EXPOSURE AND TOXICITY FACTORS

Active ingredient:

(for multiple exposure durations, create new files)

	Toxicity
Incidental Oral	POD (mg/kg/day)
	LOC
Inhalation	POD (mg/kg/day)
	LOC
Dermal	POD (mg/kg/day)
	POD source/study
	Absorption (0-1)
	Absorption source/study
	LOC

	Body Weights (kg)
Adults	Dermal
	Inhalation
Children (1 <2 years)	

Body Weight Pick List Reference (DO NOT	
POD Type	**Lifestage**
General	Combined Adults (16 < 80 years old)
Female-specific	Female Adults (13 < 49 years old)
Male-specific	Male Adults (16 < 80 years old)

Toxicity Source/Study Pick List (DO NOT DELETE)	
POD	**Absorption**
Route-specific	Human study
Oral	Animal study
	Estimated by POD or LOAEL/NOAEL comparison
	In vitro study
	Other

Exposure Duration Pick List (Do Not Delete)

Green cells = input required by assessor

TCVP (Pet Collar)

Short-Term

2.8
1000
2.8
0.096
Animal study
100

Note: POD is a 21 day SS value

Note: Dermal assessment not relevant/n

Note: Not used for non-cancer assessm

69
69
11

DELETE)
Mean Body Weight (kg)
80
69
86

Table 3.3. Summary of Toxicologica
Occupational Human Health Risk Asse

Exposure/ Scenario	Point of Departure	Unce Fac
Incidental Oral (steady state)	$BMDL_{10}$ = 2.8 mg/kg/day	UF_A= UF_H=1 FQPA 10x
Dermal (steady state)	No potential hazard *via* th the lack of RBC and brai dose levels up to 1000 m	
Inhalation (steady state)	$BMDL_{10}$=0.022 mg/L (males)	UF_A= UF_H=1 FQPA 10X
Cancer (oral, dermal, inhalation)	Classification: A possible	

[1] **Explanation of Abbreviations:** Point of Depar dose-response data and used to mark the beginni relevant human exposures. NOAEL = no observ uncertainty factor. UFA = extrapolation from an

ıeeded for non-cancer endpt evaluation; no hazard via dermal route

ent

l Doses and Endpoints for TCVP for Use in Dietary and Non-ssments		
rtainty tors*	Level of Concern	Study and Toxicological Effects
10x 10x SF =	Residential LOC for MOE = 1000	Repeat dose CCA study (MRID 48773401a) - Rat BMD_{10} = 3.2 mg/kg/day, based on PND 21 male RBC ChE inhibition
he dermal route, based on the lack of treatment-related effects, including n cholinesterase inhibition following repeat dermal exposure of rats at g/kg/day and no concern for quantitative susceptibility.		
3x 10x SF =	Residential LOC for MOE = 300	Subchronic Inhalation Toxicity Study (MRID 48803501) – Rat BMD_{10} = 0.12 mg/L, based on RBC ChE inhibition in both sexes
: human (Group C) carcinogen. Q_1^* = 1.83 x 10^{-5} (mg/kg/day)$^{-1}$		

ture (POD) = A data point or an estimated point that is derived from observed ng of extrapolation to determine risk associated with lower environmentally ed adverse effect level. LOAEL = lowest observed adverse effect level. UF = ainal to human (interspecies). UFH = potential variation in sensitivity among

Short-Term
Intermediate-Term
Long-Term

members of the human population (interspecies);
$BMDL_{10}$= benchmark dose lower limit for 10% r
women of childbearing age for all exposure scen
neurodevelopmental effects (see Section 4.4 of tl

; MOE = margin of exposure. LOC = level of concern. RBC = red blood cell.
response. *The 10X FQPA SF is retained for infants, children, youths, and
arios due to uncertainty in the human dose-response relationship for
he Tetrachlorvinphos RA (D436834)).

Do Not Delete This Box
Short-Term
Intermediate-Term
Long-Term

Treated Pet Post-app Dermal - Pet Collars

Levels of Concern	
Dermal	1000 Not applicable

Application Rate (calculated from product label)				
Animal Type	size	amount applied (g)	%ai	AR (mg ai)
Trimmed Pet Collars				
Cat	Small	5.6	14.55%	814.8
	Medium	8.8	14.55%	1283.31
	Large	12.2	14.55%	1772.19
Dog	Small	13.3	14.55%	1935.15
	Medium	18.2	14.55%	2648.1
	Large	23.1	14.55%	3361.05

%TR		Far
0.167	Day 10, 25 stroke study avg.*	0.00167
0.13	21 day S57; Chambers study - 90 day avg = 0.13%	0.0013

*see EPA 2019 review of Hartz TR petting simulation study:

"Percent transferable residues of TCVP is calculated by taking the ratio of the residues of TCVP observed on the glove to the total amount of TCVP in the collar at application (calculated as the percent TCVP * initial weight of collar). This results in percent transfer values ranging from 0.049% to 0.228%. The average percent transferable residues of TCVP were 0.098% for Group 1 (5 petting simulations), 0.086% for Group 2 (10 petting simulations), and 0.167% for Group 3 (25 petting simulations)."

