ingestion of Breast Milk, Lipid Intake, mL/day (recommended value for lipid content of human milk is 4.0 %).</b> | 20   | 27   | 30   | 25   |      |      |      |      |      |      |      |      | US EPA 2008 |  |  |

Notes: US EPA 1997, Exposure Factors Handbook. US EPA 2004, RAGS Part E Exhibit 3-5, Reasonable Maximum Exposure Scenario. US EPA 2008, Child-Specific Exposure Factors Handbook.

Table 3-8 Exposure Point Concentrations

|                      | Media   | Value           | Units             | Equivalent | Source                                       |
|----------------------|---|-----------------|-------------------|------------|--|
| Outdoor Environment  | Outdoor Air                                     |                 |                   |            |  |
|                      | central tendency                                | 124             | pg/m <sup>3</sup> |            | EPA (2010) review of CARB (2005)             |
|                      | tetra/penta BDEs<br>hexa/hepta BDEs<br>deca BDE | 9<br>25         |                   |            |  |
| Outdoor Surface Soil | central tendency                                | 5.9             | ng/g              | PPB        | EPA (2010) review of Offenberg et al. (2006) |
|                      | tetra/penta BDEs                                | 47.9            |                   |            |  |
|                      | hexa/hepta BDEs                                 | 12.4            |                   |            |  |
|                      | octa BDE  | 16.1            |                   |            |  |
|                      | deca BDE  |                 |                   |            |  |
| Indoor Environment   | Indoor Air                                      |                 |                   |            |  |
|                      | central tendency                                | 321.13          | pg/m <sup>3</sup> |            | Allen et al., 2007                           |
|                      | tetra/penta BDEs<br>hexa/hepta BDEs<br>deca BDE | 12.17<br>120.87 |                   |            |  |
| Indoor Dust          | worst case                                      | 3,848.9         | pg/m <sup>3</sup> |            |  |
|                      | tetra/penta BDEs                                | 194.7           |                   |            |  |
|                      | hexa/hepta BDEs<br>deca BDE                     | 1,277.7         |                   |            |  |
| Indoor Environment   | Indoor Dust                                     |                 |                   |            |  |
|                      | central tendency                                | 3,638.6         | ng/g              | PPB        | Allen et al., 2008                           |
|                      | tetra/penta BDEs                                | 334.4           |                   |            |  |
|                      | hexa/hepta BDEs<br>octa BDE<br>deca BDE         | 40.1<br>3,226.9 |                   |            |  |

|   |           |                   |                     |
|---|-----------|-------------------|---------------------|
| worst case, tetra/penta BDEs            | 45,558.0  | ng/g              | PPB                 |
| hexa/hepta BDEs                         | 5,105.5   |                   |                     |
| octa BDE                                | 1,765.7   |                   |                     |
| deca BDE                                | 112,612.1 |                   |                     |
| <b>Diet - Infants Human breast milk</b> |           |                   |                     |
| central tendency, tetra/penta BDEs      | 20.9      | ng/g lipid weight | PPB Wu et al., 2007 |
| hexa/hepta BDEs                         | 3.23      |                   |                     |
| octa BDE                                | 0.1       |                   |                     |
| deca BDE                                | 0.25      |                   |                     |
| worst case, tetra/penta BDEs            | 253       | ng/g lwt          | PPB                 |
| hexa/hepta BDEs                         | 97.1      |                   |                     |
| octa BDE                                | 0.5       |                   |                     |
| deca BDE                                | 10.9      |                   |                     |

**Table 3-8.1 Calculating Exposure Point Concentrations for Indoor Air**

| Congener                 | Personal Air (n=20) |        |         |                   | Bedroom (n=20) |       |                   |       | Main Living Area (n=20) |                   |       |       |
|--------------------------|---------------------|--------|---------|-------------------|----------------|-------|-------------------|-------|-------------------------|-------------------|-------|-------|
|                          | GM                  | Range  |         | GM                | Range          |       | GM                | Range |                         | GM                | Range |       |
|                          | pg/m <sup>3</sup>   | (min)  | (max)   | pg/m <sup>3</sup> | (min)          | (max) | pg/m <sup>3</sup> | (min) | (max)                   | pg/m <sup>3</sup> | (min) | (max) |
| BDE 17                   | 7.6                 | <4     | 58.1    | 8.1               | <3.4           | 46.7  | 7                 | <4    | 81.5                    |                   |       |       |
| BDE 28/33                | 29.6                | <23.6  | 98.4    | 27.3              | <11.4          | 102.3 | 25.4              | <11.2 | 166.2                   |                   |       |       |
| BDE 47                   | 226.8               | <147.6 | 1393    | 157.9             | <62.4          | 784.3 | 145.1             | <61.8 | 2371.4                  |                   |       |       |
| BDE 49                   | 9.1                 | <3.4   | 59.5    | 6                 | <3.4           | 35.7  | 7.2               | <3.4  | 88.3                    |                   |       |       |
| BDE 66                   | 3.7                 | <3.4   | 18.9    | 3.5               | <2.8           | 15.9  | 3.5               | <3.4  | 59.6                    |                   |       |       |
| BDE 85/155               | 3.8                 | <3.4   | 39.5    | 2.7               | <3.4           | 16.7  | 2.5               | <3.4  | 9.4                     |                   |       |       |
| BDE 99                   | 110.8               | <41.62 | 879.4   | 66.9              | <56.8          | 385.7 | 60.3              | <49.2 | 552.6                   |                   |       |       |
| BDE 100                  | 22.2                | <8.8   | 177.2   | 14.4              | <8.8           | 101.2 | 12                | <10.4 | 156.3                   |                   |       |       |
| <b>SUM "tetra/penta"</b> | 413.6               |        | 2,724   | 286.8             |                | 1,489 | 263               |       | 3,485.3                 |                   |       |       |
|                          |                     |        |         |                   |                |       |                   |       |                         |                   |       |       |
| BDE 153                  | 8.6                 | <3.2   | 73.7    | 4                 | <3.2           | 26.7  | 3.5               | <3.2  | 10.9                    |                   |       |       |
| BDE 154                  | 9.1                 | <4.2   | 78.9    | 6.1               | <4.2           | 138.7 | 5.2               | <4.2  | 60.5                    |                   |       |       |
| <b>SUM "hexa"</b>        | 17.7                |        | 152.6   | 10.1              |                | 165.4 | 8.7               |       | 71.4                    |                   |       |       |
|                          |                     |        |         |                   |                |       |                   |       |                         |                   |       |       |
| <b>BDE 209</b>           | 173.6               | <52.4  | 1,635.6 | 94.8              | <51.0          | 268.6 | 94.2              | <47.8 | 651.2                   |                   |       |       |

  

| Central Tendency (GM) |       | Worst Case (Max) |         |
|-----------------------|-------|------------------|---------|
| Sum                   | 963.4 | Sum              | 7,697.8 |
| Average               | 321.1 | Average          | 3,848.9 |

  

| Central Tendency (GM) |      | Worst Case (Max) |       |
|-----------------------|------|------------------|-------|
| Sum                   | 36.5 | Sum              | 389.4 |
| Average               | 12.2 | Average          | 194.7 |

  

| Central Tendency (GM) |       | Worst Case (Max) |         |
|-----------------------|-------|------------------|---------|
| Sum                   | 362.6 | Sum              | 2,555.4 |
| Average               | 120.9 | Average          | 1,277.7 |

**Table 3 – 8.2 Calculating Exposure Point Concentrations for Indoor Dust**

| Congener                 | Main Living Area (n=20) |            |                 |                | Bedroom (n=20) |                 |  |  |
|--------------------------|-------------------------|------------|-----------------|----------------|----------------|-----------------|--|--|
|                          | GM                      | Range      |                 | GM             | Range          |                 |  |  |
|                          | ng/g                    | ng/g (min) | ng/g (max)      | ng/g           | ng/g (min)     | ng/g (max)      |  |  |
| BDE 17                   | 1.4                     | <0.1       | 112.4           | 0.6            | <0.1           | 28.9            |  |  |
| BDE 28/33                | 16.3                    | 1.6        | 120.5           | 10.5           | 0.7            | 119.4           |  |  |
| BDE 47                   | 1,865.0                 | 445.4      | 16,840.0        | 837.0          | 54.3           | 15,000.0        |  |  |
| BDE 49                   | 29.6                    | 0.3        | 372.0           | 23.6           | 3.6            | 343.5           |  |  |
| BDE 66                   | 17.2                    | 0.2        | 287.1           | 15.3           | 1.6            | 245.8           |  |  |
| BDE 75                   | 9.3                     | 1.3        | 75.3            | 5.3            | 1.0            | 67.3            |  |  |
| BDE 85/155               | 124.0                   | 18.0       | 1,088.0         | 51.8           | 2.6            | 995.8           |  |  |
| BDE 99                   | 2,460.0                 | 330.6      | 24,510.0        | 1,170.0        | 56.5           | 22,850.0        |  |  |
| BDE 100                  | 436.3                   | 71.0       | 4,274.0         | 204.0          | 11.4           | 3,786.0         |  |  |
| <b>SUM "tetra/penta"</b> | <b>4,959.1</b>          |            | <b>47,679.3</b> | <b>2,318.1</b> |                | <b>43,436.7</b> |  |  |
| BDE 138                  | 20.9                    | 0.1        | 243.2           | 12.1           | 0.2            | 327.8           |  |  |
| BDE 153                  | 234.4                   | 27.7       | 2,377.0         | 124.2          | 4.2            | 2,870.0         |  |  |
| BDE 154                  | 182.8                   | 27.4       | 2,061.0         | 94.4           | 4.3            | 2,332.0         |  |  |
| <b>SUM "hexa"</b>        | <b>438.1</b>            |            | <b>4,681.2</b>  | <b>230.7</b>   |                | <b>5,529.8</b>  |  |  |
| BDE 183                  | 27.9                    | 1.7        | 229.7           | 32.9           | 0.1            | 1,617.0         |  |  |
| BDE-196                  | 3.6                     | 0.1        | 135.0           | 2.6            | 0.1            | 315.2           |  |  |
| BDE-197                  | 2.7                     | <0.1       | 84.0            | 3.3            | 0.1            | 802.4           |  |  |
| BDE-203                  | 3.6                     | 0.1        | 54.4            | 3.6            | 0.1            | 293.6           |  |  |

  

| Central Tendency (GM) |         | Worst Case (Max) |          |
|-----------------------|---------|------------------|----------|
| Sum                   | Average | Sum              | Average  |
| 7,277.2               | 3,638.6 | 91,116.0         | 45,558.0 |

  

| Central Tendency (GM) |         | Worst Case (Max) |         |
|-----------------------|---------|------------------|---------|
| Sum                   | Average | Sum              | Average |
| 668.8                 | 334.4   | 10,211.0         | 5,105.5 |

  

| Central Tendency (GM) |         | Worst Case (Max) |         |
|-----------------------|---------|------------------|---------|
| Sum                   | Average | Sum              | Average |
|                       |         |                  |         |

|                   |      |       |      |         |      |      |         |         |
|-------------------|------|-------|------|---------|------|------|---------|---------|
| <b>SUM "octa"</b> | 37.8 | 503.1 | 42.4 | 3,028.2 | 80.2 | 40.1 | 3,531.3 | 1,765.7 |
|-------------------|------|-------|------|---------|------|------|---------|---------|

|                   |                |       |                  |                |      |                 | <b>Central Tendency (GM)</b> |                | <b>Worst Case (Max)</b> |                |
|-------------------|----------------|-------|------------------|----------------|------|-----------------|------------------------------|----------------|-------------------------|----------------|
|                   |                |       |                  |                |      |                 | <b>Sum</b>                   | <b>Average</b> | <b>Sum</b>              | <b>Average</b> |
| BDE 206           | 76.3           | 8.1   | 1,484.0          | 48.1           | 4.5  | 803.3           | 6,453.7                      | 3,226.9        | 225,224.2               | 112,612.1      |
| BDE-207           | 45.9           | 1.2   | 599.8            | 25.3           | 0.3  | 539.3           |                              |                |                         |                |
| BDE 208           | 35.6           | 1.9   | 536.4            | 17.5           | 0.7  | 531.4           |                              |                |                         |                |
| BDE 209           | 4,502.0        | 791.9 | 184,600.0        | 1,703.0        | 24.0 | 36,130.0        |                              |                |                         |                |
| <b>SUM "deca"</b> | <b>4,659.8</b> |       | <b>187,220.2</b> | <b>1,793.9</b> |      | <b>38,004.0</b> |                              |                |                         |                |

**Table 3 - 8.3 Calculating Exposure Point Concentrations for Breast Milk**

Summary Statistics from Table S2, Supplemental Information \*

| Congener                 | Median<br>(ng/g lipid) | Min<br>(ng/g lipid) | Max<br>(ng/g lipid) |
|--------------------------|------------------------|---------------------|---------------------|
| BDE 17                   | 0.011                  | <DL                 | 0.1                 |
| BDE 28                   | 0.9                    | 0.1                 | 6.0                 |
| BDE 47                   | 13.9                   | 2.0                 | 126.6               |
| BDE 66                   | 1.0                    | <DL                 | 2.1                 |
| BDE 85                   | 0.3                    | <DL                 | 7.1                 |
| BDE 99                   | 2.4                    | 0.4                 | 84.3                |
| BDE 100                  | 2.4                    | 0.4                 | 26.8                |
| <b>SUM "tetra/penta"</b> | 20.9                   |                     | 253.0               |
| BDE 138                  | 0.03                   | <DL                 | 0.8                 |
| BDE 153                  | 3.0                    | 0.4                 | 91.7                |
| BDE 154                  | 0.2                    | 0.04                | 4.6                 |
| <b>SUM "hexa"</b>        | 3.2                    |                     | 97.1                |
| BDE 183                  | 0.1                    | <DL                 | 0.5                 |
| <b>SUM "octa"</b>        | 0.1                    |                     | 0.5                 |
| BDE 209                  | 0.25                   | <DL                 | 10.9                |
| <b>SUM "deca"</b>        | 0.25                   |                     | 10.9                |

  

|  | Central Tendency (Median) | Worst Case (Max) |
|--|---------------------------|------------------|
|  | 20.9                      | 253.0            |

  

|  | Central Tendency (Median) | Worst Case (Max) |
|--|---------------------------|------------------|
|  | 3.2                       | 97.1             |

  

|  | Central Tendency (Median) | Worst Case (Max) |
|--|---------------------------|------------------|
|  | 0.1                       | 0.5              |

  

|  | Central Tendency (Median) | Worst Case (Max) |
|--|---------------------------|------------------|
|  | 0.25                      | 10.9             |

Source: (Wu et al., 2007), Table S2 (Supplemental Information) \*PBDEs in Breast Milk \*

Note: Table S2 presents original data and summary statistics. The authors indicate that measurements reported as below detection limit were replaced by a value of 1/2 the detection limit for the purpose of calculations. This is reflected in the median values for BDE 17 and BDE 209.

