Trophic Level Weighted BAFs – EPA 2014 vs. EPA 2015

	2014 TL2	2014 TL3	2014 TL4	2014 weighted BAF	2015 TL2	2015 TL3	2015 TL4	2015 weighted BAF	2015 vs 2014	Difference as a % of 2015 final
Acrolein	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	1.4
Acrylonitrile	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	-3.5
Aldrin	222600.0	207700.0	184000.0	207731.8	18000.0	310000.0	650000.0	281090.9	73359.1	26.1
alpha-BHC	934.9	1118.0	1935.0	1237.1	1700.0	1400.0	1500.0	1531.8	294.7	19.2
alpha-Endosulfan	375.6	409.7	544.4	427.9	130.0	180.0	200.0	166.4	-261.6	-157.2
Benzene	8.9	10.0	14.8	10.7	3.6	4.5	5.0	4.3	-6.4	-149.5
Benzidine	2.2	2.4	3.0	2.4	1.4	1.6	1.7	1.6	-0.9	-57.5
beta-BHC	934.9	1118.0	1935.0	1237.1	110.0	160.0	180.0	146.4	-1090.7	-745.2
beta-Endosulfan	178.9	199.2	281.1	210.4	80.0	110.0	130.0	103.6	-106.8	-103.0
Bis(2-Chloroethyl) Ether	2.0	2.2	2.6	2.2	1.4	1.6	1.7	1.6	-0.7	-43.2
*Bis(2-Chloro-1-Methylethyl) Ether	13.5	14.2	15.6	14.3	6.7	8.8	10.0	8.3	-6.0	-71.8
Bis(Chloromethyl) Ether	1.1	1.2	1.2	1.2	1.0	1.0	1.0	1.0	-0.2	-17.3
Bromoform	13.9	15.2	19.5	15.7	5.8	7.5	8.5	7.1	-8.6	-120.5
Carbon Tetrachloride	20.0	20.1	18.8	19.8	9.3	12.0	14.0	11.5	-8.3	-72.4
Chlordane	688200.0	1318000.0	3205000.0	1517845.5	5300.0	44000.0	60000.0	33563.6	-1484281.8	-4422.3
Chlorobenzene	24.4	25.1	25.0	24.8	14.0	19.0	22.0	17.9	-6.9	-38.9
Chlorodibromomethane	8.7	9.6	12.8	10.0	3.7	4.8	5.3	4.5	-5.5	-121.8
Chloroform	6.0	6.6	8.7	6.9	2.8	3.4	3.8	3.3	-3.6	-109.5
Dichlorobromomethane	6.6	7.3	10.0	7.6	3.4	4.3	4.8	4.1	-3.5	-86.8
Dieldrin	17280.0	20740.0	30820.0	21772.7	14000.0	210000.0	410000.0	184181.8	162409.1	88.2
Endosulfan Sulfate	255.0	281.0	383.0	294.7	88.0	120.0	140.0	112.9	-181.8	-161.0
Endrin	17280.0	20740.0	30820.0	21772.7	4600.0	36000.0	46000.0	26854.5	5081.8	18.9
Endrin Aldehyde	5409.0	6428.0	10070.0	6885.2	440.0	920.0	850.0	729.5	-6155.6	-843.8
Ethylbenzene	61.5	65.3	73.6	65.8	100.0	140.0	160.0	130.0	64.2	49.4
Fluorene	763.0	789.7	909.2	807.2	230.0	450.0	710.0	429.1	-378.1	-88.1
gamma-BHC (Lindane)	934.9	1118.0	1935.0	1237.1	1200.0	2400.0	2500.0	1986.4	749.3	37.7
Heptachlor	31680.0	33940.0	39160.0	34304.5	12000.0	180000.0	330000.0	153000.0	118695.5	77.6
Heptachlor Epoxide	11850.0	19230.0	55830.0	24864.5	4000.0	28000.0	35000.0	20863.6	-4000.9	-19.2
Hexachlorobenzene	157300.0	294000.0	791100.0	357268.2	18000.0	46000.0	90000.0	45818.2	-311450.0	-679.8

