- Residential Handler Pet Product Risk Summary:
  - No risks of concern identified (all MOEs ≥ LOC of 300)
  - Cancer Risk Estimates are in the 10^{-8} range

- Residential Post-application Pet Product Risk Summary:
  - Dusts/Powders:
    - Risks of concern identified for all dust/powder products
    - MOEs range from 98- 640
    - Cancer risk estimates range from 10^{-7} to 10^{-6}
  - Pump/Trigger Sprays
    - No risks of concern identified
    - MOEs range from 1,600 – 15,000
    - Cancer risk estimates are all 10^{-7}
  - Pet Collars
    - Incorporated trimming adjustment to application rate for collars (20% - minimum value from efficacy study data provided by Hartz)
    - Updated fraction transfer values (recalculated Davis study value excluding residues from petting simulations over the collar):
      - Davis study and Hartz study now provide the same fraction transfer factor for use in non-cancer assessment: 0.0017
      - Davis study also provides value for use in cancer assessment of 0.00092
    - Risks of concern identified:
      - MOEs range from 340 – 2,300
      - Cancer risk estimates range from 10^{-7} to 10^{-6}

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Appendix C – Summary of Residential Handler Non-Cancer Exposures and Risks

Table C.1. Residential Handler Non-Cancer Dermal and Inhalation Doses Assuming a Liquid or Dust Formulation for Pet Collars.

Exposure Scenario	Reg. No. (Target Animal)	Dermal Unit Exposure (mg/lb ai)	Inhalation Unit Exposure (mg/lb ai)	Maximum Application Rate[1] (lb ai/pet)	Amount Handled Daily (animals treated per day)[2]	Dermal Dose (mg/kg/day)[3]	Inhalation Dose (mg/kg/day)[4]
Assume Liquid Formulation -- Use of Spot-On Exposure Data (based on 2012 Residential SOPs)							
Application of TCVP Collars	2596-49 (Cat)	120	Negligible	0.0029	2	0.0010	Negligible
	2596-50, 62 (Dog)			0.0049 (small collar)		0.0016	
				0.0082 (large collar)		0.0027	
	2596-63 (Cat)			0.0039 (small collar)		0.0013	
				0.0044 (large collar)		0.0015	
	2596-83 (Cat)			0.0031 (small collar)		0.0010	
				0.0064 (large collar)		0.0021	
	2596-84 (Dog)			0.0049 (small collar)		0.0016	
				0.0082 (large collar)		0.0027	
	2596-139 (Cat)			0.0026		0.0009	
	2596-139 (Dog)			0.0129		0.0043	
Assume Dust Formulation -- Use of TCVP Dust Applicator Exposure Data (MRID 45519601)							
Application of TCVP Collars	2596-49 (Cat)	1,700	3.1	0.0029	2	0.014	0.00026
	2596-50, 62 (Dog)			0.0049 (small collar)		0.023	0.00044
				0.0082 (large collar)		0.039	0.00074
	2596-63 (Cat)			0.0039 (small collar)		0.018	0.00035
				0.0044 (large collar)		0.021	0.00039
	2596-83 (Cat)			0.0031 (small collar)		0.015	0.00028
				0.0064 (large collar)		0.030	0.00058
	2596-84 (Dog)			0.0049 (small collar)		0.023	0.00044
				0.0082 (large collar)		0.039	0.00074
	2596-139 (Cat)			0.0026		0.012	0.00023
	2596-139 (Dog)			0.0129		0.061	0.00116

1 Based on registered TCVP pet product labels and an adjustment for 20% of the collar being removed due to trimming (see Table A2). Application rate (lb ai/pet) = (collar weight in grams adjusted for 20% trimming ÷ 454 lb/g conversion factor) * percent ai in collar.

2 Based on HED's 2012 Residential SOPs (http://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/standard-operating-procedures-residential-pesticide).

3 Dermal Dose = Dermal Unit Exposure (mg/lb ai) × Application Rate (lb ai/pet) × Area Treated or Amount Handled (pets/day) × Dermal Absorption Factor (9.6 %) ÷ Body Weight (69 kg).