TR study avg for 16 to 25 lbs beagle mix dogs was 2756 mg (range was 2540 to 2906) TCVP applied initially

-

Pet Size	Cat			Dog		
	lbs	Un-Trimmed collar size (g)	Trimmed collar size (g)*	lbs	Un-Trimmed collar size (g)	Trimmed collar size (g)*
Small	<5	8	5.6	<25	19.0	13.3
Medium	6 - 12	13	8.8	25 - 55	26.0	18.2
Large	>12	17.4	12.2	>55	33.0	23.1

*Trimmed collar sizes represent 30% removal, based on 7 month efficacy study animal data, and reflects approximately 2 to 7 inches of excess collar removal.

LIQUID FORMULATION - Assumes pet collars are a liquid formulat

Animal Type	Animal Size	Lifestage	Application Rate (mg ai)	F_{ai}	SA of pet (cm^2/animal)	Transferable residue (mg/cm^2)	Transfer coefficient (cm^2/hr)	Exposure time (hr/day)	Exposure (mg/day)	Absorbed Dose (mg/kg/day)	**Absorbed Dose Adjusted 99.9% (mg/kg/day)**
Cat	Small	Adult	814.8	0.00167	1500	0.000907	5200	0.77	3.63	0.0051	0.0050
		Child (1 < 2 yrs)	814.8	0.00167	1500	0.000907	1400	1	1.27	0.0111	0.0110
	Medium	Adult	1283.31	0.00167	2500	0.000857	5200	0.77	3.43	0.0048	0.0048
		Child (1 < 2 yrs)	1283.31	0.00167	2500	0.000857	1400	1	1.20	0.0105	0.0104
	Large	Adult	1772.19	0.00167	4000	0.000740	5200	0.77	2.96	0.0041	0.0041
		Child (1 < 2 yrs)	1772.19	0.00167	4000	0.000740	1400	1	1.04	0.0090	0.0090
Dog	Small	Adult	1935.15	0.00167	3000	0.001077	5200	0.77	4.31	0.0060	0.0060
		Child (1 < 2 yrs)	1935.15	0.00167	3000	0.001077	1400	1	1.51	0.0132	0.0131
	Medium	Adult	2648.1	0.00167	7000	0.000632	5200	0.77	2.53	0.0035	0.0035
		Child (1 < 2 yrs)	2648.1	0.00167	7000	0.000632	1400	1	0.88	0.0077	0.0077
	Large	Adult	3361.05	0.00167	11000	0.000510	5200	0.77	2.04	0.0028	0.0028
		Child (1 < 2 yrs)	3361.05	0.00167	11000	0.000510	1400	1	0.71	0.0062	0.0062

SOLID FORMULATION - Assumes pet collars are a solid formulation

Animal Type	Animal Size	Lifestage	Application Rate (mg ai)	F_{ai}	SA of pet (cm^2/animal)	Transferable residue (mg/cm^2)	Transfer coefficient (cm^2/hr)	Exposure time (hr/day)	Exposure (mg/day)	Absorbed Dose (mg/kg/day)	**Absorbed Dose Adjusted 8.1% (mg/kg/day)**
Cat	Small	Adult	814.8	0.00167	1500	0.000907	140000	0.77	97.79	0.136	0.000517
		Child (1 < 2 yrs)	814.8	0.00167	1500	0.000907	38000	1	34.47	0.301	0.001143
	Medium	Adult	1283.31	0.00167	2500	0.000857	140000	0.77	92.41	0.129	0.000489
		Child (1 < 2 yrs)	1283.31	0.00167	2500	0.000857	38000	1	32.58	0.284	0.001080
	Large	Adult	1772.19	0.00167	4000	0.000740	140000	0.77	79.76	0.111	0.000422
		Child (1 < 2 yrs)	1772.19	0.00167	4000	0.000740	38000	1	28.12	0.245	0.000932
Dog	Small	Adult	1935.15	0.00167	3000	0.001077	140000	0.77	116.13	0.162	0.000614
		Child (1 < 2 yrs)	1935.15	0.00167	3000	0.001077	38000	1	40.93	0.357	0.001358
	Medium	Adult	2648.1	0.00167	7000	0.000632	140000	0.77	68.10	0.095	0.000360
		Child (1 < 2 yrs)	2648.1	0.00167	7000	0.000632	38000	1	24.01	0.210	0.000796
	Large	Adult	3361.05	0.00167	11000	0.000510	140000	0.77	55.01	0.077	0.000291
		Child (1 < 2 yrs)	3361.05	0.00167	11000	0.000510	38000	1	19.39	0.169	0.000643

	CAT	DOG
Liquid	0.9962	0.9962
Solid*	0.00380	0.00380
	1.0000	1.0000

*See EPA 2019 (Lowe and Britton) review of Hartz torsion study; conclusion: "This results in the determination that 0.38% mass (assumed ot be dust) is lost from the collar due to torsional stress (i.e., 133.9 mg / 35600 mg * 100)."