**Table 4 - 1 Exposure and Risk Summary**

**Excess Lifetime Cancer Risk**

| Receptor         | Exposure Scenario | Breast Milk Ingestion | Outdoor Air | Indoor Air | Soil     | Dermal Contact with Soil | Soil Ingestion | Dermal Contact with Dust | Dust Ingestion | Excess Lifetime Cancer Risk |
|------------------|-------------------|-----------------------|-------------|------------|----------|--------------------------|----------------|--------------------------|----------------|-----------------------------|
| Adult            | Average           |                       | 1.27E-11    | 8.90E-12   | 8.81E-14 | 2.55E-13                 | 2.38E-10       | 8.93E-10                 | 1.15E-09       |                             |
|                  | Worst Case        |                       | 1.27E-11    | 8.55E-11   | 8.81E-14 | 2.55E-13                 | 8.29E-09       | 3.12E-08                 | 3.96E-08       |                             |
| Child            | Average           | 7.42E-13              |             | 6.33E-14   |          |                          |                |                          |                | 8.05E-13                    |
|                  | Worst Case        | 6.69E-13              |             | 6.69E-13   |          |                          |                |                          |                | 1.34E-12                    |
| 1 < 3 months     | Average           | 2.58E-12              | 2.09E-16    | 1.71E-13   |          |                          |                |                          |                | 2.75E-12                    |
|                  | Worst Case        | 1.13E-10              | 2.09E-16    | 1.81E-12   |          |                          |                |                          |                | 1.14E-10                    |
| 3 < 6 months     | Average           | 2.12E-12              | 5.39E-16    | 1.34E-13   |          |                          |                |                          |                | 2.26E-12                    |
|                  | Worst Case        | 9.25E-11              | 5.39E-16    | 1.42E-12   |          |                          |                |                          |                | 9.39E-11                    |
| 6 < 12 months    | Average           | 2.82E-12              | 6.28E-15    | 2.68E-13   | 6.72E-15 | 2.12E-14                 | 1.26E-11       | 7.96E-11                 | 9.54E-11       |                             |
|                  | Worst Case        | 1.23E-10              | 6.28E-15    | 2.84E-12   | 6.72E-15 | 2.12E-14                 | 4.40E-10       | 2.78E-09                 | 3.35E-09       |                             |
| 1 to < 2 years   | Average           | 1.42E-12              | 1.42E-12    | 7.06E-12   | 3.33E-15 | 2.28E-14                 | 2.51E-11       | 2.23E-10                 | 2.50E-10       |                             |
|                  | Worst Case        | 1.42E-12              | 1.42E-12    | 7.06E-12   | 3.33E-15 | 2.28E-14                 | 8.76E-10       | 7.78E-09                 | 8.66E-09       |                             |
| 2 to < 3 years   | Average           | 2.94E-12              | 2.94E-12    | 7.71E-13   | 6.28E-15 | 3.97E-14                 | 2.18E-11       | 1.79E-10                 | 2.05E-10       |                             |
|                  | Worst Case        | 2.94E-12              | 2.94E-12    | 8.15E-12   | 6.28E-15 | 3.97E-14                 | 7.60E-10       | 6.25E-09                 | 7.02E-09       |                             |
| 3 to < 6 years   | Average           | 3.52E-12              | 3.52E-12    | 1.58E-12   | 3.70E-14 | 1.24E-13                 | 6.57E-11       | 3.87E-10                 | 4.58E-10       |                             |
|                  | Worst Case        | 3.52E-12              | 3.52E-12    | 1.67E-11   | 3.70E-14 | 1.24E-13                 | 2.29E-09       | 1.35E-08                 | 1.58E-08       |                             |
| 6 to < 11 years  | Average           | 2.89E-12              | 2.89E-12    | 1.71E-12   | 4.42E-14 | 1.50E-13                 | 8.58E-11       | 3.67E-10                 | 4.58E-10       |                             |
|                  | Worst Case        | 2.89E-12              | 2.89E-12    | 1.80E-11   | 4.42E-14 | 1.50E-13                 | 2.99E-09       | 1.28E-08                 | 1.58E-08       |                             |
| 11 to < 16 years | Average           | 1.49E-12              | 1.49E-12    | 1.18E-12   | 2.80E-14 | 6.35E-14                 | 2.49E-11       | 2.09E-10                 | 2.37E-10       |                             |
|                  | Worst Case        | 1.49E-12              | 1.49E-12    | 1.25E-11   | 2.80E-14 | 6.35E-14                 | 8.69E-10       | 7.30E-09                 | 8.18E-09       |                             |
| 16 to < 21 years | Average           | 1.32E-12              | 1.32E-12    | 1.01E-12   | 9.28E-15 | 5.14E-14                 | 2.32E-11       | 1.66E-10                 | 1.92E-10       |                             |
|                  | Worst Case        | 1.32E-12              | 1.32E-12    | 1.07E-11   | 9.28E-15 | 5.14E-14                 | 8.10E-10       | 5.79E-09                 | 6.61E-09       |                             |



**Table 5 -1 Exposure and Risk Summary: Percent Contribution by Pathway**

**Cancer Effects**

| Receptor           | Exposure Scenario | Breast Milk Ingestion |              |              |              | Outdoor Air  |              | Indoor Air   |              | Dermal Contact with Soil |              | Dermal Contact with Dust |              | Total Excess Lifetime Cancer Risk |                                   |
|--------------------|-------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------------------|--------------|--------------------------|--------------|-----------------------------------|-----------------------------------|
|                    |                   | % Total Risk          | % Total Risk | % Total Risk | % Total Risk | % Total Risk | % Total Risk | % Total Risk | % Total Risk | % Total Risk             | % Total Risk | % Total Risk             | % Total Risk | Dust Ingestion                    | Total Excess Lifetime Cancer Risk |
| Adult              | Average           |                       | 1.1%         | 0.8%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 20.6%        | 77.5%                    | 1.15E-09     |                                   |                                   |
|                    | Worst Case        |                       | 0.0%         | 0.2%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 21.0%        | 78.8%                    | 3.96E-08     |                                   |                                   |
| Child              |                   |                       |              |              |              |              |              |              |              |                          |              |                          |              |                                   |                                   |
| Birth to < 1 month | Average           | 92.1%                 |              | 7.9%         |              |              |              |              |              |                          |              |                          | 8.05E-13     |                                   |                                   |
|                    | Worst Case        | 98.0%                 |              | 2.0%         |              |              |              |              |              |                          |              |                          | 3.30E-11     |                                   |                                   |
| 1 < 3 months       | Average           | 93.8%                 | 0.0%         | 6.2%         |              |              |              |              |              |                          |              |                          | 2.75E-12     |                                   |                                   |
|                    | Worst Case        | 98.4%                 | 0.0%         | 1.6%         |              |              |              |              |              |                          |              |                          | 1.14E-10     |                                   |                                   |
| 3 < 6 months       | Average           | 94.0%                 | 0.0%         | 5.9%         |              |              |              |              |              |                          |              |                          | 2.26E-12     |                                   |                                   |
|                    | Worst Case        | 98.5%                 | 0.0%         | 1.5%         |              |              |              |              |              |                          |              |                          | 9.99E-11     |                                   |                                   |
| 6 < 12 months      | Average           | 3.0%                  | 0.0%         | 0.3%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 13.2%        | 83.5%                    | 9.54E-11     |                                   |                                   |
|                    | Worst Case        | 3.7%                  | 0.0%         | 0.1%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 13.2%        | 83.1%                    | 3.35E-09     |                                   |                                   |
| 1 to < 2 years     | Average           |                       | 0.6%         | 0.3%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 10.0%        | 89.1%                    | 2.50E-10     |                                   |                                   |
|                    | Worst Case        |                       | 0.0%         | 0.1%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 10.1%        | 89.8%                    | 8.66E-09     |                                   |                                   |
| 2 to < 3 years     | Average           |                       | 1.4%         | 0.4%         | 0.1%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 10.6%        | 87.5%                    | 2.05E-10     |                                   |                                   |
|                    | Worst Case        |                       | 0.0%         | 0.1%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 10.8%        | 89.0%                    | 7.02E-09     |                                   |                                   |
| 3 to < 6 years     | Average           |                       | 0.8%         | 0.3%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 14.3%        | 84.5%                    | 4.58E-10     |                                   |                                   |
|                    | Worst Case        |                       | 0.0%         | 0.1%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 14.5%        | 85.4%                    | 1.58E-08     |                                   |                                   |
| 6 to < 11 years    | Average           |                       | 0.6%         | 0.4%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 18.7%        | 80.2%                    | 4.58E-10     |                                   |                                   |
|                    | Worst Case        |                       | 0.0%         | 0.1%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 18.9%        | 81.0%                    | 1.58E-08     |                                   |                                   |
| 11 to < 16 years   | Average           |                       | 0.6%         | 0.5%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 10.5%        | 88.3%                    | 2.37E-10     |                                   |                                   |
|                    | Worst Case        |                       | 0.0%         | 0.2%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 10.6%        | 89.2%                    | 8.18E-09     |                                   |                                   |
| 16 to < 21 years   | Average           |                       | 0.69%        | 0.53%        | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 12.12%       | 86.64%                   | 1.92E-10     |                                   |                                   |
|                    | Worst Case        |                       | 0.02%        | 0.16%        | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%         | 0.0%                     | 12.25%       | 87.57%                   | 6.61E-09     |                                   |                                   |



**Table 5 - 3 Average Daily Dose (ADD)  
By receptor and pathway and compared to range of RfDs.**

| Receptor         | Exposure Scenario  | Breast Milk Ingestion |           | Outdoor Air |           | Indoor Air |           | Dermal Contact with Soil |           | Dermal Contact with Dust |           | Dust Ingestion |           | Total ADD |                  | RID TetraBDE- RID DecaBDE |       |
|------------------|--------------------|-----------------------|-----------|-------------|-----------|------------|-----------|--------------------------|-----------|--------------------------|-----------|----------------|-----------|-----------|------------------|---------------------------|-------|
|                  |                    | mg/kg-day             | mg/kg-day | mg/kg-day   | mg/kg-day | mg/kg-day  | mg/kg-day | mg/kg-day                | mg/kg-day | mg/kg-day                | mg/kg-day | mg/kg-day      | mg/kg-day | mg/kg-day | ng/kg bw per day | ng/kg bw per day          | (PPT) |
| Adult            | Average            |                       | 2.38E-08  | 6.52E-08    | 8.77E-10  | 3.30E-09   | 1.04E-06  | 3.91E-06                 | 5.04E-06  | 5.04                     | 5.04      | 100            | 70        |           |                  |                           |       |
|                  | Worst Case         |                       | 2.38E-08  | 6.94E-07    | 8.77E-10  | 3.30E-09   | 2.37E-05  | 8.90E-05                 | 1.18E-04  | 113.42                   | 113.42    | 100            | 70        |           |                  |                           |       |
| Child            | Birth to < 1 month |                       |           |             |           |            |           |                          |           |                          |           |                |           |           |                  |                           |       |
|                  | Average            | 9.34E-05              |           | 3.08E-07    |           |            |           |                          |           |                          |           |                |           | 9.37E-05  | 93.69            | 100                       | 70    |
|                  | Worst Case         | 1.38E-03              |           | 3.58E-06    |           |            |           |                          |           |                          |           |                |           | 1.38E-03  | 1,382.53         | 100                       | 70    |
| 1 < 3 months     | Average            |                       | 5.41E-10  | 2.76E-07    |           |            |           |                          |           |                          |           |                |           | 1.09E-04  | 108.56           | 100                       | 70    |
|                  | Worst Case         |                       | 5.41E-10  | 3.22E-06    |           |            |           |                          |           |                          |           |                |           | 1.60E-03  | 1,602.34         | 100                       | 70    |
| 3 < 6 months     | Average            |                       | 1.40E-09  | 2.16E-07    |           |            |           |                          |           |                          |           |                |           | 8.93E-05  | 89.30            | 100                       | 70    |
|                  | Worst Case         |                       | 1.40E-09  | 2.53E-06    |           |            |           |                          |           |                          |           |                |           | 1.32E-03  | 1,317.44         | 100                       | 70    |
| 6 < 12 months    | Average            |                       | 8.19E-09  | 2.16E-07    | 7.36E-09  | 4.66E-08   | 6.06E-06  | 3.88E-05                 | 1.04E-04  | 103.88                   | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 8.19E-09  | 2.53E-06    | 7.36E-09  | 4.66E-08   | 1.38E-04  | 8.73E-04                 | 1.89E-03  | 1,888.23                 | 100       | 70             |           |           |                  |                           |       |
| 1 to < 2 years   | Average            |                       | 2.52E-09  | 2.69E-07    | 1.83E-09  | 1.62E-08   | 6.03E-06  | 5.36E-05                 | 5.98E-05  | 59.88                    | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 2.52E-09  | 3.15E-06    | 1.83E-09  | 1.62E-08   | 1.38E-04  | 1.22E-03                 | 1.36E-03  | 1,361.61                 | 100       | 70             |           |           |                  |                           |       |
| 2 to < 3 years   | Average            |                       | 5.22E-09  | 3.10E-07    | 5.95E-08  | 2.83E-08   | 5.24E-06  | 4.30E-05                 | 4.87E-05  | 48.67                    | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 5.22E-09  | 3.64E-06    | 5.95E-08  | 2.83E-08   | 1.19E-04  | 9.81E-04                 | 1.10E-03  | 1,104.06                 | 100       | 70             |           |           |                  |                           |       |
| 3 to < 6 years   | Average            |                       | 6.25E-09  | 2.12E-07    | 6.75E-09  | 2.95E-08   | 5.26E-06  | 3.10E-05                 | 3.65E-05  | 36.52                    | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 6.25E-09  | 2.48E-06    | 6.75E-09  | 2.95E-08   | 1.20E-04  | 7.07E-04                 | 8.29E-04  | 829.25                   | 100       | 70             |           |           |                  |                           |       |
| 6 to < 11 years  | Average            |                       | 5.13E-09  | 1.37E-07    | 4.84E-09  | 2.13E-08   | 4.12E-06  | 1.77E-05                 | 2.19E-05  | 21.94                    | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 5.13E-09  | 9.40E-05    | 4.84E-09  | 2.13E-08   | 9.40E-05  | 4.02E-04                 | 5.90E-04  | 590.41                   | 100       | 70             |           |           |                  |                           |       |
| 11 to < 16 years | Average            |                       | 2.65E-09  | 9.53E-08    | 3.07E-09  | 9.03E-09   | 1.20E-06  | 1.01E-05                 | 1.14E-05  | 11.36                    | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 2.65E-09  | 1.12E-06    | 3.07E-09  | 9.03E-09   | 2.73E-05  | 2.29E-04                 | 2.58E-04  | 257.70                   | 100       | 70             |           |           |                  |                           |       |
| 16 to < 21 years | Average            |                       | 2.34E-09  | 8.14E-08    | 1.02E-09  | 7.31E-09   | 1.12E-06  | 1.01E-05                 | 1.19E-05  | 11.27                    | 100       | 70             |           |           |                  |                           |       |
|                  | Worst Case         |                       | 2.34E-09  | 9.54E-07    | 1.02E-09  | 7.31E-09   | 2.54E-05  | 2.29E-04                 | 2.56E-04  | 255.68                   | 100       | 70             |           |           |                  |                           |       |

Note: PBDE intake studies present data in parts per trillion, expressed as ng/kg per day. Therefore, this chart shows ADD values converted to parts per trillion for the sake of comparison. Total ADD values that are near or exceed the lowest PBDE RID are highlighted either via an outline (average exposure scenario) or shaded in grey (worst case).

**Table 5 - 4 Comparing Four Studies -- Estimated Daily PBDE Exposure and Absorbed Doses for U.S.**

| Infant                              | Toddler<br>(1-5 yrs) | Child<br>(6-11 yrs) | Adolescent<br>(12-19 yrs) | Adult              | Pathways        | Exposure Dose<br>vs. Absorbed<br>Dose | Reference                           |
|-------------------------------------|----------------------|---------------------|---------------------------|--------------------|-----------------|---------------------------------------|-------------------------------------|
| ng/kg-day<br>(PPT)                  | ng/kg-day<br>(PPT)   | ng/kg-day<br>(PPT)  | ng/kg-day<br>(PPT)        | ng/kg-day<br>(PPT) |                 |                                       |                                     |
| 427.6 to 153.4 newborn to 9<br>mos  | 124.9 - 38.4         | 16.2 - 9.5          | 11.8 - 7.5                | 7.1                | Comprehensive * | Exposure Dose                         | US EPA (2010)                       |
| 86.4                                | 13.3                 | 5.3                 | 3.5                       | 2.9                | Comprehensive * | Exposure Dose                         | Johnson-Restrepo &<br>Kannan (2009) |
| 400 - 140 newborn to 9 months       | 49.3                 | 14.4                | 9.1                       | 7.7                | Comprehensive * | Exposure Dose                         | Lorber (2008)                       |
| 108.6 - 89.3<br>(newborn to 12 mos) | 59.9 - 36.5          | 21.9                | 11.4 - 11.3               | 5.04               | Excludes Diet   | Absorbed Dose                         | This study                          |

Notes: PPT = Parts per trillion.

Comprehensive = exposure dose from 6 pathways: indoor & outdoor air, dermal contact and ingestion of outdoor soil and indoor dust, and diet.

Excludes Diet = average daily dose from 5 pathways: indoor & outdoor, air, dermal contact w/soil and dust, ingestion of soil/dust.