	2014 TL2	2014 TL3	2014 TL4	2014 weighted BAF	2015 TL2	2015 TL3	2015 TL4	2015 weighted BAF	2015 vs 2014	Difference as a % of 2015 final
Hexachlorobutadiene	6044.0	8953.0	23410.0	11180.9	23000.0	2800.0	1100.0	9759.1	-1421.8	-14.6
Hexachlorocyclohexane-Technical	1270.0	1534.0	2705.0	1704.1	160.0	220.0	250.0	205.0	-1499.1	-731.3
Hexachlorocyclopentadiene	7310.0	6930.0	6502.0	6970.9	620.0	1500.0	1300.0	1134.5	-5836.4	-514.4
Hexachloroethane	727.1	762.8	912.6	783.9	1200.0	280.0	600.0	687.3	-96.6	-14.1
Isophorone	3.3	3.5	4.0	3.5	1.9	2.2	2.4	2.1	-1.4	-65.5
Methoxychlor	9.0	8860.0	9001.0	5673.5	1400.0	4800.0	4400.0	3472.7	-2200.8	-63.4
Methyl Bromide	1.8	1.9	2.2	1.9	1.2	1.3	1.4	1.3	-0.6	-50.5
Methylene Chloride	2.0	2.1	2.6	2.2	1.4	1.5	1.6	1.5	-0.7	-46.1
Nitrobenzene	4.7	5.1	6.4	5.2	2.3	2.8	3.1	2.7	-2.5	-94.9
Pentachlorobenzene	19630.0	28470.0	61860.0	32844.1	3500.0	4500.0	10000.0	5386.4	-27457.7	-509.8
Pentachlorophenol	486.1	360.9	254.7	382.3	44.0	290.0	520.0	252.8	-129.5	-51.2
Phenol	2.2	2.3	2.4	2.3	1.5	1.7	1.9	1.7	-0.6	-36.1
Tetrachloroethylene	54.2	53.0	46.0	51.8	49.0	66.0	76.0	62.1	10.2	16.5
Toluene	27.6	30.1	37.8	31.0	11.0	15.0	17.0	14.0	-17.0	-121.1
Toxaphene	117800.0	163300.0	278100.0	172845.5	1700.0	6600.0	6300.0	4750.0	-168095.5	-3538.9
Trichloroethylene	15.4	17.2	23.7	18.0	8.7	12.0	13.0	11.0	-7.0	-63.5
Vinyl Chloride	3.3	3.7	4.9	3.8	1.4	1.6	1.7	1.6	-2.3	-146.5
1,1,1-Trichloroethane	10.6	10.7	10.3	10.6	6.9	9.0	10.0	8.5	-2.1	-24.8
1,1,2,2-Tetrachloroethane	13.7	15.1	19.6	15.6	5.7	7.4	8.4	7.0	-8.6	-122.7
1,1,2-Trichloroethane	4.9	5.3	6.6	5.5	6.0	7.8	8.9	7.4	1.9	26.2
1,1-Dichloroethylene	8.2	9.0	11.9	9.4	2.0	2.4	2.6	2.3	-7.1	-307.6
1,2,4,5-Tetrachlorobenzene	3696.0	4798.0	9639.0	5497.5	17000.0	2900.0	1500.0	7709.1	2211.6	28.7
1,2,4-Trichlorobenzene	642.8	714.7	1010.0	755.7	2800.0	1500.0	430.0	1729.5	973.9	56.3
1,2-Dichlorobenzene	151.5	168.6	235.6	177.6	52.0	71.0	82.0	66.6	-111.0	-166.7
1,2-Dichloroethane	2.7	2.9	3.8	3.0	1.6	1.8	1.9	1.8	-1.3	-72.1
1,2-Dichloropropane	5.7	6.1	7.4	6.2	2.9	3.5	3.9	3.4	-2.9	-85.1
1,2-Diphenylhydrazine	41.5	44.7	53.3	45.5	18.0	24.0	27.0	22.5	-23.0	-102.2
1,2-Trans-Dichloroethylene	6.7	7.5	10.7	8.0	3.3	4.2	4.7	4.0	-4.0	-99.5
1,3-Dichlorobenzene	134.3	140.1	149.5	140.1	31.0	120.0	190.0	103.5	-36.6	-35.3
1,3-Dichloropropene	7.1	8.0	11.4	8.4	2.3	2.7	3.0	2.6	-5.8	-221.8
1,4-Dichlorobenzene	165.7	187.5	281.3	200.9	28.0	66.0	84.0	56.3	-144.6	-257.0