Cell: F17
Comment: Refer to the SA Calculations tab to calculate the SA of an animal in a different weight range than specified in the SOP

Cell: F34
Comment: Refer to the SA Calculations tab to calculate the SA of an animal in a different weight range than specified in the SOP

Treated Pet Incidental Oral - Pet Collars

Level of Concern	
Incidental Oral	1000

LIQUID FORMULATION

Animal Type	Animal Size	Lifestage	$F_{aihands}$	DE	SA_H	HR	F_m	ET	Replenish-ment interval (min)	N_Replen	SE	Freq_HtM	Absorbed Dose (mg/kg/day)
				Dermal Exposure (mg)	Surface area of 1 hand (cm^2)	Hand residue loading (mg/cm^2)	Fraction of hand mouthed	Exposure Time (hours/day)		# replenish-ment intervals per hour (intervals/hr)	Fraction Saliva Extraction	Number of hand-to-mouth contacts events per hour (events/hr)	
Cat	Small	Children 1 to < 2 years old	0.04	1.3	150	0.0002	0.13	1	15	4	0.48	20	0.001155
	Medium		0.04	1.2	150	0.0002	0.13	1	15	4	0.48	20	0.001092
	Large		0.04	1.0	150	0.0001	0.13	1	15	4	0.48	20	0.000942
Dog	Small		0.04	1.5	150	0.0002	0.13	1	15	4	0.48	20	0.001372
	Medium		0.04	0.9	150	0.0001	0.13	1	15	4	0.48	20	0.000804
	Large		0.04	0.7	150	0.0001	0.13	1	15	4	0.48	20	0.000650

SOLID FORMULATION

Animal Type	Animal Size	Lifestage	$F_{aihands}$	DE	SA_H	HR	F_m	ET	Replenish-ment interval (min)	N_Replen	SE	Freq_HtM	Absorbed Dose (mg/kg/day)
				Dermal Exposure (mg)	Surface area of 1 hand (cm^2)	Hand residue loading (mg/cm^2)	Fraction of hand mouthed	Exposure Time (hours/day)		# replenish-ment intervals per hour (intervals/hr)	Fraction Saliva Extraction	Number of hand-to-mouth contacts events per hour (events/hr)	
Cat	Small	Children 1 to < 2 years old	0.37	34	150	0.0425	0.13	1	15	4	0.48	20	0.290
	Medium		0.37	33	150	0.0402	0.13	1	15	4	0.48	20	0.274
	Large		0.37	28	150	0.0347	0.13	1	15	4	0.48	20	0.237
Dog	Small		0.37	41	150	0.0505	0.13	1	15	4	0.48	20	0.344
	Medium		0.37	24	150	0.0296	0.13	1	15	4	0.48	20	0.202
	Large		0.37	19	150	0.0239	0.13	1	15	4	0.48	20	0.163

Absorbed Dose Adjusted 99.8% (mg/kg/day)
0.001150687
0.0010874
0.000938529
0.001366441
0.000801372
0.000647262

	CAT	DOG
Liquid	0.9962	0.9962
Solid	0.00380	0.00380
	1.0000	1.0000

Absorbed Dose Adjusted 0.1% (mg/kg/day)
0.001102026
0.001041414
0.00089884
0.001308655
0.000767482
0.000619889

Cell: G1
Comment: Auto-populates from "Chemical Info" tab

Animal Type	Animal Size	Dermal Dose 99.17% Liquid	Dermal Dose 0.83% Solid
Cat	Small	0.01104	0.00114
	Medium	0.01043	0.00108
	Large	0.00901	0.00093
Dog	Small	0.01311	0.00136
	Medium	0.0077	0.0008
	Large	0.0062	0.0006

Animal Type	Animal Size	Dermal Dose 99.17% Liquid	Dermal Dose 0.83% Solid
Cat	Small	0.00503	0.00052
	Medium	0.00476	0.00049
	Large	0.00411	0.00042
Dog	Small	0.00598	0.00061
	Medium	0.00351	0.00036
	Large	0.00283	0.00029