**Table 5 - 5 Average Daily Dose: With and Without Food Ingestion**

| Receptor | Exposure Scenario | Dermal            |                   |                   |                   |                    |                    | ADD                |                     |                     |             |  |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|---------------------|---------------------|-------------|--|
|          |                   | Outdoor Air       | Indoor Air        | Contact with Soil | Soil Ingestion    | Contact with Dust  | Dust Ingestion     |                    | Food Ingestion      |                     |             |  |
|          |                   | mg/kg - day       | mg/kg - day       | mg/kg - day       | mg/kg - day       | mg/kg - day        | mg/kg - day        | mg/kg - day        | mg/kg - day         | mg/kg - day         | ng/kg - day |  |
| Adult    | Average           | 2.36E-08<br>0.47% | 6.52E-08<br>1.29% | 8.77E-10<br>0.02% | 3.30E-09<br>0.07% | 1.04E-06<br>20.62% | 3.91E-06<br>77.53% | 0.00E+00<br>0.00%  | 5.04E-06<br>100.00% | 5.04<br>(PPT)       |             |  |
|          |                   | 2.36E-08<br>0.39% | 6.52E-08<br>1.08% | 8.77E-10<br>0.01% | 3.30E-09<br>0.05% | 1.04E-06<br>17.21% | 3.91E-06<br>64.69% | 1.00E-06<br>16.57% | 6.04E-06<br>100.00% | 6.04                |             |  |
| Child    |                   |                   |                   |                   |                   |                    |                    |                    |                     |                     |             |  |
|          | 2 to < 3 years    | Average           | 5.22E-09<br>0.01% | 3.10E-07<br>0.64% | 5.95E-08<br>0.12% | 2.83E-08<br>0.06%  | 5.24E-06<br>10.76% | 4.30E-05<br>88.41% | 0.00E+00<br>0.00%   | 4.87E-05<br>100.00% | 48.67       |  |
|          |                   | 5.22E-09<br>0.01% | 3.10E-07<br>0.60% | 5.95E-08<br>0.12% | 2.83E-08<br>0.06% | 5.24E-06<br>10.20% | 4.30E-05<br>83.82% | 2.67E-06<br>5.20%  | 5.13E-05<br>100.00% | 51.34               |             |  |
|          | 6 to < 11 years   | Average           | 5.13E-09<br>0.02% | 1.37E-07<br>0.63% | 4.84E-09<br>0.02% | 2.13E-08<br>0.10%  | 4.12E-06<br>18.79% | 1.77E-05<br>80.44% | 0.00E+00<br>0.00%   | 2.19E-05<br>100.00% | 21.94       |  |
|          |                   | 5.13E-09<br>0.02% | 1.37E-07<br>0.58% | 4.84E-09<br>0.02% | 2.13E-08<br>0.09% | 4.12E-06<br>17.41% | 1.77E-05<br>74.53% | 1.74E-06<br>7.35%  | 2.37E-05<br>100.00% | 23.68               |             |  |
|          | 11 to < 16 years  | Average           | 2.65E-09<br>0.02% | 9.53E-08<br>0.84% | 3.07E-09<br>0.03% | 9.03E-09<br>0.08%  | 1.20E-06<br>10.53% | 1.01E-05<br>88.50% | 0.00E+00<br>0.00%   | 1.14E-05<br>100.00% | 11.36       |  |
|          |                   | 2.65E-09<br>0.02% | 9.53E-08<br>0.75% | 3.07E-09<br>0.02% | 9.03E-09<br>0.07% | 1.20E-06<br>9.41%  | 1.01E-05<br>79.10% | 1.35E-06<br>10.62% | 1.27E-05<br>100.00% | 12.71               |             |  |
|          | 16 to < 21 years  | Average           | 2.34E-09<br>0.02% | 8.14E-08<br>0.72% | 1.02E-09<br>0.01% | 7.31E-09<br>0.06%  | 1.12E-06<br>9.90%  | 1.01E-05<br>89.28% | 0.00E+00<br>0.00%   | 1.13E-05<br>100.00% | 11.27       |  |
|          |                   | 2.34E-09<br>0.02% | 8.14E-08<br>0.65% | 1.02E-09<br>0.01% | 7.31E-09<br>0.06% | 1.12E-06<br>8.84%  | 1.01E-05<br>79.72% | 1.35E-06<br>10.70% | 1.26E-05<br>100.00% | 12.62               |             |  |

Note: Source for daily food intake Schecter et al. (2010). "Polychlorinated biphenyl ether levels in foodstuffs collected from three locations from the United States." The data from Schecter are average daily intake rates (not absorbed doses). In addition, Schecter calculates an average intake rate of 1.35E-06 for ages 12-19 years. For the sake of comparison, this chart assumes this rate for ages 11 to < 21 years.

**Table 5 - 6 Comparing Three Data Sets: Risk Estimates for Breast Milk Ingestion by Infants**

**Cancer Effects**

| Receptor                     | Exposure Scenario              | Excess Lifetime Cancer Risk                                    | Excess Lifetime Cancer Risk   | Excess Lifetime Cancer Risk                               |
|------------------------------|--------------------------------|--|---|---|
| Child                        |                                | Wu et al., 2007<br>Massachusetts<br>(Data used for this paper) | Restreppo et al., 2007<br>Massachusetts<br>(Data not used for this paper) | She et al., 2007<br>Northwest US<br>(Data used by US EPA) |
| <b>Birth to &lt; 1 month</b> | Average (Median)<br>Worst Case | 7.42E-13<br>3.23E-11   | NA<br>NA  | 1.28E-12<br>1.26E-11                                      |
| <b>1 &lt; 3 months</b>       | Average (Median)<br>Worst Case | 2.58E-12<br>1.13E-10   | NA<br>NA  | 4.44E-12<br>4.40E-11                                      |
| <b>3 &lt; 6 months</b>       | Average (Median)<br>Worst Case | 2.12E-12<br>9.25E-11   | NA<br>NA  | 3.65E-12<br>3.62E-11                                      |
| <b>6 &lt; 12 months</b>      | Average (Median)<br>Worst Case | 2.82E-12<br>1.23E-10   | NA<br>NA  | 4.86E-12<br>4.81E-11                                      |

Note: NA, not applicable. Johnson-Restreppo and colleagues report that BDE-209 (DecaBDE) was not detected in any samples above the detection limit (204 ng/g).

**Table 5 - 7 Comparing Three Data Sets: Risk Estimates for Breast Milk Ingestion by Infants**

**Noncancer Effects**

| Receptor | Exposure Scenario  | Receptor Hazard Index            | Receptor Hazard Index                   | Receptor Hazard Index            |          |
|----------|--------------------|----------------------------------|---|----------------------------------|----------|
| Child    |                    | Wu et al., 2007<br>Massachusetts | Restreppo et al., 2007<br>Massachusetts | She et al., 2007<br>Northwest US |          |
|          |                    | (Data used for this paper)       | (Data not used for this paper)          | (Data used by US EPA)            |          |
|          | Birth to < 1 month | Average (Median)                 | 8.59E-01                                | 6.10E-01                         | 1.79E+00 |
|          |                    | Worst Case                       | 1.15E+01                                | 7.12E+01                         | 1.69E+01 |
|          | 1 < 3 months       | Average (Median)                 | 9.96E-01                                | 7.08E-01                         | 2.08E+00 |
|          |                    | Worst Case                       | 1.33E+01                                | 8.25E+01                         | 1.96E+01 |
|          | 3 < 6 months       | Average (Median)                 | 8.20E-01                                | 5.82E-01                         | 1.71E+00 |
|          |                    | Worst Case                       | 1.10E+01                                | 6.79E+01                         | 1.61E+01 |
|          | 6 < 12 months      | Average (Median)                 | 5.45E-01                                | 3.87E-01                         | 3.87E-01 |
|          |                    | Worst Case                       | 7.30E+00                                | 4.51E+01                         | 4.51E+01 |

**APPENDIX B – RISK ASSESSMENT SPREADSHEETS**

INHALATION of Indoor Air

Receptor: Birth to < 1 month

| COC                     | EPC     | Intake | Fraction Indoor | Frquency | Duration | Period | Absorbency Factor | Conversion Factor | Body Weight |       |      | AT | ADD ing | RfD     | HI      | AT Cancer Effects |           | LADD inh | SF      | ELCR |          |
|-------------------------|---------|--------|-----------------|----------|----------|--------|-------------------|-------------------|-------------|-------|------|----|---------|---------|---------|-------------------|-----------|----------|---------|------|----------|
|                         |         |        |                 |          |          |        |                   |                   | kg          | yrs   | days |    |         |         |         | (yrs x d)         | mg/kg-day |          |         |      | mg/kg-da |
| <b>Central Tendency</b> |         |        |                 |          |          |        |                   |                   |             |       |      |    |         |         |         |                   |           |          |         |      |          |
| tetra/penta             | 321.13  | 3.6    | 1.00            | 7        | 52       | 0.08   | 0.9               | 1.00E-09          | 4.8         | 0.08  | 365  | 30 | 2.2E-07 | 1.0E-04 | 2.2E-03 |                   |           |          |         |      |          |
| hexa/hepta              | 12.17   | 3.6    | 1.00            | 7        | 52       | 0.08   | 0.9               | 1.00E-09          | 4.8         | 0.08  | 365  | 30 | 8.2E-09 | 2.0E-04 | 4.1E-05 |                   |           |          |         |      |          |
| deca                    | 120.87  | 3.6    | 1.00            | 7        | 52       | 0.08   | 0.9               | 1.00E-09          | 4.8         | 0.08  | 365  | 30 | 8.1E-08 | 7.0E-03 | 1.2E-05 | 27375             | 9.0E-11   | 0.0007   | 6.3E-14 |      |          |
|                         |         |        |                 |          |          |        |                   |                   |             |       |      |    | 3.1E-07 |         | 2.2E-03 |                   |           |          |         |      |          |
| <b>Worst Case</b>       |         |        |                 |          |          |        |                   |                   |             |       |      |    |         |         |         |                   |           |          |         |      |          |
| tetra/penta             | 3848.90 | 3.6    | 1.00            | 7        | 52       | 0.08   | 0.9               | 1.00E-09          | 4.8         | 0.083 | 365  | 30 | 2.6E-06 | 1.0E-04 | 2.6E-02 |                   |           |          |         |      |          |
| hexa/hepta              | 194.70  | 3.6    | 1.00            | 7        | 52       | 0.08   | 0.9               | 1.00E-09          | 4.8         | 0.083 | 365  | 30 | 1.3E-07 | 2.0E-04 | 6.6E-04 |                   |           |          |         |      |          |
| deca                    | 1277.70 | 3.6    | 1.00            | 7        | 52       | 0.08   | 0.9               | 1.00E-09          | 4.8         | 0.083 | 365  | 30 | 8.6E-07 | 7.0E-03 | 1.2E-04 | 27375             | 9.6E-10   | 0.0007   | 6.7E-13 |      |          |
|                         |         |        |                 |          |          |        |                   |                   |             |       |      |    | 3.6E-06 |         | 2.7E-02 |                   |           |          |         |      |          |

**INGESTION of Breast Milk**

**Receptor: Birth to < 1 month**

| COC                     | EPC  | % Fat in Breast Milk | Ingestion Rate<br>mL/day | Frequency<br>d/wk | Duration<br>yr | Absorbency Factor<br>RAF | Conversion Factor<br>1 L / 1000 mL | Conversion Factor<br>1 Kg / 1000 g | Conversion Factor<br>/g | Conversion Factor<br>1000 mg / g | Conversion Factor<br>1 mg / 10 <sup>6</sup> ng | Conversion Factor<br>1 kg / 10 <sup>6</sup> mg | Body Weight |         |         | AT<br>(yr x d) | ADD ing<br>mg/kg-day | RfD<br>mg/kg-day | HI | AT Cancer Effects<br>(yr x d) | LADD inh<br>mg/kg-day | SF      | ELCR  |        |        |        |  |  |  |  |
|-------------------------|------|----------------------|--------------------------|-------------------|----------------|--------------------------|------------------------------------|------------------------------------|-------------------------|----------------------------------|--|--|-------------|---------|---------|----------------|----------------------|------------------|----|-------------------------------|-----------------------|---------|-------|--------|--------|--------|--|--|--|--|
|                         |      |                      |                          |                   |                |                          |                                    |                                    |                         |                                  |  |  | kg          | yr      | d       |                |                      |                  |    |                               |                       |         |       |        |        |        |  |  |  |  |
| <b>Central Tendency</b> |      |                      |                          |                   |                |                          |                                    |                                    |                         |                                  |  |  |             |         |         |                |                      |                  |    |                               |                       |         |       |        |        |        |  |  |  |  |
| tetra/penta             | 20.9 | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 8.E-05                        | 1.E-04                | 8.0E-01 |       |        |        |        |  |  |  |  |
| hexal/hepta             | 3.23 | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 1.E-05                        | 2.E-04                | 6.2E-02 |       |        |        |        |  |  |  |  |
| octa                    | 0.1  | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 4.E-07                        | 3.E-03                | 1.3E-04 |       |        |        |        |  |  |  |  |
| deca                    | 0.25 | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 1.E-06                        | 7.E-03                | 1.4E-04 | 27375 | 1.E-09 | 7.E-04 | 7.E-13 |  |  |  |  |
| <b>8.6E-01</b>          |      |                      |                          |                   |                |                          |                                    |                                    |                         |                                  |  |  |             |         |         |                |                      |                  |    |                               |                       |         |       |        |        |        |  |  |  |  |
| <b>Worst Case</b>       |      |                      |                          |                   |                |                          |                                    |                                    |                         |                                  |  |  |             |         |         |                |                      |                  |    |                               |                       |         |       |        |        |        |  |  |  |  |
| tetra/penta             | 253  | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 1.E-03                        | 1.E-04                | 9.7E+00 |       |        |        |        |  |  |  |  |
| hexal/hepta             | 97.1 | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 4.E-04                        | 2.E-04                | 1.9E+00 |       |        |        |        |  |  |  |  |
| octa                    | 0.5  | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 2.E-06                        | 3.E-03                | 6.4E-04 |       |        |        |        |  |  |  |  |
| deca                    | 10.9 | 0.04                 | 510                      | 7                 | 52             | 0.08                     | 0.9                                | 1.0E-03                            | 1                       | 1000                             | 1000   | 1.0E+03  | 1.0E-06     | 1.0E-06 | 1.0E-06 | 4.8            | 0.08                 | 365              | 30 | 4.E-05                        | 7.E-03                | 5.9E-03 | 27375 | 5.E-08 | 7.E-04 | 3.E-11 |  |  |  |  |
| <b>1.2E+01</b>          |      |                      |                          |                   |                |                          |                                    |                                    |                         |                                  |  |  |             |         |         |                |                      |                  |    |                               |                       |         |       |        |        |        |  |  |  |  |

Note: EPC = PBDE concentration in br.  
1 Liter water = 1 Kilogram, assume 1 Liter breast milk = 1 Kilogram.

**INHALATION of Outdoor Air**

**Receptor: Child 1 < 3 months**

| COC                     | EPC<br>pg/m <sup>3</sup> | IR<br>m <sup>3</sup> /day | Fraction Outdoor |      | Frequency<br>days/<br>week | Duration<br>weeks/<br>year | Period<br>years | Absorbency Factor | Conversion Factor<br>1 mg/10 <sup>9</sup><br>pg | Body Weight<br>kg | AT<br>(years x<br>days) | ADD inh<br>mg/kg-day | RfD<br>mg/kg-day | HI       | AT<br>Cancer<br>Effects<br>(years x<br>days) | LADD inh<br>mg/kg-day | Slope<br>Factor<br>per mg/kg<br>per day | ELCR     |  |
|-------------------------|--------------------------|---------------------------|------------------|------|----------------------------|----------------------------|-----------------|-------------------|---|-------------------|-------------------------|----------------------|------------------|----------|--|-----------------------|---|----------|--|
|                         |                          |                           | IR               | IR   |                            |                            |                 |                   |   |                   |                         |                      |                  |          |  |                       |   |          |  |
| <b>Central Tendency</b> |                          |                           |                  |      |                            |                            |                 |                   |   |                   |                         |                      |                  |          |  |                       |   |          |  |
| tetra/penta BDEs        | 124.00                   | 3.8                       | 0.01             | 0.01 | 7                          | 52                         | 0.25            | 0.9               | 1.00E-09  | 5.6               | 91.25                   | 4.20E-10             | 0.0001           | 4.20E-06 |  |                       |   |          |  |
| hexa/hepta BDEs         | 9.00                     | 3.8                       | 0.01             | 0.01 | 7                          | 55                         | 0.25            | 0.9               | 1.00E-09  | 5.6               | 91.25                   | 3.22E-11             | 0.0002           | 1.61E-07 |  |                       |   |          |  |
| deca BDE                | 25.00                    | 3.8                       | 0.01             | 0.01 | 7                          | 55                         | 0.25            | 0.9               | 1.00E-09  | 5.6               | 91.25                   | 8.95E-11             | 0.007            | 1.28E-08 | 27375  | 2.98E-13              | 0.0007                                  | 2.09E-16 |  |
|                         |                          |                           |                  |      |                            |                            |                 |                   |   |                   |                         | 5.41E-10             |                  | 4.37E-06 |  |                       |   |          |  |