4 Inhalation Dose = Inhalation Unit Exposure (mg/lb ai) × Application Rate (lb ai/pet) × Area Treated or Amount Handled (pets/day) ÷ Body Weight (69 kg).

Table C.2. Residential Handler Non-cancer Risk Estimates Assuming 99.62% Liquid/0.38% Dust Ratio Formulation Pet Collars. LOC = 300						
Exposure Scenario	Reg. No. (Target Animal)	Maximum Application Rate[1] (lb ai/pet)	Amount Handled Daily (animals treated per day)[2]	Combined 99.62%/0.38% Liquid/Dust Dermal Dose (mg/kg/day)[3]	Combined 99.62%/0.38% Liquid/Dust Inhalation Dose (mg/kg/day)[4]	Combined 99.62%/0.38% Liquid/Dust Ratio Inhalation MOE **(LOC = 300)**[5]
Application of TCVP Collars	2596-49 (Cat)	0.0029	2	0.0010	0.0000010	1,300,000
	2596-50, 62 (Dog)	0.0049 (small collar)		0.0017	0.0000017	780,000
		0.0082 (large collar)		0.0029	0.0000028	470,000
	2596-63 (Cat)	0.0039 (small collar)		0.0013	0.0000013	990,000
		0.0044 (large collar)		0.0015	0.0000015	880,000
	2596-83 (Cat)	0.0031 (small collar)		0.0011	0.0000011	1,200,000
		0.0064 (large collar)		0.0022	0.0000022	600,000
	2596-84 (Dog)	0.0049 (small collar)		0.0017	0.0000017	780,000
		0.0082 (large collar)		0.0029	0.0000028	470,000
	2596-139 (Cat)	0.0026		0.0009	0.0000009	1,500,000
	2596-139 (Dog)	0.0129		0.0045	0.0000044	300,000

1 Based on registered TCVP pet product labels and an adjustment for 20% of the collar being removed due to trimming. (see Table A2). Application rate (lb ai/pet) = (collar weight in grams adjusted for 20% trimming ÷ 454 lb/g conversion factor) * percent ai in collar.
2 Based on HED's 2012 Residential SOPs (http://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/standard-operating-procedures-residential-pesticide).
3 Combined 99.62%/0.38% Liquid/Dust Dermal Dose = (Liquid dermal dose * 0.9962) + (Dust dermal dose * 0.0038).
4 Combined 99.62%/0.38% Liquid/Dust Inhalation Dose = (Liquid inhalation dose * 0.9962) + (Dust inhalation dose * 0.0038).
5. No dermal MOE estimated due to lack of dermal hazard. Inhalation MOE = Inhalation HED (1.31 mg/kg/day) ÷ Combined 99.62%/0.38% Liquid/Dust Inhalation Dose (mg/kg/day).

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Table C.3. Residential Handler Non-cancer Exposure and Risk Estimates from Use of TCVP Dust/Powder and Pump/Trigger Spray Products.

Exposure Scenario	Reg. No. (Target Animal)	Dermal Unit Exposure (mg/lb ai)	Inhalation Unit Exposure (mg/lb ai)	Maximum Application Rate[1] (lb ai/pet)	Amount Handled Daily (animals treated per day)[2]	Dermal		Inhalation	
						Dose (mg/kg/day)[3]	MOE[4]	Dose (mg/kg/day)[5]	MOE **(LOC = 300)**[6]
Application of TCVP Dusts/Powders	47000-123 (Dog)	1,700	3.1	0.00037 (small animal)	2	0.0018	N/A, No Dermal Hazard	0.000034	39,000
				0.00094 (medium animal)		0.0044		0.000084	16,000
				0.0015 (large animal)		0.0071		0.00013	9,700
	47000-123 (Cat)			0.000094 (small animal)		0.00044		0.0000084	160,000
				0.00023 (medium animal)		0.0011		0.000020	65,000
				0.00034 (large animal)		0.0016		0.000030	43,000
	2596-78 (Cat)			0.00062 (small animal)		0.0029		0.000056	24,000
				0.0010 (large animal)		0.0049		0.000093	14,000
	2596-79 (Dog)			0.0010 (small animal)		0.0049		0.000093	14,000
				0.0021 (medium animal)		0.0097		0.00019	7,100
				0.0026 (large animal)		0.0122		0.00023	5,600
				0.00067 (medium animal)		0.0032		0.000061	22,000
				0.0010 (large animal)		0.0048		0.000091	14,000
Application of TCVP Pump/Trigger Sprays	2596-126, -140 (Cat) (Trigger)	820	3.3	0.00055 (small animal)		0.0013	N/A, No Dermal Hazard	0.000053	25,000
				0.00077 (medium animal)		0.0018		0.000074	18,000
	2596-140 (Cat) (Pump)			0.00011 (small animal)		0.00026		0.000011	120,000
				0.00016 (large animal)		0.00036		0.000015	87,000
	2596-125, -140 (Dog) (Trigger)			0.00077 (small animal)		0.0018		0.000074	18,000
				0.00088 (medium animal)		0.0020		0.000084	16,000
				0.0015 (large animal)		0.0035		0.00015	8,900