	2014 TL2	2014 TL3	2014 TL4	2014 weighted BAF	2015 TL2	2015 TL3	2015 TL4	2015 weighted BAF	2015 vs 2014	Difference as a % of 2015 final
2,4,5-Trichlorophenol	190.4	195.0	198.5	194.1	100.0	140.0	160.0	130.0	-64.1	-49.3
2,4,6-Trichlorophenol	109.6	106.9	93.6	104.9	94.0	130.0	150.0	121.5	16.6	13.7
2,4-Dichlorophenol	35.3	36.7	34.0	35.5	31.0	42.0	48.0	39.4	3.8	9.7
2,4-Dimethylphenol	10.0	10.7	12.3	10.8	4.8	6.2	7.0	5.9	-4.9	-83.9
2,4-Dinitrotoluene	6.5	7.2	10.3	7.7	2.8	3.5	3.9	3.3	-4.3	-129.7
2-Chloronaphthalene	440.4	477.8	626.2	497.9	150.0	210.0	240.0	195.0	-302.9	-155.3
2-Chlorophenol	9.0	10.0	14.1	10.5	3.8	4.8	5.4	4.6	-6.0	-130.5
2-Methyl-4,6-Dinitrophenol	4.8	4.8	4.5	4.7	6.8	8.9	10.0	8.4	3.7	43.9
3,3'-Dichlorobenzidine	138.1	145.6	162.1	146.6	44.0	60.0	69.0	56.2	-90.4	-160.8
3-Methyl-4-Chlorophenol	23.0	22.2	18.8	21.7	25.0	34.0	39.0	31.9	10.1	31.8
4,4'-DDD	370200.0	678800.0	1636000.0	784127.3	33000.0	140000.0	240000.0	123818.2	-660309.1	-533.3
4,4'-DDE	463100.0	573300.0	775200.0	579113.6	270000.0	1100000.0	3100000.0	1252727.3	673613.6	53.8
4,4'-DDT	1022000.0	1446000.0	2315000.0	1489318.2	35000.0	240000.0	1100000.0	360909.1	-1128409.1	-312.7

Bioaccumulation factors (BAFs) were calculated or modeled for 94 pollutants and published in the 2014 draft. In the 2015 final update 21 of the 94 BAF values were based on the BCF leaving 73 pollutants with BAF values. When comparing the 2014 draft BAF values to the 2015 final values, 56 pollutants have lower BAF values in the 2015 final criteria while the remaining 17 pollutants have greater values in the 2015 final criteria; there were no values that were the same between the 2014 draft and the 2015 final criteria.

DEQ is using trophic level weighted BAFs for calculation of its 2015 criteria where EPA has provided trophic level specific BAFs. Where a single BCF is provided that value is used instead, either the 2015 updated value, or if not updated in 2015 the value in EPA's 2002 HH Criteria Calculation Matrix.

About Trophic Level -Weighting

The 90th %tile FCR values by trophic level from EPA's 2014 fish consumption report are level 2 7.6 g/day, level 3 8.6 g/day, and level 4 5.1 g/day. That adds up to just 21.3 g/day, rather than the 22g/day national default FCR they recommend, a consequence of independent estimation using the NCI method.

This is adjusted to 22g/day, maintaining the ratios, as explained in each of EPA's chemical specific documents:

"In order to derive the trophic level breakdown of the 22 grams/day freshwater and estuarine FCR, the trophic level specific freshwater and estuarine FCR data sets for adults 21 years of age and older were identified (USEPA, 2014: *see Tables 16a*, *17a*, *and 18a*). In each trophic level specific data set, the ratio of that trophic level's 90th percentile FCR compared to the summation of all three trophic level specific 90th percentile FCRs was applied to the 22 grams/day FCR used in this update. The trophic level ratios were calculated as follows: TL ratio = 90th percentile FCR for the TL divided by the sum of the 90th percentile FCRs for all TLs. TL2 = 7.6/21.3 = 0.3568 (35.68%), TL3 = 8.6/21.3 = 0.4038 (40.38%), and TL4 = 5.1/21.3 = 0.2394 (23.94%). Applying these ratios to the updated FCR of 22 grams/day result in trophic level breakdowns of TL2 = 8 grams/day (0.008 kg/day); TL3 = 9 grams/day (0.009 kg/day); and TL4 = 5 grams/day (0.005 kg/day). These resulting trophic level FCRs are well within the confidence intervals for each of the trophic level specific distributions' 90th percentiles and add to the total of 22 grams/day (USEPA, 2014)."

So we calculate a trophic level weighted BAF, to get a single value to work with, using 8, 9, and 5 grams/day respectively for trophic levels 2, 3 and 4.

BAF TL weighted ave =((0.008*TL2 BAF)+(0.009*TL3 BAF)+(0.005* TL3 BAF))/0.022

Although out fish consumption rate deviates from 22 g/day, this calculation maintains the ratios apparent in the national data.