**INGESTION of Breast Milk**

**Receptor: Child 1 < 3 months**

| COC                     | Fraction of Fat in Breast Milk |      | Ingestion Rate<br>mL/day | Frequency<br>days/<br>week | Duration<br>weeks/<br>year | Period<br>years | Absorbency Factor<br>RAF | Conversion Factor<br>1 L / 1000 mL | Conversion Factor<br>1 Kg / 1 L | Conversion Factor<br>1000 g / 1 Kg | Conversion Factor<br>1000 mg / g | Conversion Factor<br>1,000 g / kg | Conversion Factor<br>1 mg / 10 <sup>6</sup> ng | Conversion Factor<br>1 kg / 1 x 10 <sup>6</sup> mg |
|-------------------------|--------------------------------|------|--------------------------|----------------------------|----------------------------|-----------------|--------------------------|------------------------------------|---------------------------------|------------------------------------|----------------------------------|-----------------------------------|--|--|
|                         | EPC<br>ng/g lipid<br>wt        | Milk |                          |                            |                            |                 |                          |                                    |                                 |                                    |                                  |                                   |  |  |
| <b>Central Tendency</b> |                                |      |                          |                            |                            |                 |                          |                                    |                                 |                                    |                                  |                                   |  |  |
| tetra/penta BDEs        | 20.9                           | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| hexa/hepta BDEs         | 3.23                           | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| octa BDE                | 0.1                            | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| deca BDE                | 0.25                           | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| <b>Worst Case</b>       |                                |      |                          |                            |                            |                 |                          |                                    |                                 |                                    |                                  |                                   |  |  |
| tetra/penta BDEs        | 253                            | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| hexa/hepta BDEs         | 97.1                           | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| octa BDE                | 0.5                            | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |
| deca BDE                | 10.9                           | 0.04 | 690                      | 7                          | 52                         | 0.25            | 0.9                      | 1.00E-03                           | 1                               | 1000                               | 1000                             | 1.00E+03                          | 1.00E-06                                       | 1.00E-06   |

Note: EPC = PBDE concentration in breast milk fat  
 1 Liter water = 1 Kilogram, assume 1 Liter breast milk = 1 Kilogram.

| Body Weight | Averaging Time |                | ADD inh   | RfD       | HI              | AT Cancer Effects<br>(years x days) | LADD inh  | Slope Factor | ELCR     |
|-------------|----------------|----------------|-----------|-----------|-----------------|-------------------------------------|-----------|--------------|----------|
|             | years          | days           |           |           |                 |                                     |           |              |          |
| kg          |                | (years x days) | mg/kg-day | mg/kg-day |                 |                                     | mg/kg-day | per mg/kg    |          |
|             |                |                |           |           |                 |                                     |           | per day      |          |
| 5.6         | 0.25           | 365            | 91.25     | 0.0001    | 9.25E-01        |                                     |           |              |          |
| 5.6         | 0.25           | 365            | 91.25     | 0.0002    | 7.14E-02        |                                     |           |              |          |
| 5.6         | 0.25           | 365            | 91.25     | 0.003     | 1.47E-04        |                                     |           |              |          |
| 5.6         | 0.25           | 365            | 91.25     | 0.007     | 1.58E-04        | 27375                               | 3.69E-09  | 0.0007       | 2.58E-12 |
|             |                |                |           |           | <u>9.96E-01</u> |                                     |           |              |          |
|             |                |                |           |           | <u>1.33E+01</u> |                                     |           |              |          |
| 5.6         | 0.3            | 365            | 91.25     | 0.0001    | 1.12E+01        |                                     |           |              |          |
| 5.6         | 0.3            | 365            | 91.25     | 0.0002    | 2.15E+00        |                                     |           |              |          |
| 5.6         | 0.3            | 365            | 91.25     | 0.003     | 7.37E-04        |                                     |           |              |          |
| 5.6         | 0.3            | 365            | 91.25     | 0.007     | 6.89E-03        | 27375                               | 1.61E-07  | 0.0007       | 1.13E-10 |
|             |                |                |           |           | <u>1.60E-03</u> |                                     |           |              |          |



**INHALATION of Indoor Air**

**Receptor: Child 3 < 6 months**

| COC                     | EPC     | Intake | Fraction Indoor |         | Frequency | Duration |      | Period   | Absorbency Factor | Conversion Factor | Body Weight |       | Averaging Time | ADD ing | RfD      | HI       | AT Cancer Effects | LADD inh | Slope Factor | ELCR |
|-------------------------|---------|--------|-----------------|---------|-----------|----------|------|----------|-------------------|-------------------|-------------|-------|----------------|---------|----------|----------|-------------------|----------|--------------|------|
|                         |         |        | per day         | per day |           | days/wk  | year |          |                   |                   | years       | kg    |                |         |          |          |                   |          |              |      |
| <b>Central Tendency</b> |         |        |                 |         |           |          |      |          |                   |                   |             |       |                |         |          |          |                   |          |              |      |
| tetra/penta BDEs        | 321.13  | 4.1    | 0.98            | 7       | 52        | 0.25     | 0.9  | 1.00E-09 | 7.6               | 0.25              | 365         | 91.25 | 1.53E-07       | 0.0001  | 1.53E-03 |          |                   |          |              |      |
| hexa/hepta BDEs         | 12.17   | 4.1    | 0.98            | 7       | 52        | 0.25     | 0.9  | 1.00E-09 | 7.6               | 0.25              | 365         | 91.25 | 5.78E-09       | 0.0002  | 2.89E-05 |          |                   |          |              |      |
| deca BDE                | 120.87  | 4.1    | 0.98            | 7       | 52        | 0.25     | 0.9  | 1.00E-09 | 7.6               | 0.25              | 365         | 91.25 | 5.75E-08       | 0.007   | 8.21E-06 | 27375    | 1.92E-10          | 0.0007   | 1.34E-13     |      |
|                         |         |        |                 |         |           |          |      |          |                   |                   |             |       | 2.16E-07       |         |          | 1.56E-03 |                   |          |              |      |
| <b>Worst Case</b>       |         |        |                 |         |           |          |      |          |                   |                   |             |       |                |         |          |          |                   |          |              |      |
| tetra/penta BDEs        | 3848.90 | 4.1    | 0.98            | 7       | 52        | 0.25     | 0.9  | 1.00E-09 | 7.6               | 0.25              | 365         | 91.25 | 1.83E-06       | 0.0001  | 1.83E-02 |          |                   |          |              |      |
| hexa/hepta BDEs         | 194.70  | 4.1    | 0.98            | 7       | 52        | 0.25     | 0.9  | 1.00E-09 | 7.6               | 0.25              | 365         | 91.25 | 9.26E-08       | 0.0002  | 4.63E-04 |          |                   |          |              |      |
| deca BDE                | 1277.70 | 4.1    | 0.98            | 7       | 52        | 0.25     | 0.9  | 1.00E-09 | 7.6               | 0.25              | 365         | 91.25 | 6.07E-07       | 0.007   | 8.68E-05 | 27375    | 2.02E-09          | 0.0007   | 1.42E-12     |      |
|                         |         |        |                 |         |           |          |      |          |                   |                   |             |       | 2.53E-06       |         |          | 1.88E-02 |                   |          |              |      |

**INGESTION of Breast Milk**

**Receptor: Child 3 < 6 months**

| COC                     | Fraction of Fat in Breast Milk |      | Ingestion Rate | Frequency | Duration | Period | Absorbency Factor | Conversion Factor | Conversion Factor | Conversion Factor | Conversion Factor | Conversion Factor | Conversion Factor |               |          |            |
|-------------------------|--------------------------------|------|----------------|-----------|----------|--------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|----------|------------|
|                         | EPC                            | Milk |                |           |          |        |                   |                   |                   |                   |                   |                   |                   | ng/g lipid wt | mL/day   | days/ week |
| <b>Central Tendency</b> |                                |      |                |           |          |        |                   |                   |                   |                   |                   |                   |                   |               |          |            |
| tetra/penta BDEs        | 20.911                         | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| hexa/hepta BDEs         | 3.23                           | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| octa BDE                | 0.1                            | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| deca BDE                | 0.25                           | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| <b>Worst Case</b>       |                                |      |                |           |          |        |                   |                   |                   |                   |                   |                   |                   |               |          |            |
| tetra/penta BDEs        | 253                            | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| hexa/hepta BDEs         | 97.1                           | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| octa BDE                | 0.5                            | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |
| deca BDE                | 10.9                           | 0.04 | 770            | 7         | 52       | 0.25   | 0.9               | 1.00E-03          | 1                 | 1000              | 1000              | 1000              | 1.00E+03          | 1.00E-06      | 1.00E-06 | 1.00E-06   |

Note: EPC = PBDE concentration in breast milk fat  
 1 Liter water = 1 Kilogram, assume 1 Liter breast milk = 1 Kilogram.

| Body Weight | Averaging Time |      | ADD ing   | RfD       | HI       | AT Cancer Effects |           | Slope Factor | ELCR     |
|-------------|----------------|------|-----------|-----------|----------|-------------------|-----------|--------------|----------|
|             | years          | days |           |           |          | (years x days)    | LADD inh  |              |          |
| kg          |                |      | mg/kg-day | mg/kg-day |          | (years x days)    | mg/kg-day |              |          |
| 7.6         | 0.25           | 365  | 7.61E-05  | 0.0001    | 7.61E-01 |                   |           |              |          |
| 7.6         | 0.25           | 365  | 1.17E-05  | 0.0002    | 5.87E-02 |                   |           |              |          |
| 7.6         | 0.25           | 365  | 3.64E-07  | 0.003     | 1.21E-04 |                   |           |              |          |
| 7.6         | 0.25           | 365  | 9.09E-07  | 0.007     | 1.30E-04 | 27375             | 3.03E-09  | 0.0007       | 2.12E-12 |
|             |                |      | 8.91E-05  |           | 8.20E-01 |                   |           |              |          |
| 7.6         | 0.3            | 365  | 9.20E-04  | 0.0001    | 9.20E+00 |                   |           |              |          |
| 7.6         | 0.3            | 365  | 3.53E-04  | 0.0002    | 1.77E+00 |                   |           |              |          |
| 7.6         | 0.3            | 365  | 1.82E-06  | 0.003     | 6.06E-04 |                   |           |              |          |
| 7.6         | 0.3            | 365  | 3.96E-05  | 0.007     | 5.66E-03 | 27375             | 1.32E-07  | 0.0007       | 9.25E-11 |
|             |                |      | 1.31E-03  |           | 1.10E+01 |                   |           |              |          |

INHALATION of Outdoor Air

Receptor: Child 6 < 12 months

| COC              | EPC               | IR                  | Fraction Outdoor |         | Frequency  | Duration    |      | Period | Absorbency Factor | Conversion Factor       | Body Weight | AT             | ADD inh   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|------------------|-------------------|---------------------|------------------|---------|------------|-------------|------|--------|-------------------|-------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                  |                   |                     | per day          | per day |            | days/ week  | year |        |                   |                         |             |                |           |           |           |                   |           |                   |          |
| Central Tendency | pg/m <sup>3</sup> | m <sup>3</sup> /day |                  |         | days/ week | weeks/ year | year | years  |                   | 1 mg/10 <sup>9</sup> pg | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| tetra/penta BDEs | 124.00            | 5.4                 | 0.10             | 0.10    | 7          | 52          | 0.5  | 0.5    | 0.9               | 1.00E-09                | 9.2         | 182.5          | 6.31E-09  | 0.0001    | 6.31E-05  |                   |           |                   |          |
| hexa/hepta BDEs  | 9.00              | 5.4                 | 0.10             | 0.10    | 7          | 55          | 0.5  | 0.5    | 0.9               | 1.00E-09                | 9.2         | 182.5          | 4.84E-10  | 0.0002    | 2.42E-06  |                   |           |                   |          |
| deca BDE         | 25.00             | 5.4                 | 0.10             | 0.10    | 7          | 55          | 0.5  | 0.5    | 0.9               | 1.00E-09                | 9.2         | 182.5          | 1.34E-09  | 0.007     | 1.92E-07  | 27375             | 8.98E-12  | 0.0007            | 6.28E-15 |
|                  |                   |                     |                  |         |            |             |      |        |                   |                         |             |                | 8.13E-09  |           | 6.57E-05  |                   |           |                   |          |

INHALATION of Indoor Air

Receptor: Child 6 < 12 months

| COC                     | EPC     | Intake | Fraction Indoor   |                     |         | Frequency | Duration | Period | Absorbency Factor | Conversion Factor | Body Weight | Averaging Time | ADD ing  | RfD    | HI       | AT Cancer Effects | LADD inh | Slope Factor | ELCR     |
|-------------------------|---------|--------|-------------------|---------------------|---------|-----------|----------|--------|-------------------|-------------------|-------------|----------------|----------|--------|----------|-------------------|----------|--------------|----------|
|                         |         |        | pg/m <sup>3</sup> | m <sup>3</sup> /day | per day |           |          |        |                   |                   |             |                |          |        |          |                   |          |              |          |
| <b>Central Tendency</b> |         |        |                   |                     |         |           |          |        |                   |                   |             |                |          |        |          |                   |          |              |          |
| tetra/penta BDEs        | 321.13  | 5.4    | 0.90              | 0.90                | 0.90    | 7         | 52       | 0.5    | 0.9               | 1.00E-09          | 9.2         | 182.5          | 1.53E-07 | 0.0001 | 1.53E-03 |                   |          |              |          |
| hexa/hepta BDEs         | 12.17   | 5.4    | 0.90              | 0.90                | 0.90    | 7         | 52       | 0.5    | 0.9               | 1.00E-09          | 9.2         | 182.5          | 5.79E-09 | 0.0002 | 2.90E-05 |                   |          |              |          |
| deca BDE                | 120.87  | 5.4    | 0.90              | 0.90                | 0.90    | 7         | 52       | 0.5    | 0.9               | 1.00E-09          | 9.2         | 182.5          | 5.75E-08 | 0.007  | 8.22E-06 | 27375             | 3.84E-10 | 0.0007       | 2.68E-13 |
|                         |         |        |                   |                     |         |           |          |        |                   |                   |             |                | 2.16E-07 |        | 1.57E-03 |                   |          |              |          |
| <b>Worst Case</b>       |         |        |                   |                     |         |           |          |        |                   |                   |             |                |          |        |          |                   |          |              |          |
| tetra/penta BDEs        | 3848.90 | 5.4    | 0.90              | 0.90                | 0.90    | 7         | 52       | 0.5    | 0.9               | 1.00E-09          | 9.2         | 182.5          | 1.83E-06 | 0.0001 | 1.83E-02 |                   |          |              |          |
| hexa/hepta BDEs         | 194.70  | 5.4    | 0.90              | 0.90                | 0.90    | 7         | 52       | 0.5    | 0.9               | 1.00E-09          | 9.2         | 182.5          | 9.27E-08 | 0.0002 | 4.63E-04 |                   |          |              |          |
| deca BDE                | 1277.70 | 5.4    | 0.90              | 0.90                | 0.90    | 7         | 52       | 0.5    | 0.9               | 1.00E-09          | 9.2         | 182.5          | 6.08E-07 | 0.007  | 8.69E-05 | 27375             | 4.05E-09 | 0.0007       | 2.84E-12 |
|                         |         |        |                   |                     |         |           |          |        |                   |                   |             |                | 2.53E-06 |        | 1.89E-02 |                   |          |              |          |

INGESTION of Outdoor Soil

Receptor: Child 6 < 12 months

| COC              | EPC  | Intake | Fraction Outdoor | Frequency | Duration   | Period | Absorbency Factor | Conversion Factor | Conversion Factor       | Conversion Factor                                | Conversion Factor | Body Weight | Averaging Time | ADD ing   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |  |
|------------------|------|--------|------------------|-----------|------------|--------|-------------------|-------------------|-------------------------|--|-------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|--|
|                  | ng/g | mg/day |                  | days/week | weeks/year | years  | RAF               | 1,000 g/l kg      | 1 mg/10 <sup>6</sup> ng | 1 mg/10 <sup>6</sup> 1 kg/1 x 10 <sup>6</sup> mg | mg                | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |  |
| Central Tendency |      |        |                  |           |            |        |                   |                   |                         |  |                   |             |                |           |           |           |                   |           |                   |          |  |
| tetra/penta BDEs | 5.9  | 60     | 0.06             | 7         | 52         | 0.5    | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06   | 1.00E-06          | 9.2         | 182.5          | 2.16E-09  | 0.0001    | 2.16E-05  |                   |           |                   |          |  |
| hexa/hepta BDEs  | 47.9 | 60     | 0.06             | 7         | 52         | 0.5    | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06   | 1.00E-06          | 9.2         | 182.5          | 1.75E-08  | 0.0002    | 8.76E-05  |                   |           |                   |          |  |
| octa BDE         | 12.4 | 60     | 0.06             | 7         | 52         | 0.5    | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06   | 1.00E-06          | 9.2         | 182.5          | 4.54E-09  | 0.003     | 1.51E-06  |                   |           |                   |          |  |
| deca BDE         | 16.1 | 60     | 0.06             | 7         | 52         | 0.5    | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06   | 1.00E-06          | 9.2         | 182.5          | 5.89E-09  | 0.007     | 8.41E-07  | 27375             | 3.02E-11  | 0.0007            | 2.12E-14 |  |
|                  |      |        |                  |           |            |        |                   |                   |                         |  |                   |             |                | 3.01E-08  |           | 1.12E-04  |                   |           |                   |          |  |