1 Based on registered TCVP pet product labels.
2 Based on HED's 2012 Residential SOPs (http://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/standard-operating-procedures-residential-pesticide)
3 Dermal Dose = Dermal Unit Exposure (mg/lb ai) × Application Rate (lb ai/pet) × Area Treated or Amount Handled (pets/day) × Dermal Absorption Factor (9.6%) ÷ Body Weight (69 kg). Dermal dose presented only for purpose of calculation of cancer risks for residential handlers.
4 No dermal MOE estimated due to lack of dermal hazard.

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5 Inhalation Dose = Inhalation Unit Exposure (mg/lb ai) × Application Rate (lb ai/pet) × Area Treated or Amount Handled (pets/day) ÷ Body Weight (69 kg).
6 Inhalation MOE = Inhalation HED (1.31 mg/kg/day) ÷ Inhalation Dose (mg/kg/day).

Appendix D – Summary of Residential Handler Cancer Exposure and Risk Estimates

Table D.1. Residential Handler Cancer Exposure and Risk Estimates from TCVP Pet Collar Products Using 99.62% Liquid/0.38% Dust Ratio.

Reg No./ Animal Type	Animal Size	Lifestage	Liquid LADD[1]	Dust LADD[2]	99.62% Liquid / 0.38% Dust Cancer Risk Estimate[3]
2596-49 (Cat)	Any	Adult	6.8E-06	9.8E-05	1.3E-08
2596-50, 62 (Dog)	Small		1.1E-05	1.7E-04	2.2E-08
	Medium, Large		1.9E-05	2.8E-04	3.7E-08
2596-63 (Cat)	Small		9.0E-06	1.3E-04	1.7E-08
	Medium, Large		1.0E-05	1.5E-04	2.0E-08
2596-83 (Cat)	Small		7.2E-06	1.0E-04	1.4E-08
	Medium, Large		1.5E-05	2.2E-04	2.9E-08
2596-84 (Dog)	Small		1.2E-05	1.7E-04	2.2E-08
	Medium, Large		1.9E-05	2.8E-04	3.7E-08
2596-139 (Cat)	Any		6.0E-06	8.7E-05	1.2E-08
2596-139 (Dog)	Any		3.0E-05	4.3E-04	5.8E-08

1 Liquid LADD = [Inhalation + Dermal Dose (mg/kg/day)] × [Days per year of exposure (4 days/yr) ÷ 365 days/year] × [Years per lifetime of exposure (50 yrs) ÷ Lifetime expectancy (78 yrs)]. Inhalation exposures considered negligible based on use of spot-on data for liquid pet collar formulation.
2 Dust LADD = [Inhalation + Dermal Dose (mg/kg/day)] × [Days per year of exposure (4 days/yr) ÷ 365 days/year] × [Years per lifetime of exposure (50 yrs) ÷ Lifetime expectancy 78 (yrs)].
3 Cancer risk estimates = [(Liquid LADD * 0.9962) + (Dust LADD * 0.0038)] × Q_1^*, where $Q_1^* = 1.83 \times 10^{-3}$ $(mg/kg/day)^{-1}$

Table D.2. Residential Handler Dermal and Inhalation Cancer Exposure and Risk Estimates from Dust/Powder and Pump/Trigger Spray Products.