		Combined (Dermal + H
Combined liquid + solid Dermal Dose	**Dermal MOE**	**HtM Dose 99.17% Liquid**
0.01218	230	0.00115
0.01151	240	0.00109
0.00994	280	0.00094
0.01447	190	0.00137
0.00849	330	0.00080
0.00685	410	0.00065

Combined liquid + solid Dermal Dose	**Dermal MOE (not used)**	**LADD**
Adults		
0.0056	500	9.13E-04
0.0052	530	8.62E-04
0.0045	620	7.44E-04
0.0066	420	1.08E-03
0.0039	720	6.36E-04
0.0031	900	5.13E-04

tM) MOE Liquid and Solid - 99.9/0.01 Liquid/Dust Ratio

HtM Dose 0.83% Solid	Combined liquid + solid Incidental Oral Dose
Children 1 to < 2 Years Old	
0.00110	**0.0023**
0.00104	**0.0021**
0.00090	**0.0018**
0.00131	**0.0027**
0.00077	**0.0016**
0.00062	**0.0013**

Theoretical Lifetime Excess Cancer Risk (LECR)
1.67E-06
1.58E-06
1.36E-06
1.98E-06
1.16E-06
9.39E-07

Theorectical cancer risk estimation input variables:
Q1* (mg/kg/day)-1
days per yr of use (7 mon)
yrs of pet ownership)
days per yr
yrs per lifetime

Combined liq + dermal dose

HtM MOE	Combined Dermal + HtM Dose*	Combined Dermal + HtM MOE*
1,200	0.014	190
1,300	0.014	210
1,500	0.012	240
1,000	0.017	160
1,800	0.010	280
2,200	0.008	340

***Combined Dermal and HTM, and related MOE note used/not relevant**

1.83E-03
210
20
365
70

(see Adults, colunn E)

Total Dose (ug/kg) from biomonitoring	MOE	MOE
22.19	126	360
84.67	33	94
0.60	4656	13302
65.21	43	123
1.72	1630	4656
1.11	2531	7232
3.06	915	2615
12.76	219	627
143.39	20	56
	#VALUE!	#VALUE!
16.51	170	485
62.76	45	127
47.98	58	167
	#VALUE!	#VALUE!
30.72	91	260
166.32	17	48
153.00	18	52
1.20	2342	6693
	#VALUE!	#VALUE!
125.19	22	64
1.32	2125	6073
0.46	6071	17345
95.70	29	84
900.17	3	9
6.64	421	1204
59.32	47	135
2.30	1216	3474
30.39	92	263
0.69	4051	11573
1.11	2531	7232
5.24	535	1528
2.63	1064	3040
154.69	18	52
	#VALUE!	#VALUE!
3.44	815	2328
111.79	25	72
18.30	153	437
	#VALUE!	#VALUE!
20.25	138	395
55.45	50	144
117.70	24	68
1.78	1571	4488
7.06	397	1134
231.23	12	35
1.62	1729	4941
2.71	1034	2954
77.42	36	103
733.84	4	11
	#VALUE!	#VALUE!
83.53	34	96
3.80	737	2107
11.17	251	716

1.05	2660	7601
0.51	5494	15697
1.90	1472	4207
3.26	858	2453
95.78	29	84
	#VALUE!	#VALUE!
19.08	147	419
198.23	14	40
32.56	86	246
	#VALUE!	#VALUE!
12.79	219	625
24.75	113	323
67.50	41	119
1.63	1723	4922
10.71	261	747
57.28	49	140
1.00	2794	7981
1.00	2794	7981
77.33	36	103
256.59	11	31
	#VALUE!	#VALUE!
82.11	34	97
24.62	114	325
15.18	184	527
5.12	547	1562
0.51	5463	15608
1.21	2309	6597
1.45	1928	5508
54.05	52	148
	#VALUE!	#VALUE!
2.01	1392	3978
55.46	50	144
42.19	66	190
	#VALUE!	#VALUE!
28.12	100	285
183.31	15	44
95.72	29	84
1.87	1498	4281
43.74	64	183
73.30	38	109
3.40	823	2352
0.41	6829	19511
75.49	37	106
697.15	4	11
	#VALUE!	#VALUE!
75.83	37	106
0.46	6084	17382
7.54	371	1061
0.93	3014	8611
0.52	5418	15479
8.38	334	955
2.10	1335	3813
155.82	18	51
1.47	1901	5432

	31.58	89	253
	35.78	78	224
		#VALUE!	#VALUE!
	3.58	782	2235
	46.85	60	171
	115.98	24	69
	0.64	4345	12415
	18.53	151	432
	155.56	18	51
	0.63	4470	12770
	1.46	1917	5478
	55.05	51	145
	427.82	7	19
		#VALUE!	#VALUE!
Mean	67.70		
MOE	41.36021198		