DERMAL CONTACT with Outdoor Soil

Receptor: Child 6 < 12 months

| COC              | EPC  | SA              | SAF                | Absorbency Factor | Fraction Outdoor | Frequency | Duration   | Period | Conversion Factor | Conversion Factor       | Conversion Factor           | Body Weight | Averaging Time | ADD derm  | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|------------------|------|-----------------|--------------------|-------------------|------------------|-----------|------------|--------|-------------------|-------------------------|-----------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                  | ng/g | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               |                  | days/week | weeks/year | years  | 1,000 g/1 kg      | 1 mg/10 <sup>6</sup> ng | 1 kg/1 x 10 <sup>6</sup> mg | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| Central Tendency | 59   | 1,425.0         | 0.2                | 0.03              | 0.10             | 7         | 52         | 0.5    | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 9.2         | 182.5          | 5.28E-10  | 0.0001    | 5.28E-06  |                   |           |                   |          |
| tetra/penta BDEs | 47.9 | 1,425.0         | 0.2                | 0.03              | 0.10             | 7         | 52         | 0.5    | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 9.2         | 182.5          | 4.29E-09  | 0.0002    | 2.14E-05  |                   |           |                   |          |
| hexa/hepta BDEs  | 12.4 | 1,425.0         | 0.2                | 0.03              | 0.10             | 7         | 52         | 0.5    | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 9.2         | 182.5          | 1.11E-09  | 0.003     | 3.70E-07  |                   |           |                   |          |
| octa BDE         | 16.1 | 1,425.0         | 0.2                | 0.03              | 0.10             | 7         | 52         | 0.5    | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 9.2         | 182.5          | 1.44E-09  | 0.007     | 2.06E-07  | 27375             | 9.60E-12  | 0.0007            | 6.72E-15 |
| deca BDE         |      |                 |                    |                   |                  |           |            |        |                   |                         |                             |             |                | 7.36E-09  |           | 2.73E-05  |                   |           |                   |          |

INGESTION of Indoor Dust/Soil

Receptor: Child 6 < 12 months

| COC                     | EPC       | Intake | Fraction Indoor | Frequency | Duration | Period | Absorbency Factor | Conversion Factor | Conversion Factor | Conversion Factor | Body Weight | Averaging Time | ADD ing  | RfD      | HI     | AT Cancer Effects | LADD inh | Slope Factor | ELCR   |          |
|-------------------------|-----------|--------|-----------------|-----------|----------|--------|-------------------|-------------------|-------------------|-------------------|-------------|----------------|----------|----------|--------|-------------------|----------|--------------|--------|----------|
|                         |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |          |          |        |                   |          |              |        | ng/g     |
| <b>Central Tendency</b> |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |          |          |        |                   |          |              |        |          |
| tetra/penta BDEs        | 3,638.6   | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 1.92E-05 | 0.0001 | 1.92E-01          |          |              |        |          |
| hexa/hepta BDEs         | 334.4     | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 1.77E-06 | 0.0002 | 8.84E-03          |          |              |        |          |
| octa BDE                | 40.1      | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 2.12E-07 | 0.003  | 7.07E-05          |          |              |        |          |
| deca BDE                | 3,226.9   | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 1.71E-05 | 0.007  | 2.44E-03          | 27375    | 1.14E-07     | 0.0007 | 7.96E-11 |
|                         |           |        |                 |           |          |        |                   |                   |                   |                   |             |                | 3.83E-05 |          |        | 2.04E-01          |          |              |        |          |
| <b>Worst Case</b>       |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |          |          |        |                   |          |              |        |          |
| tetra/penta BDEs        | 45,558.0  | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 2.41E-04 | 0.0001 | 2.41E+00          |          |              |        |          |
| hexa/hepta BDEs         | 5,105.5   | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 2.70E-05 | 0.0002 | 1.38E-01          |          |              |        |          |
| octa BDE                | 1,765.7   | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 9.34E-06 | 0.003  | 3.11E-03          |          |              |        |          |
| deca BDE                | 112,612.1 | 60     | 0.90            | 7         | 52       | 0.5    | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 9.2         | 0.5            | 365      | 5.96E-04 | 0.007  | 8.51E-02          | 27375    | 3.97E-06     | 0.0007 | 2.78E-09 |
|                         |           |        |                 |           |          |        |                   |                   |                   |                   |             |                | 8.73E-04 |          |        | 2.63E+00          |          |              |        |          |

DERMAL CONTACT with Indoor Dust/Soil

Receptor: Child 6 < 12 months

| COC                     | EPC<br>ng/g | SA<br>cm <sup>2</sup> | SAF<br>mg/cm <sup>2</sup> | Absorbency Factor<br>ABS | Fraction Indoor | Frequency<br>days/<br>week | Duration<br>weeks/<br>year | Period<br>years | Conversion Factor<br>1,000 g/l | Conversion Factor<br>1 mg/10 <sup>6</sup> | Conversion Factor<br>1 kg/1 x 10 <sup>6</sup> | Body Weight<br>kg | years | days | Averaging Time<br>(years x<br>days) | ADD derm<br>mg/kg-day | RfD<br>mg/kg-day | HI<br>(years x<br>days) | AT Cancer Effects<br>mg/kg-day | LADD inh<br>per mg/kg per<br>day | Slope Factor<br>ELCR |          |
|-------------------------|-------------|-----------------------|---------------------------|--------------------------|-----------------|----------------------------|----------------------------|-----------------|--------------------------------|---|---|-------------------|-------|------|-------------------------------------|-----------------------|------------------|-------------------------|--------------------------------|----------------------------------|----------------------|----------|
|                         |             |                       |                           |                          |                 |                            |                            |                 |                                |   |   |                   |       |      |                                     |                       |                  |                         |                                |                                  |                      | mg       |
| <b>Central Tendency</b> |             |                       |                           |                          |                 |                            |                            |                 |                                |   |   |                   |       |      |                                     |                       |                  |                         |                                |                                  |                      |          |
| tetra/penta BDEs        | 3,638.6     | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 3.05E-06              | 0.0001           | 3.05E-02                |                                |                                  |                      |          |
| hexa/hepta BDEs         | 334.4       | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 2.80E-07              | 0.0002           | 1.40E-03                |                                |                                  |                      |          |
| octa BDE                | 40.1        | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 3.36E-08              | 0.003            | 1.12E-05                |                                |                                  |                      |          |
| deca BDE                | 3,226.9     | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 2.70E-06              | 0.007            | 3.88E-04                | 27375                          | 1.80E-08                         | 0.0007               | 1.26E-11 |
|                         |             |                       |                           |                          |                 |                            |                            |                 |                                |   |   |                   |       |      |                                     | 6.06E-06              |                  | 3.23E-02                |                                |                                  |                      |          |
| <b>Worst Case</b>       |             |                       |                           |                          |                 |                            |                            |                 |                                |   |   |                   |       |      |                                     |                       |                  |                         |                                |                                  |                      |          |
| tetra/penta BDEs        | 45,568.0    | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 3.81E-05              | 0.0001           | 3.81E-01                |                                |                                  |                      |          |
| hexa/hepta BDEs         | 5,105.5     | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 4.28E-06              | 0.0002           | 2.14E-02                |                                |                                  |                      |          |
| octa BDE                | 1,765.7     | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 1.48E-06              | 0.003            | 4.93E-04                |                                |                                  |                      |          |
| deca BDE                | 112,612.1   | 1,425.0               | 0.2                       | 0.03                     | 0.90            | 7                          | 52                         | 0.5             | 1.00E+03                       | 1.00E-06                                  | 1.00E-06                                      | 9.2               | 0.5   | 365  | 182.5                               | 9.43E-05              | 0.007            | 1.35E-02                | 27375                          | 6.29E-07                         | 0.0007               | 4.40E-10 |
|                         |             |                       |                           |                          |                 |                            |                            |                 |                                |   |   |                   |       |      |                                     | 1.38E-04              |                  | 4.17E-01                |                                |                                  |                      |          |

**INGESTION of Breast Milk**

Receptor: Child 6 < 12 months

| COC                     | EPC<br>ng/g lipid<br>wt | Fraction<br>of Fat in<br>Breast<br>Milk | Ingestion Rate |               | Period | Absorbency Factor | Duration       |          | Conversion Factor | Conversion Factor | Conversion Factor | Conversion Factor | Conversion Factor | Conversion Factor |
|-------------------------|-------------------------|---|----------------|---------------|--------|-------------------|----------------|----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                         |                         |   | mL/day         | days/<br>week |        |                   | weeks/<br>year | years    |                   |                   |                   |                   |                   |                   |
| <b>Central Tendency</b> |                         |   |                |               |        |                   |                |          |                   |                   |                   |                   |                   |                   |
| tetra/penta BDEs        | 20.911                  | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| hexa/hepta BDEs         | 3.23                    | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| octa BDE                | 0.1                     | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| deca BDE                | 0.25                    | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| <b>Worst Case</b>       |                         |   |                |               |        |                   |                |          |                   |                   |                   |                   |                   |                   |
| tetra/penta BDEs        | 253                     | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| hexa/hepta BDEs         | 97.1                    | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| octa BDE                | 0.5                     | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |
| deca BDE                | 10.9                    | 0.04                                    | 620            | 7             | 52     | 0.5               | 0.9            | 1.00E-03 | 1                 | 1000              | 1000              | 1000              | 1000              | 1.00E-06          |

Note: EPC = PBDE concentration in breast m  
1 Liter water = 1 Kilogram, assume 1 Liter breast milk = 1 Kilogram.

| Body Weight | years | days | Averaging Time<br>(years x days) | ADD ing<br>mg/kg-day | RfD<br>mg/kg-day | HI       | AT Cancer Effects<br>(years x days) | LADD inh<br>mg/kg-day | Slope Factor<br>per mg/kg per day | ELCR     |
|-------------|-------|------|----------------------------------|----------------------|------------------|----------|-------------------------------------|-----------------------|-----------------------------------|----------|
| 9.2         | 0.5   | 365  | 182.5                            | 5.06E-05             | 0.0001           | 5.06E-01 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 7.81E-06             | 0.0002           | 3.91E-02 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 2.42E-07             | 0.003            | 8.06E-05 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 6.05E-07             | 0.007            | 8.64E-05 | 27375                               | 4.03E-09              | 0.0007                            | 2.82E-12 |
|             |       |      |                                  | 5.93E-05             |                  | 5.45E-01 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 6.12E-04             | 0.0001           | 6.12E+00 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 2.35E-04             | 0.0002           | 1.17E+00 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 1.21E-06             | 0.003            | 4.03E-04 |                                     |                       |                                   |          |
| 9.2         | 0.5   | 365  | 182.5                            | 2.64E-05             | 0.007            | 3.77E-03 | 27375                               | 1.76E-07              | 0.0007                            | 1.23E-10 |
|             |       |      |                                  | 8.75E-04             |                  | 7.30E+00 |                                     |                       |                                   |          |

INHALATION of Outdoor Air

Receptor: Child 1 < 2 years

| COC                     | EPC               | IR                  | Fraction Outdoor |         | Frequency | Duration   |            | Period | Absorbency Factor | Conversion Factor       | Body Weight |       | AT             | ADD inh   | RfD       | HI        | AT Cancer Effects (years x days) | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-------------------|---------------------|------------------|---------|-----------|------------|------------|--------|-------------------|-------------------------|-------------|-------|----------------|-----------|-----------|-----------|----------------------------------|-----------|-------------------|----------|
|                         |                   |                     | per day          | per day |           | days/week  | weeks/year |        |                   |                         | years       | years |                |           |           |           |                                  |           |                   |          |
| <b>Central Tendency</b> | pg/m <sup>3</sup> | m <sup>3</sup> /day |                  |         | days/week | weeks/year | years      |        |                   | 1 mg/10 <sup>9</sup> pg | kg          | kg    | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)                   | mg/kg-day | per mg/kg per day | ELCR     |
| tetra/penta BDEs        | 124.00            | 8                   | 0.03             | 0.03    | 7         | 52         | 1          | 365    | 0.9               | 1.00E-09                | 11.4        | 11.4  | 365            | 1.95E-09  | 0.0001    | 1.95E-05  |                                  |           |                   |          |
| hexa/hepta BDEs         | 9.00              | 8                   | 0.03             | 0.03    | 7         | 55         | 1          | 365    | 0.9               | 1.00E-09                | 11.4        | 11.4  | 365            | 1.50E-10  | 0.0002    | 7.49E-07  |                                  |           |                   |          |
| deca BDE                | 25.00             | 8                   | 0.03             | 0.03    | 7         | 55         | 1          | 365    | 0.9               | 1.00E-09                | 11.4        | 11.4  | 365            | 4.16E-10  | 0.007     | 5.95E-08  | 75                               | 2.03E-09  | 0.0007            | 1.42E-12 |
|                         |                   |                     |                  |         |           |            |            |        |                   |                         |             |       |                | 2.52E-09  |           | 2.03E-05  |                                  |           |                   |          |

INHALATION of Indoor Air

Receptor: Child 1 < 2 years

| COC                     | EPC               | Intake              | Fraction Indoor | Frequency | Duration   | Period | Absorbency Factor | Conversion Factor       | Body Weight | Averaging Time | ADD ing   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-------------------|---------------------|-----------------|-----------|------------|--------|-------------------|-------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | pg/m <sup>3</sup> | m <sup>3</sup> /day | per day         | days/week | weeks/year | years  |                   | 1 mg/10 <sup>6</sup> pg | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day | ELCR     |
| <b>Central Tendency</b> |                   |                     |                 |           |            |        |                   |                         |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 321.13            | 8                   | 0.94            | 7         | 52         | 1      | 0.9               | 1.00E-09                | 11.4        | 365            | 1.90E-07  | 0.0001    | 1.90E-03  |                   |           |                   |          |
| hexa/hepta BDEs         | 12.17             | 8                   | 0.94            | 7         | 52         | 1      | 0.9               | 1.00E-09                | 11.4        | 365            | 7.20E-09  | 0.0002    | 3.60E-05  |                   |           |                   |          |
| deca BDE                | 120.87            | 8                   | 0.94            | 7         | 52         | 1      | 0.9               | 1.00E-09                | 11.4        | 365            | 7.15E-08  | 0.007     | 1.02E-05  | 27375             | 9.54E-10  | 0.0007            | 6.68E-13 |
|                         |                   |                     |                 |           |            |        |                   |                         |             |                | 2.69E-07  |           | 1.95E-03  |                   |           |                   |          |
| <b>Worst Case</b>       |                   |                     |                 |           |            |        |                   |                         |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 3848.90           | 8                   | 0.94            | 7         | 52         | 1      | 0.9               | 1.00E-09                | 11.4        | 365            | 2.28E-06  | 0.0001    | 2.28E-02  |                   |           |                   |          |
| hexa/hepta BDEs         | 194.70            | 8                   | 0.94            | 7         | 52         | 1      | 0.9               | 1.00E-09                | 11.4        | 365            | 1.15E-07  | 0.0002    | 5.76E-04  |                   |           |                   |          |
| deca BDE                | 1277.70           | 8                   | 0.94            | 7         | 52         | 1      | 0.9               | 1.00E-09                | 11.4        | 365            | 7.56E-07  | 0.007     | 1.08E-04  | 27375             | 1.01E-08  | 0.0007            | 7.06E-12 |
|                         |                   |                     |                 |           |            |        |                   |                         |             |                | 3.15E-06  |           | 2.35E-02  |                   |           |                   |          |

INGESTION of Outdoor Soil

Receptor: Child 1 < 2 years

| COC              | EPC  | Intake | Fraction Outdoor | Frequency  | Duration    | Period | Absorbency Factor | Conversion Factor | Conversion Factor       | Conversion Factor         | Body Weight | Averaging Time | ADD ing   | RfD       | HI       | AT Cancer Effects | LADD      | Slope Factor      | ELCR     |
|------------------|------|--------|------------------|------------|-------------|--------|-------------------|-------------------|-------------------------|---------------------------|-------------|----------------|-----------|-----------|----------|-------------------|-----------|-------------------|----------|
|                  | ng/g | mg/day |                  | days/ week | weeks/ year | years  | RAF               | 1,000 g/l kg      | 1 mg/10 <sup>6</sup> ng | 1 kg/1x10 <sup>6</sup> mg | kg          | (years x days) | mg/kg-day | mg/kg-day |          | (years x days)    | mg/kg-day | per mg/kg per day |          |
| Central Tendency |      |        |                  |            |             |        |                   |                   |                         |                           |             |                |           |           |          |                   |           |                   |          |
| tetra/penta BDEs | 5.9  | 100    | 0.03             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                  | 11.4        | 365            | 1.16E-09  | 0.0001    | 1.16E-05 |                   |           |                   |          |
| hexa/hepta BDEs  | 47.9 | 100    | 0.03             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                  | 11.4        | 365            | 9.43E-09  | 0.0002    | 4.71E-05 |                   |           |                   |          |
| octa BDE         | 12.4 | 100    | 0.03             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                  | 11.4        | 365            | 2.44E-09  | 0.003     | 8.14E-07 |                   |           |                   |          |
| deca BDE         | 16.1 | 100    | 0.03             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                  | 11.4        | 365            | 3.17E-09  | 0.007     | 4.53E-07 | 27375             | 3.25E-11  | 0.0007            | 2.28E-14 |
|                  |      |        |                  |            |             |        |                   |                   |                         |                           |             |                | 1.62E-08  |           | 6.00E-05 |                   |           |                   |          |

DERMAL CONTACT with Outdoor Soil

Receptor: Child 1 < 2 years

| COC              | EPC  | SA              | SAF                | Absorbency Factor |      | Fraction Outdoor | Frequency | Duration | Period | Conversion Factor | Body Weight | Averaging Time | ADD derm | RfD    | HI       | AT Cancer Effects | LADD inh | Slope Factor | ELCR     |
|------------------|------|-----------------|--------------------|-------------------|------|------------------|-----------|----------|--------|-------------------|-------------|----------------|----------|--------|----------|-------------------|----------|--------------|----------|
|                  | ng/g | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               | SAF  |                  |           |          |        |                   |             |                |          |        |          |                   |          |              |          |
| Central Tendency |      |                 |                    |                   |      |                  |           |          |        |                   |             |                |          |        |          |                   |          |              |          |
| tetra/penta BDEs | 5.9  | 1,690.0         | 0.2                | 0.03              | 0.03 | 0.03             | 7         | 52       | 1      | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.31E-10 | 0.0001 | 1.31E-06 |                   |          |              |          |
| hexa/hepta BDEs  | 47.9 | 1,690.0         | 0.2                | 0.03              | 0.03 | 0.03             | 7         | 52       | 1      | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.06E-09 | 0.0002 | 5.31E-06 |                   |          |              |          |
| octa BDE         | 12.4 | 1,690.0         | 0.2                | 0.03              | 0.03 | 0.03             | 7         | 52       | 1      | 1.00E+03          | 1.00E-06    | 1.00E-06       | 2.75E-10 | 0.0003 | 9.17E-08 |                   |          |              |          |
| deca BDE         | 16.1 | 1,690.0         | 0.2                | 0.03              | 0.03 | 0.03             | 7         | 52       | 1      | 1.00E+03          | 1.00E-06    | 1.00E-06       | 3.57E-10 | 0.0007 | 5.10E-08 | 27375             | 4.76E-12 | 0.0007       | 3.33E-15 |
|                  |      |                 |                    |                   |      |                  |           |          |        |                   |             |                | 1.83E-09 |        | 6.76E-06 |                   |          |              |          |

INGESTION of Indoor Dust/Soil

Receptor: Child 1 < 2 years

| COC                     | EPC       | Intake | Fraction Indoor | Frequency     | Duration       | Period | Absorbency Factor | Conversion Factor | Conversion Factor          | Conversion Factor              | Body Weight | Averaging Time | ADD ing  | RD        | HI        | AT Cancer Effects | LADD inh  | Slope Factor         | ELCR     |
|-------------------------|-----------|--------|-----------------|---------------|----------------|--------|-------------------|-------------------|----------------------------|--------------------------------|-------------|----------------|----------|-----------|-----------|-------------------|-----------|----------------------|----------|
|                         | ng/g      | mg/day |                 | days/<br>week | weeks/<br>year | years  | RAF               | 1,000 g/l<br>kg   | 1 mg/10 <sup>6</sup><br>ng | 1 kg/1 x 10 <sup>6</sup><br>mg | kg          | years          | days     | mg/kg-day | mg/kg-day | (years x<br>days) | mg/kg-day | per mg/kg<br>per day |          |
| <b>Central Tendency</b> |           |        |                 |               |                |        |                   |                   |                            |                                |             |                |          |           |           |                   |           |                      |          |
| tetra/penta BDEs        | 3,638.6   | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0001    | 2.69E-01  |                   |           |                      |          |
| hexa/hepta BDEs         | 334.4     | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0002    | 1.24E-02  |                   |           |                      |          |
| octa BDE                | 40.1      | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0003    | 9.89E-05  |                   |           |                      |          |
| deca BDE                | 3,226.9   | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0007    | 3.41E-03  | 27375             | 3.18E-07  | 0.0007               | 2.23E-10 |
|                         |           |        |                 |               |                |        |                   |                   |                            |                                |             |                | 5.36E-05 |           | 2.85E-01  |                   |           |                      |          |
| <b>Worst Case</b>       |           |        |                 |               |                |        |                   |                   |                            |                                |             |                |          |           |           |                   |           |                      |          |
| tetra/penta BDEs        | 45,558.0  | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0001    | 3.37E+00  |                   |           |                      |          |
| hexa/hepta BDEs         | 5,105.5   | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0002    | 1.89E-01  |                   |           |                      |          |
| octa BDE                | 1,765.7   | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0003    | 4.35E-03  |                   |           |                      |          |
| deca BDE                | 112,612.1 | 100    | 0.94            | 7             | 52             | 1      | 0.9               | 1.00E+03          | 1.00E-06                   | 1.00E-06                       | 11.4        | 1              | 365      | 0.0007    | 1.19E-01  | 27375             | 1.11E-05  | 0.0007               | 7.78E-09 |
|                         |           |        |                 |               |                |        |                   |                   |                            |                                |             |                | 1.22E-03 |           | 3.68E+00  |                   |           |                      |          |





**INHALATION of Indoor Air**

**Receptor: Child 2 < 3 years**

| COC                     | EPC               | Intake              | Fraction Indoor | Frequency       | Duration       | Period | Absorbency Factor | Conversion Factor          | Body Weight | Averaging Time    | ADD ing   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor         | ELCR     |
|-------------------------|-------------------|---------------------|-----------------|-----------------|----------------|--------|-------------------|----------------------------|-------------|-------------------|-----------|-----------|-----------|-------------------|-----------|----------------------|----------|
|                         | pg/m <sup>3</sup> | m <sup>3</sup> /day | per day         | days/wk<br>week | weeks/<br>year | years  |                   | 1 mg/10 <sup>9</sup><br>pg | kg          | (years x<br>days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x<br>days) | mg/kg-day | per mg/kg per<br>day |          |
| <b>Central Tendency</b> |                   |                     |                 |                 |                |        |                   |                            |             |                   |           |           |           |                   |           |                      |          |
| tetra/penta BDEs        | 321.13            | 9.5                 | 0.91            | 7               | 52             | 1      | 0.9               | 1.00E-09                   | 11.4        | 365               | 2.20E-07  | 0.0001    | 2.20E-03  |                   |           |                      |          |
| hexa/hepta BDEs         | 12.17             | 9.5                 | 0.91            | 7               | 52             | 1      | 0.9               | 1.00E-09                   | 11.4        | 365               | 8.32E-09  | 0.0002    | 4.16E-05  |                   |           |                      |          |
| deca BDE                | 120.87            | 9.5                 | 0.91            | 7               | 52             | 1      | 0.9               | 1.00E-09                   | 11.4        | 365               | 8.26E-08  | 0.007     | 1.18E-05  | 27375             | 1.10E-09  | 0.0007               | 7.71E-13 |
|                         |                   |                     |                 |                 |                |        |                   |                            |             |                   | 3.10E-07  |           | 2.25E-03  |                   |           |                      |          |
| <b>Worst Case</b>       |                   |                     |                 |                 |                |        |                   |                            |             |                   |           |           |           |                   |           |                      |          |
| tetra/penta BDEs        | 3848.90           | 9.5                 | 0.91            | 7               | 52             | 1      | 0.9               | 1.00E-09                   | 11.4        | 365               | 2.63E-06  | 0.0001    | 2.63E-02  |                   |           |                      |          |
| hexa/hepta BDEs         | 194.70            | 9.5                 | 0.91            | 7               | 52             | 1      | 0.9               | 1.00E-09                   | 11.4        | 365               | 1.33E-07  | 0.0002    | 6.65E-04  |                   |           |                      |          |
| deca BDE                | 1277.70           | 9.5                 | 0.91            | 7               | 52             | 1      | 0.9               | 1.00E-09                   | 11.4        | 365               | 8.73E-07  | 0.007     | 1.25E-04  | 27375             | 1.16E-08  | 0.0007               | 8.15E-12 |
|                         |                   |                     |                 |                 |                |        |                   |                            |             |                   | 3.64E-06  |           | 2.71E-02  |                   |           |                      |          |

INGESTION of Outdoor Soil

Receptor: Child 2 < 3 years

| COC                     | EPC  | Intake | Fraction Outdoor | Frequency  | Duration    | Period | Absorbency Factor | Conversion Factor | Conversion Factor       | Conversion Factor           | Body Weight | Averaging Time | ADD ing   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR   |          |
|-------------------------|------|--------|------------------|------------|-------------|--------|-------------------|-------------------|-------------------------|-----------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|--------|----------|
|                         | ng/g | mg/day |                  | days/ week | weeks/ year | years  | RAF               | 1,000 g/l         | 1 mg/10 <sup>6</sup> ng | 1 kg/l x 10 <sup>6</sup> mg | kg          | years x days   | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |        |          |
| <b>Central Tendency</b> |      |        |                  |            |             |        |                   |                   |                         |                             |             |                |           |           |           |                   |           |                   |        |          |
| tetra/penta BDEs        | 5.9  | 100    | 0.05             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 1              | 365       | 2.03E-09  | 0.0001    | 2.03E-05          |           |                   |        |          |
| hexa/hepta BDEs         | 47.9 | 100    | 0.05             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 1              | 365       | 1.64E-08  | 0.0002    | 8.22E-05          |           |                   |        |          |
| octa BDE                | 12.4 | 100    | 0.05             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 1              | 365       | 4.26E-09  | 0.003     | 1.42E-06          |           |                   |        |          |
| deca BDE                | 16.1 | 100    | 0.05             | 7          | 52          | 1      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 1              | 365       | 5.53E-09  | 0.007     | 7.89E-07          | 27375     | 5.68E-11          | 0.0007 | 3.97E-14 |
|                         |      |        |                  |            |             |        |                   |                   |                         |                             |             |                | 2.83E-08  |           | 1.05E-04  |                   |           |                   |        |          |





DERMAL CONTACT with Indoor Dust/Soil

Receptor: Child 2 < 3 years

| COC                     | EPC       | SA              | SAF                | Absorbency Factor | Fraction Indoor | Frequency | Duration   | Period | Conversion Factor | Body Weight | Averaging Time | ADD derm  | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-----------|-----------------|--------------------|-------------------|-----------------|-----------|------------|--------|-------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | ng/g      | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               | .               | days/week | weeks/year | years  | 1,000 g/1 kg      | kg          | years          | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| <b>Central Tendency</b> |           |                 |                    |                   |                 |           |            |        |                   |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 3,638.6   | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 2,63E-06  | 0.0001    | 2.63E-02  |                   |           |                   |          |
| hexa/hepta BDEs         | 334.4     | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 2,42E-07  | 0.0002    | 1.21E-03  |                   |           |                   |          |
| octa BDE                | 40.1      | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 2,90E-08  | 0.003     | 9.67E-06  |                   |           |                   |          |
| deca BDE                | 3,226.9   | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 2,33E-06  | 0.007     | 3.33E-04  | 27375             | 3.11E-08  | 0.0007            | 2.18E-11 |
|                         |           |                 |                    |                   |                 |           |            |        |                   |             |                | 5,24E-06  |           | 2,79E-02  |                   |           |                   |          |
| <b>Worst Case</b>       |           |                 |                    |                   |                 |           |            |        |                   |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 45,558.0  | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 3,29E-05  | 0.0001    | 3.29E-01  |                   |           |                   |          |
| hexa/hepta BDEs         | 5,105.5   | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 3,69E-06  | 0.0002    | 1.85E-02  |                   |           |                   |          |
| octa BDE                | 1,765.7   | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 1,28E-06  | 0.003     | 4.26E-04  |                   |           |                   |          |
| deca BDE                | 112,612.1 | 1,825.0         | 0.2                | 0.03              | 0.91            | 7         | 52         | 1      | 1.00E+03          | 13.8        | 1              | 8,14E-05  | 0.007     | 1.16E-02  | 27375             | 1.09E-06  | 0.0007            | 7.60E-10 |
|                         |           |                 |                    |                   |                 |           |            |        |                   |             |                | 1.19E-04  |           | 3.60E-01  |                   |           |                   |          |

INHALATION of Outdoor Air

Receptor: Child 3 < 6 years

| COC              | EPC               | IR                  | Fraction Outdoor | Frequency | Duration   | Period | Absorbency Factor | Conversion Factor       | Body Weight |       | AT   | ADD inh   | RID       | HI        | AI Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|------------------|-------------------|---------------------|------------------|-----------|------------|--------|-------------------|-------------------------|-------------|-------|------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                  |                   |                     |                  |           |            |        |                   |                         | kg          | years |      |           |           |           |                   |           |                   |          |
| Central Tendency | pg/m <sup>3</sup> | m <sup>3</sup> /day | per day          | days/week | weeks/year | years  |                   | 1 mg/10 <sup>9</sup> pg | kg          | years | days | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| tetra/penta BDEs | 124.00            | 10.9                | 0.07             | 7         | 52         | 3      | 0.9               | 1.00E-09                | 18.6        | 3     | 365  | 4.85E-09  | 0.0001    | 4.85E-05  |                   |           |                   |          |
| hexal/hepta BDEs | 9.00              | 10.9                | 0.07             | 7         | 55         | 3      | 0.9               | 1.00E-09                | 18.6        | 3     | 365  | 3.72E-10  | 0.0002    | 1.86E-06  |                   |           |                   |          |
| deca BDE         | 25.00             | 10.9                | 0.07             | 7         | 55         | 3      | 0.9               | 1.00E-09                | 18.6        | 3     | 365  | 1.03E-09  | 0.007     | 1.48E-07  | 225               | 5.03E-09  | 0.0007            | 3.52E-12 |
|                  |                   |                     |                  |           |            |        |                   |                         |             |       |      | 6.25E-09  |           | 5.05E-05  |                   |           |                   |          |





DERMAL CONTACT with Outdoor Soil

Receptor: Child 3 < 6 years

| COC              | EPC  | SA              | SAF                | Absorbency Factor | Fraction Outdoor | Frequency | Duration   | Period | Conversion Factor | Conversion Factor       | Conversion Factor           | Body Weight | Averaging Time | ADD derm  | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|------------------|------|-----------------|--------------------|-------------------|------------------|-----------|------------|--------|-------------------|-------------------------|-----------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                  | ng/g | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               | .                | days/week | weeks/year | years  | 1,000 g/1 kg      | 1 mg/10 <sup>6</sup> ng | 1 kg/l x 10 <sup>6</sup> mg | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| Central Tendency |      |                 |                    |                   |                  |           |            |        |                   |                         |                             |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs | 5.9  | 2,545.0         | 0.2                | 0.03              | 0.07             | 7         | 52         | 3      | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 365            | 4.84E-10  | 0.0001    | 4.84E-06  |                   |           |                   |          |
| hexa/hepta BDEs  | 47.9 | 2,545.0         | 0.2                | 0.03              | 0.07             | 7         | 52         | 3      | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 365            | 3.93E-09  | 0.0002    | 1.96E-05  |                   |           |                   |          |
| octa BDE         | 12.4 | 2,545.0         | 0.2                | 0.03              | 0.07             | 7         | 52         | 3      | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 365            | 1.02E-09  | 0.003     | 3.39E-07  |                   |           |                   |          |
| deca BDE         | 16.1 | 2,545.0         | 0.2                | 0.03              | 0.07             | 7         | 52         | 3      | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 13.8        | 365            | 1.32E-09  | 0.007     | 1.89E-07  | 27375             | 5.28E-11  | 0.0007            | 3.70E-14 |
|                  |      |                 |                    |                   |                  |           |            |        |                   |                         |                             |             |                | 6.75E-09  |           | 2.50E-05  |                   |           |                   |          |



DERMAL CONTACT with Indoor Dust/Soil

Receptor: Child 3 < 6 years

| COC                     | EPC       | SA              | SAF                | Absorbency Factor | Fraction Indoor | Frequency  | Duration    | Period | Conversion Factor | Body Weight | Averaging Time | ADD derm  | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-----------|-----------------|--------------------|-------------------|-----------------|------------|-------------|--------|-------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | ng/g      | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               | .               | days/ week | weeks/ year | years  | 1,000 g/1 kg      | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| <b>Central Tendency</b> |           |                 |                    |                   |                 |            |             |        |                   |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 3,638.6   | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 2.64E-06  | 0.0001    | 2.64E-02  |                   |           |                   |          |
| hexa/hepta BDEs         | 334.4     | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 2.43E-07  | 0.0002    | 1.21E-03  |                   |           |                   |          |
| octa BDE                | 40.1      | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 2.91E-08  | 0.003     | 9.71E-06  |                   |           |                   |          |
| deca BDE                | 3,226.9   | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 2.34E-06  | 0.007     | 3.35E-04  | 27375             | 9.38E-08  | 0.0007            | 6.57E-11 |
|                         |           |                 |                    |                   |                 |            |             |        |                   |             |                | 5.26E-06  |           | 2.80E-02  |                   |           |                   |          |
| <b>Worst Case</b>       |           |                 |                    |                   |                 |            |             |        |                   |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 45,558.0  | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 3.31E-05  | 0.0001    | 3.31E-01  |                   |           |                   |          |
| hexa/hepta BDEs         | 5,105.5   | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 3.71E-06  | 0.0002    | 1.85E-02  |                   |           |                   |          |
| octa BDE                | 1,765.7   | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 1.28E-06  | 0.003     | 4.28E-04  |                   |           |                   |          |
| deca BDE                | 112,612.1 | 2,545.0         | 0.2                | 0.03              | 0.89            | 7          | 52          | 3      | 1.00E+03          | 18.6        | 1095           | 8.78E-05  | 0.007     | 1.77E-02  | 27375             | 3.27E-06  | 0.0007            | 2.29E-09 |
|                         |           |                 |                    |                   |                 |            |             |        |                   |             |                | 1.20E-04  |           | 3.62E-01  |                   |           |                   |          |

INHALATION of Outdoor Air

Receptor: Child 6 < 11 years

| COC                     | EPC    | IR   | Fraction Outdoor |         | Frequency | Duration   |             | Period | Absorbency Factor | Conversion Factor    | Body Weight |       | AT   | ADD inh  | RfD    | HI       | AT Cancer Effects | LADD inh | Slope Factor | ELCR     |
|-------------------------|--------|------|------------------|---------|-----------|------------|-------------|--------|-------------------|----------------------|-------------|-------|------|----------|--------|----------|-------------------|----------|--------------|----------|
|                         |        |      | per day          | per day |           | days/ week | weeks/ year |        |                   |                      | years       | years |      |          |        |          |                   |          |              |          |
| <b>Central Tendency</b> |        |      |                  |         |           |            |             |        |                   | 1 mg/10 <sup>3</sup> |             |       |      |          |        |          |                   |          |              |          |
| tetra/penta BDEs        | 124.00 | 12.4 | 0.09             | 0.09    | 7         | 52         | 5           | 5      | 0.9               | 1.00E-09             | 31.8        | 5     | 1825 | 3.98E-09 | 0.0001 | 3.98E-05 |                   |          |              |          |
| hexa/hepta BDEs         | 9.00   | 12.4 | 0.09             | 0.09    | 7         | 55         | 5           | 0.9    | 1.00E-09          | 1.00E-09             | 31.8        | 5     | 1825 | 3.05E-10 | 0.0002 | 1.53E-06 |                   |          |              |          |
| deca BDE                | 25.00  | 12.4 | 0.09             | 0.09    | 7         | 55         | 5           | 0.9    | 1.00E-09          | 1.00E-09             | 31.8        | 5     | 1825 | 8.48E-10 | 0.007  | 1.21E-07 | 375               | 4.13E-09 | 0.0007       | 2.89E-12 |
|                         |        |      |                  |         |           |            |             |        |                   |                      |             |       |      | 5.13E-09 |        | 4.14E-05 |                   |          |              |          |

INHALATION of Indoor Air

Receptor: Child 6 < 11 years

| COC                     | EPC               | Intake              | Fraction Indoor |                | Frequency | Duration | Period | Absorbency Factor       | Conversion Factor | Body Weight       | Averaging Time | ADD inh   | RID       | HI                | AT Cancer Effects | LADD inh             | Slope Factor | ELCR     |
|-------------------------|-------------------|---------------------|-----------------|----------------|-----------|----------|--------|-------------------------|-------------------|-------------------|----------------|-----------|-----------|-------------------|-------------------|----------------------|--------------|----------|
|                         |                   |                     | per day         | per day        |           |          |        |                         |                   |                   |                |           |           |                   |                   |                      |              |          |
|                         | pg/m <sup>3</sup> | m <sup>3</sup> /day | days/w<br>week  | weeks/<br>year | years     | years    | 0.9    | 1 mg/10 <sup>9</sup> pg | kg                | (years x<br>days) | mg/kg-day      | mg/kg-day | mg/kg-day | (years x<br>days) | mg/kg-day         | per mg/kg per<br>day |              |          |
| <b>Central Tendency</b> |                   |                     |                 |                |           |          |        |                         |                   |                   |                |           |           |                   |                   |                      |              |          |
| tetra/penta BDEs        | 321.13            | 12.4                | 0.86            | 0.86           | 7         | 52       | 0.9    | 1.00E-09                | 31.8              | 5                 | 365            | 1825      | 0.0001    | 9.71E-04          | 0.0001            | 9.71E-04             | 0.0007       | 1.71E-12 |
| hexa/hepta BDEs         | 12.17             | 12.4                | 0.86            | 0.86           | 7         | 52       | 0.9    | 1.00E-09                | 31.8              | 5                 | 365            | 1825      | 0.0002    | 1.84E-05          | 0.0002            | 1.84E-05             | 0.0007       | 1.71E-12 |
| deca BDE                | 120.87            | 12.4                | 0.86            | 0.86           | 7         | 52       | 0.9    | 1.00E-09                | 31.8              | 5                 | 365            | 1825      | 0.007     | 5.22E-06          | 0.007             | 5.22E-06             | 0.0007       | 1.71E-12 |
|                         |                   |                     |                 |                |           |          |        |                         |                   |                   |                |           |           | 9.96E-04          |                   |                      |              |          |
| <b>Worst Case</b>       |                   |                     |                 |                |           |          |        |                         |                   |                   |                |           |           |                   |                   |                      |              |          |
| tetra/penta BDEs        | 3848.90           | 12.4                | 0.86            | 0.86           | 7         | 52       | 0.9    | 1.00E-09                | 31.8              | 5                 | 365            | 1825      | 0.0001    | 1.16E-02          | 0.0001            | 1.16E-02             | 0.0007       | 1.80E-11 |
| hexa/hepta BDEs         | 194.70            | 12.4                | 0.86            | 0.86           | 7         | 52       | 0.9    | 1.00E-09                | 31.8              | 5                 | 365            | 1825      | 0.0002    | 2.94E-04          | 0.0002            | 2.94E-04             | 0.0007       | 1.80E-11 |
| deca BDE                | 1277.70           | 12.4                | 0.86            | 0.86           | 7         | 52       | 0.9    | 1.00E-09                | 31.8              | 5                 | 365            | 1825      | 0.007     | 5.52E-05          | 0.007             | 5.52E-05             | 0.0007       | 1.80E-11 |
|                         |                   |                     |                 |                |           |          |        |                         |                   |                   |                |           |           | 1.20E-02          |                   |                      |              |          |

INGESTION of Outdoor Soil

Receptor: Child 6 < 11 years

| COC               | EPC  | Intake | Fraction Outdoor | Frequency | Duration | Period | Absorbency Factor | Conversion Factor | Conversion Factor | Conversion Factor | Body Weight | Averaging Time | ADD ing  | RfD      | HI     | AT Cancer Effects | LADD inh | Slope Factor | ELCR   |          |
|-------------------|------|--------|------------------|-----------|----------|--------|-------------------|-------------------|-------------------|-------------------|-------------|----------------|----------|----------|--------|-------------------|----------|--------------|--------|----------|
|                   |      |        |                  |           |          |        |                   |                   |                   |                   |             |                |          |          |        |                   |          |              |        | ng/g     |
| Central Tendency  |      |        |                  |           |          |        |                   |                   |                   |                   |             |                |          |          |        |                   |          |              |        |          |
| tetra/merita BDEs | 5.9  | 100    | 0.09             | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 31.8        | 5              | 365      | 1.53E-09 | 0.0001 | 1.53E-05          |          |              |        |          |
| hexa/hepta BDEs   | 47.9 | 100    | 0.09             | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 31.8        | 5              | 365      | 1.24E-08 | 0.0002 | 6.20E-05          |          |              |        |          |
| octa BDE          | 12.4 | 100    | 0.09             | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 31.8        | 5              | 365      | 3.21E-09 | 0.003  | 1.07E-06          |          |              |        |          |
| deca BDE          | 16.1 | 100    | 0.09             | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 31.8        | 5              | 365      | 4.17E-09 | 0.007  | 5.95E-07          | 27375    | 2.14E-10     | 0.0007 | 1.50E-13 |
|                   |      |        |                  |           |          |        |                   |                   |                   |                   |             |                | 2.13E-08 |          |        | 7.89E-05          |          |              |        |          |

DERMAL CONTACT with Outdoor Soil

Receptor: Child 6 < 11 years

| COC                     | EPC  | SA              | SAF                | Absorbency Factor | Fraction Outdoor | Frequency  | Duration    | Period | Conversion Factor        | Body Weight | Averaging Time | ADD derm  | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|------|-----------------|--------------------|-------------------|------------------|------------|-------------|--------|--------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | ng/g | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               | .                | days/ week | weeks/ year | years  | 1,000 g/1 kg             | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| <b>Central Tendency</b> |      |                 |                    |                   |                  |            |             |        | 1 kg/l x 10 <sup>6</sup> |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 5.9  | 3.410.0         | 0.2                | 0.03              | 0.09             | 7          | 52          | 5      | 1.00E-06                 | 31.8        | 1825           | 3.47E-10  | 0.0001    | 3.47E-06  |                   |           |                   |          |
| hexa/hepta BDEs         | 47.9 | 3.410.0         | 0.2                | 0.03              | 0.09             | 7          | 52          | 5      | 1.00E-06                 | 31.8        | 1825           | 2.82E-09  | 0.0002    | 1.41E-05  |                   |           |                   |          |
| octa BDE                | 12.4 | 3.410.0         | 0.2                | 0.03              | 0.09             | 7          | 52          | 5      | 1.00E-06                 | 31.8        | 1825           | 7.29E-10  | 0.003     | 2.43E-07  |                   |           |                   |          |
| deca BDE                | 16.1 | 3.410.0         | 0.2                | 0.03              | 0.09             | 7          | 52          | 5      | 1.00E-06                 | 31.8        | 1825           | 9.47E-10  | 0.007     | 1.35E-07  | 27375             | 6.31E-11  | 0.0007            | 4.42E-14 |
|                         |      |                 |                    |                   |                  |            |             |        |                          |             |                | 4.84E-09  |           | 1.79E-05  |                   |           |                   |          |

INGESTION of Indoor Dust/Soil

Receptor: Child 6 < 11 years

| COC                     | EPC       | Intake | Fraction Indoor | Frequency | Duration | Period | Absorbency Factor | Conversion Factor | Body Weight | Averaging Time | ADD ing  | RfD    | HI       | AT Cancer Effects | LADD inh | Slope Factor      | ELCR     |          |
|-------------------------|-----------|--------|-----------------|-----------|----------|--------|-------------------|-------------------|-------------|----------------|----------|--------|----------|-------------------|----------|-------------------|----------|----------|
|                         |           |        |                 |           |          |        |                   |                   |             |                |          |        |          |                   |          |                   |          | ng/g     |
| <b>Central Tendency</b> |           |        |                 |           |          |        |                   |                   |             |                |          |        |          |                   |          |                   |          |          |
| tetra/penta BDEs        | 3,638.6   | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.0001 | 8.87E-02 | (years x days)    | 8.87E-06 | per mg/kg per day |          |          |
| hexa/hepta BDEs         | 334.4     | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.0002 | 4.08E-03 | (years x days)    | 8.15E-07 | per mg/kg per day |          |          |
| octa BDE                | 40.1      | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.003  | 3.26E-05 | (years x days)    | 9.78E-08 | per mg/kg per day |          |          |
| deca BDE                | 3,226.9   | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.007  | 1.12E-03 | (years x days)    | 7.87E-06 | per mg/kg per day |          |          |
|                         |           |        |                 |           |          |        |                   |                   |             |                |          |        | 9.40E-02 |                   | 1.77E-05 |                   | 5.25E-07 |          |
| <b>Worst Case</b>       |           |        |                 |           |          |        |                   |                   |             |                |          |        |          |                   |          |                   |          |          |
| tetra/penta BDEs        | 45,568.0  | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.0001 | 1.11E+00 | (years x days)    | 1.11E-04 | per mg/kg per day |          |          |
| hexa/hepta BDEs         | 5,105.5   | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.0002 | 6.22E-02 | (years x days)    | 1.24E-05 | per mg/kg per day |          |          |
| octa BDE                | 1,765.7   | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.003  | 1.44E-03 | (years x days)    | 4.31E-06 | per mg/kg per day |          |          |
| deca BDE                | 112,612.1 | 100    | 0.86            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06    | 1.00E-06       | 1.00E-06 | 0.007  | 3.92E-02 | (years x days)    | 2.75E-04 | per mg/kg per day |          |          |
|                         |           |        |                 |           |          |        |                   |                   |             |                |          |        | 1.21E+00 |                   | 4.02E-04 |                   | 1.83E-05 |          |
|                         |           |        |                 |           |          |        |                   |                   |             |                |          |        |          |                   |          |                   | 0.0007   | 1.28E-08 |



INHALATION of Outdoor Air

Receptor: Child 11 <16 years

| COC              | EPC               | IR                  | Fraction Outdoor |         | Frequency  | Duration    | Period | Absorbency Factor | Conversion Factor       | Body Weight |       | AT             | ADD inh   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|------------------|-------------------|---------------------|------------------|---------|------------|-------------|--------|-------------------|-------------------------|-------------|-------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                  |                   |                     | days/ week       | per day |            |             |        |                   |                         | kg          | years |                |           |           |           |                   |           |                   |          |
| Central Tendency | pg/m <sup>3</sup> | m <sup>3</sup> /day | days/ week       | per day | days/ week | weeks/ year | years  |                   | 1 mg/10 <sup>3</sup> pg | kg          | years | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| tetra/penta BDEs | 124.00            | 15.1                | 7                | 0.07    | 7          | 52          | 5      | 0.9               | 1.00E-09                | 56.8        | 5     | 1825           | 2.05E-09  | 0.0001    | 2.05E-05  |                   |           |                   |          |
| hexa/hepta BDEs  | 9.00              | 15.1                | 7                | 0.07    | 7          | 55          | 5      | 0.9               | 1.00E-09                | 56.8        | 5     | 1825           | 1.58E-10  | 0.0002    | 7.89E-07  |                   |           |                   |          |
| deca BDE         | 25.00             | 15.1                | 7                | 0.07    | 7          | 55          | 5      | 0.9               | 1.00E-09                | 56.8        | 5     | 1825           | 4.38E-10  | 0.007     | 6.26E-08  | 375               | 2.13E-09  | 0.0007            | 1.49E-12 |
|                  |                   |                     |                  |         |            |             |        |                   |                         |             |       |                | 2.66E-09  |           | 2.14E-05  |                   |           |                   |          |



INGESTION of Outdoor Soil

Receptor: Child 11 <16 years

| COC                     | EPC  | Intake | Fraction Outdoor | Frequency | Duration   | Period | Absorbency Factor | Conversion Factor | Conversion Factor       | Conversion Factor        | Body Weight | Averaging Time | ADD ing   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|------|--------|------------------|-----------|------------|--------|-------------------|-------------------|-------------------------|--------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | ng/g | mg/day | .                | days/week | weeks/year | years  | RAF               | 1,000 g/l         | 1 mg/10 <sup>6</sup> ng | 1 kg/l x 10 <sup>6</sup> | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day | ELCR     |
| <b>Central Tendency</b> |      |        |                  |           |            |        |                   |                   |                         |                          |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 5.9  | 100    | 0.07             | 7         | 52         | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                 | 56.8        | 1825           | 6.47E-10  | 0.0001    | 6.47E-06  |                   |           |                   |          |
| hexa/hepta BDEs         | 47.9 | 100    | 0.07             | 7         | 52         | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                 | 56.8        | 1825           | 5.26E-09  | 0.0002    | 2.63E-05  |                   |           |                   |          |
| octa BDE                | 12.4 | 100    | 0.07             | 7         | 52         | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                 | 56.8        | 1825           | 1.36E-09  | 0.003     | 4.54E-07  |                   |           |                   |          |
| deca BDE                | 16.1 | 100    | 0.07             | 7         | 52         | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                 | 56.8        | 1825           | 1.77E-09  | 0.007     | 2.52E-07  | 27375             | 9.07E-11  | 0.0007            | 6.35E-14 |
|                         |      |        |                  |           |            |        |                   |                   |                         |                          |             |                | 9.03E-09  |           | 3.35E-05  |                   |           |                   |          |



INGESTION of Indoor Dust/Soil

Receptor: Child 11 <16 years

| COC                     | EPC       | Intake | Fraction Indoor | Frequency | Duration | Period | Absorbency Factor | Conversion Factor | Conversion Factor | Conversion Factor | Body Weight | Averaging Time | ADD Int | RID      | HI       | AT Cancer Effects | LADD Int | Slope Factor | ELCR     |
|-------------------------|-----------|--------|-----------------|-----------|----------|--------|-------------------|-------------------|-------------------|-------------------|-------------|----------------|---------|----------|----------|-------------------|----------|--------------|----------|
|                         |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |         |          |          |                   |          |              |          |
| <b>Central Tendency</b> |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |         |          |          |                   |          |              |          |
| tetra/penta BDEs        | 3,638.6   | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 5.05E-06 | 0.0001   | 5.05E-02          |          |              |          |
| hexa/hepta BDEs         | 334.4     | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 4.65E-07 | 0.0002   | 2.32E-03          |          |              |          |
| octa BDE                | 40.1      | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 5.57E-08 | 0.003    | 1.86E-05          |          |              |          |
| deca BDE                | 3,226.9   | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 4.48E-06 | 0.007    | 6.40E-04          | 2.99E-07 | 0.0007       | 2.09E-10 |
|                         |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |         | 1.01E-05 | 5.35E-02 |                   |          |              |          |
| <b>Worst Case</b>       |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |         |          |          |                   |          |              |          |
| tetra/penta BDEs        | 45,558.0  | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 6.33E-05 | 0.0001   | 6.33E-01          |          |              |          |
| hexa/hepta BDEs         | 5,105.5   | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 7.09E-06 | 0.0002   | 3.55E-02          |          |              |          |
| octa BDE                | 1,765.7   | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 2.45E-06 | 0.003    | 8.18E-04          |          |              |          |
| deca BDE                | 112,612.1 | 100    | 0.88            | 7         | 52       | 5      | 0.9               | 1.00E+03          | 1.00E-06          | 1.00E-06          | 56.8        | 5              | 365     | 1.56E-04 | 0.007    | 2.23E-02          | 1.04E-05 | 0.0007       | 7.30E-09 |
|                         |           |        |                 |           |          |        |                   |                   |                   |                   |             |                |         | 2.29E-04 | 6.92E-01 |                   |          |              |          |



**INHALATION of Outdoor Air**

**Receptor: Child 16 < 21 years**

| COC                     | EPC               | IR                  | IR                  | Fraction Outdoor | Frequency  | Duration    | Period | Absorbency Factor | Conversion Factor       | Body Weight | AT             | ADD inh         | RfD       | HI              | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-------------------|---------------------|---------------------|------------------|------------|-------------|--------|-------------------|-------------------------|-------------|----------------|-----------------|-----------|-----------------|-------------------|-----------|-------------------|----------|
|                         | pg/m <sup>3</sup> | m <sup>3</sup> /day | m <sup>3</sup> /day | per day          | days/ week | weeks/ year | years  |                   | 1 mg/10 <sup>9</sup> pg | kg          | (years x days) | mg/kg-day       | mg/kg-day | mg/kg-day       | (years x days)    | mg/kg-day | per mg/kg per day |          |
| <b>Central Tendency</b> |                   |                     |                     |                  |            |             |        |                   |                         |             |                |                 |           |                 |                   |           |                   |          |
| tetra/penta BDEs        | 124.00            | 16.5                | 16.5                | 0.07             | 7          | 52          | 5      | 0.9               | 1.00E-09                | 71.6        | 1825           | 1.82E-09        | 0.0001    | 1.82E-05        |                   |           |                   |          |
| hexa/hepta BDEs         | 9.00              | 16.5                | 16.5                | 0.07             | 7          | 55          | 5      | 0.9               | 1.00E-09                | 71.6        | 1825           | 1.39E-10        | 0.0002    | 6.97E-07        |                   |           |                   |          |
| deca BDE                | 25.00             | 16.5                | 16.5                | 0.07             | 7          | 55          | 5      | 0.9               | 1.00E-09                | 71.6        | 1825           | 3.87E-10        | 0.007     | 5.53E-08        | 375               | 1.89E-09  | 0.0007            | 1.32E-12 |
|                         |                   |                     |                     |                  |            |             |        |                   |                         |             |                | <u>2.34E-09</u> |           | <u>1.89E-05</u> |                   |           |                   |          |







INGESTION of Indoor Dust/Soil

Receptor: Child 16 <21 years

| COC                     | EPC       | Intake | Fraction Indoor | Frequency  | Duration    | Period | Absorbency Factor | Conversion Factor | Conversion Factor       | Conversion Factor           | Body Weight | Averaging Time | ADD ing   | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-----------|--------|-----------------|------------|-------------|--------|-------------------|-------------------|-------------------------|-----------------------------|-------------|----------------|-----------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | ng/g      | mg/day |                 | days/ week | weeks/ year | years  | RAF               | 1,000 g/1 kg      | 1 mg/10 <sup>6</sup> ng | 1 kg/1 x 10 <sup>6</sup> ng | kg          | (years x days) | mg/kg-day | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
| <b>Central Tendency</b> |           |        |                 |            |             |        |                   |                   |                         |                             |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 3,638.6   | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 4.01E-06  | 0.0001    | 4.01E-02  |                   |           |                   |          |
| hexa/hepta BDEs         | 334.4     | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 3.69E-07  | 0.0002    | 1.84E-03  |                   |           |                   |          |
| octa BDE                | 40.1      | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 4.42E-08  | 0.003     | 1.47E-05  |                   |           |                   |          |
| deca BDE                | 3,226.9   | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 3.56E-06  | 0.007     | 5.08E-04  | 27375             | 2.37E-07  | 0.0007            | 1.66E-10 |
|                         |           |        |                 |            |             |        |                   |                   |                         |                             |             |                | 7.98E-06  |           | 4.25E-02  |                   |           |                   |          |
| <b>Worst Case</b>       |           |        |                 |            |             |        |                   |                   |                         |                             |             |                |           |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 45,588.0  | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 5.02E-05  | 0.0001    | 5.02E-01  |                   |           |                   |          |
| hexa/hepta BDEs         | 5,105.5   | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 5.63E-06  | 0.0002    | 2.81E-02  |                   |           |                   |          |
| octa BDE                | 1,765.7   | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 1.95E-06  | 0.003     | 6.49E-04  |                   |           |                   |          |
| deca BDE                | 112,612.1 | 100    | 0.88            | 7          | 52          | 5      | 0.9               | 1.00E+03          | 1.00E-06                | 1.00E-06                    | 71.6        | 1825           | 1.24E-04  | 0.007     | 1.77E-02  | 27375             | 8.27E-06  | 0.0007            | 5.79E-09 |
|                         |           |        |                 |            |             |        |                   |                   |                         |                             |             |                | 1.82E-04  |           | 5.49E-01  |                   |           |                   |          |

DERMAL CONTACT with Indoor Dust/Soil

Receptor: Child 16 < 21 years

| COC                     | EPC       | SA              | SAF                | Absorbency Factor | Fraction Indoor | Frequency  | Duration    | Period | Conversion Factor       | Body Weight | Averaging Time | ADD derm       | RfD       | HI        | AT Cancer Effects | LADD inh  | Slope Factor      | ELCR     |
|-------------------------|-----------|-----------------|--------------------|-------------------|-----------------|------------|-------------|--------|-------------------------|-------------|----------------|----------------|-----------|-----------|-------------------|-----------|-------------------|----------|
|                         | ng/g      | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS               | .               | days/ week | weeks/ year | years  | 1,000 g/l               | kg          | years          | days           | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day | per mg/kg per day |          |
|                         |           |                 |                    |                   |                 |            |             |        | 1 mg/10 <sup>6</sup> ng | kg          | days           | (years x days) | mg/kg-day | mg/kg-day | (years x days)    | mg/kg-day |                   |          |
| <b>Central Tendency</b> |           |                 |                    |                   |                 |            |             |        |                         |             |                |                |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 3,638.6   | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 5.61E-07       | 0.0001    | 5.61E-03  |                   |           |                   |          |
| hexa/hepta BDEs         | 334.4     | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 5.18E-08       | 0.0002    | 2.58E-04  |                   |           |                   |          |
| octa BDE                | 40.1      | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 6.18E-09       | 0.003     | 2.06E-06  |                   |           |                   |          |
| deca BDE                | 3,226.9   | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 4.97E-07       | 0.007     | 7.10E-05  | 27375             | 3.32E-08  | 0.0007            | 2.32E-11 |
|                         |           |                 |                    |                   |                 |            |             |        |                         |             |                | 1.12E-06       |           | 5.94E-03  |                   |           |                   |          |
| <b>Worst Case</b>       |           |                 |                    |                   |                 |            |             |        |                         |             |                |                |           |           |                   |           |                   |          |
| tetra/penta BDEs        | 45,558.0  | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 7.02E-06       | 0.0001    | 7.02E-02  |                   |           |                   |          |
| hexa/hepta BDEs         | 5,105.5   | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 7.87E-07       | 0.0002    | 3.93E-03  |                   |           |                   |          |
| octa BDE                | 1,765.7   | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 2.72E-07       | 0.003     | 9.07E-05  |                   |           |                   |          |
| deca BDE                | 112,612.1 | 6,080.0         | 0.07               | 0.03              | 0.87            | 7          | 52          | 5      | 1.00E+03                | 1.00E-06    | 1.00E-06       | 1.74E-05       | 0.007     | 2.48E-03  | 27375             | 1.16E-06  | 0.0007            | 8.10E-10 |
|                         |           |                 |                    |                   |                 |            |             |        |                         |             |                | 2.54E-05       |           | 7.67E-02  |                   |           |                   |          |



INHALATION of Indoor Air

Receptor: ADULT

| COC                     | Fraction Indoor   |                     |         |        |      |        |       |          |                         |         | AT    |       |                   |           | Slope Factor |                   |          |
|-------------------------|-------------------|---------------------|---------|--------|------|--------|-------|----------|-------------------------|---------|-------|-------|-------------------|-----------|--------------|-------------------|----------|
|                         | EPC               | Intake              | F       | D      | P    | AF     | CF    | BW       | AT                      | ADD ing | RfD   | HI    | AT Cancer Effects | LADD inh  | ELCR         |                   |          |
|                         | pg/m <sup>3</sup> | m <sup>3</sup> /day | per day | days/w | year | weeks/ | years | 0.9      | 1 mg/10 <sup>3</sup> pg | kg      | years | days  | (years x days)    | mg/kg-day | mg/kg-day    | per mg/kg per day |          |
| <b>Central Tendency</b> |                   |                     |         |        |      |        |       |          |                         |         |       |       |                   |           |              |                   |          |
| tetra/penta BDEs        | 321.13            | 13.3                | 0.88    | 7      | 50   | 55     | 0.9   | 1.00E-09 | 70                      | 55      | 365   | 20075 | 4.61E-08          | 0.0001    | 4.61E-04     |                   |          |
| hexa/hepta BDEs         | 12.17             | 13.3                | 0.88    | 7      | 50   | 55     | 0.9   | 1.00E-09 | 70                      | 55      | 365   | 20075 | 1.75E-09          | 0.0002    | 8.73E-06     |                   |          |
| deca BDE                | 120.87            | 13.3                | 0.88    | 7      | 50   | 55     | 0.9   | 1.00E-09 | 70                      | 55      | 365   | 20075 | 1.73E-08          | 0.007     | 2.48E-06     | 0.0007            |          |
|                         |                   |                     |         |        |      |        |       |          |                         |         |       |       | 6.52E-08          |           | 4.72E-04     | 1.27E-08          | 8.90E-12 |
| <b>Worst Case</b>       |                   |                     |         |        |      |        |       |          |                         |         |       |       |                   |           |              |                   |          |
| tetra/penta BDEs        | 3848.90           | 13.3                | 0.88    | 7      | 50   | 50     | 0.9   | 1.00E-09 | 70                      | 55      | 365   | 20075 | 5.02E-07          | 0.0001    | 5.02E-03     |                   |          |
| hexa/hepta BDEs         | 194.70            | 13.3                | 0.88    | 7      | 50   | 50     | 0.9   | 1.00E-09 | 70                      | 55      | 365   | 20075 | 2.54E-08          | 0.0002    | 1.27E-04     |                   |          |
| deca BDE                | 1277.70           | 13.3                | 0.88    | 7      | 50   | 50     | 0.9   | 1.00E-09 | 70                      | 55      | 365   | 20075 | 1.67E-07          | 0.007     | 2.38E-05     | 0.0007            |          |
|                         |                   |                     |         |        |      |        |       |          |                         |         |       |       | 6.94E-07          |           | 5.17E-03     | 1.22E-07          | 8.55E-11 |







DERMAL CONTACT with Indoor Dust/Soil

Receptor: ADULT

| COC                     | EPC       | SA              | SAF                | AF   | Fraction Indoor | F    | D  | P  | CF                   | CF      | CF                 | BW | AT | ADD derm  |           | RfD       | HI       | AT Cancer Effects | LADD inh          | SF      | ELCR    |
|-------------------------|-----------|-----------------|--------------------|------|-----------------|------|----|----|----------------------|---------|--------------------|----|----|-----------|-----------|-----------|----------|-------------------|-------------------|---------|---------|
|                         |           |                 |                    |      |                 |      |    |    |                      |         |                    |    |    | mg/kg-day | (yr x d)  |           |          |                   |                   |         |         |
|                         | ng/g      | cm <sup>2</sup> | mg/cm <sup>2</sup> | ABS  | per day         | d/wk | yr | yr | 1,000 g/l kg         | ng      | 10 <sup>6</sup> mg | kg | d  | (yr x d)  | mg/kg-day | mg/kg-day | (yr x d) | mg/kg-day         | per mg/kg per day |         |         |
|                         |           |                 |                    |      |                 |      |    |    | 1 mg/10 <sup>6</sup> |         |                    |    |    |           |           |           |          |                   |                   |         |         |
| <b>Central Tendency</b> |           |                 |                    |      |                 |      |    |    |                      |         |                    |    |    |           |           |           |          |                   |                   |         |         |
| tetra/penta             | 3,638.6   | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 5.2E-07   | 1.0E-04   | 5.2E-03  |                   |                   |         |         |
| hexa/hepta              | 334.4     | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 4.8E-08   | 2.0E-04   | 2.4E-04  |                   |                   |         |         |
| octa                    | 40.1      | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 5.8E-09   | 3.0E-03   | 1.9E-06  |                   |                   |         |         |
| deca                    | 3,226.9   | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 4.6E-07   | 7.0E-03   | 6.6E-05  | 27375             | 3.4E-07           | 7.0E-04 | 2.4E-10 |
|                         |           |                 |                    |      |                 |      |    |    |                      |         |                    |    |    |           | 1.0E-06   |           | 5.5E-03  |                   |                   |         |         |
| <b>Worst Case</b>       |           |                 |                    |      |                 |      |    |    |                      |         |                    |    |    |           |           |           |          |                   |                   |         |         |
| tetra/penta             | 45,558.0  | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 6.5E-06   | 1.0E-04   | 6.5E-02  |                   |                   |         |         |
| hexa/hepta              | 5,105.5   | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 7.3E-07   | 2.0E-04   | 3.7E-03  |                   |                   |         |         |
| octa                    | 1,765.7   | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 2.5E-07   | 3.0E-03   | 8.4E-05  |                   |                   |         |         |
| deca                    | 112,612.1 | 5,700.0         | 0.07               | 0.03 | 0.88            | 7    | 50 | 55 | 1.0E+03              | 1.0E-06 | 1.0E-06            | 70 | 55 | 20075     | 1.6E-05   | 7.0E-03   | 2.3E-03  | 27375             | 1.2E-05           | 7.0E-04 | 8.3E-09 |
|                         |           |                 |                    |      |                 |      |    |    |                      |         |                    |    |    |           | 2.4E-05   |           | 7.1E-02  |                   |                   |         |         |

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