Reg No./ Animal Type	Animal Size	Lifestage	Total LADD[1,2]	Cancer Risk Estimate[3]
Dust/Powder				
47000-123 (Dog)	Small	Adult	1.9E-05	3.5E-08
	Medium		4.7E-05	8.7E-08
	Large		7.6E-05	1.4E-07
47000-123 (Cat)	Small		4.7E-06	8.7E-09
	Medium		1.1E-05	2.1E-08
	Large		1.7E-05	3.1E-08
2596-78 (Cat)	Small		3.1E-05	5.7E-08
	Medium		5.2E-05	9.6E-08
2596-79 (Dog)	Small		5.2E-05	9.6E-08
	Medium		1.0E-04	1.9E-07
	Large		1.3E-04	2.4E-07
	Medium		3.4E-05	6.2E-08
	Large		5.1E-05	9.4E-08
Pump/Trigger Sprays				
2596-126, -140 (Cat) (Trigger)	Small	Adult	1.4E-05	2.5E-08
	Large		1.9E-05	3.5E-08
2596-140 (Cat) (Pump)	Small		2.8E-06	5.1E-09
	Large		3.9E-06	7.2E-09
2596-125, -140 (Dog) (Trigger)	Small		1.9E-05	3.5E-08
	Medium		2.2E-05	4.0E-08
	Large		3.9E-05	7.0E-08

1 Total Lifetime Average Daily Dose (LADD, mg/kg/day) = Dermal LADD (mg/kg/day) + Inhalation LADD (mg/kg/day).
2 Dermal and Inhalation LADD equations provided in Appendix B.
3 Cancer risk estimates = Total LADD × Q_1^*, where $Q_1^* = 1.83 \times 10^{-3}$ $(mg/kg/day)^{-1}$

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Appendix E – Summary of Residential Post-Application Non-Cancer Exposure and Risk Estimates

Table E.1. Residential Post-application Non-cancer Incidental Oral Dose Assuming a Liquid or Dust Formulation for Pet Collars.

Animal Type	Animal Size	Application Rate (mg ai)	$F_{ai hands}$	DE Dermal Exposure (mg)	SA_H Surface area of 1 hand (cm^2)	HR Hand residue loading (mg/cm^2)	F_m Fraction of hand mouthed	ET Exposure Time (hours/day)	Replenish-ment interval (min)	N_Replen # replenish-ment intervals per hour (intervals/hr)	SE Fraction Saliva Extraction	Freq_HtM Number of hand-to-mouth contacts events per hour (events/hr)	Incidental oral Absorbed Dose (mg/kg/day)
Assume Liquid Formulation													
Cat (2596-49)	small	1,320	0.04	2.1	150	0.0003	0.13	1	15	4	0.48	20	0.0019
	medium	1,320	0.04	1.3	150	0.0002	0.13	1	15	4	0.48	20	0.0011
	large	1,320	0.04	0.8	150	0.0001	0.13	1	15	4	0.48	20	0.0007
Dog (2596-50,62)	small	2,219	0.04	1.8	150	0.0002	0.13	1	15	4	0.48	20	0.0016
	large	3,738	0.04	0.8	150	0.0001	0.13	1	15	4	0.48	20	0.0007
Cat (2596-83)	small	1,402	0.04	2.2	150	0.0003	0.13	1	15	4	0.48	20	0.0020
	large	2,920	0.04	1.7	150	0.0002	0.13	1	15	4	0.48	20	0.0016
Cat (2596-139)	small	1,168	0.04	1.9	150	0.0002	0.13	1	15	4	0.48	20	0.0017
	medium	1,168	0.04	1.1	150	0.0001	0.13	1	15	4	0.48	20	0.0010
	large	1,168	0.04	0.7	150	0.0001	0.13	1	15	4	0.48	20	0.0006
Dog (2596-84)	small	2,219	0.04	1.8	150	0.0002	0.13	1	15	4	0.48	20	0.0016
	large	3,738	0.04	0.8	150	0.0001	0.13	1	15	4	0.48	20	0.0007
Dog (2596-139)	small	5,840	0.04	4.6	150	0.0006	0.13	1	15	4	0.48	20	0.0042
	medium	5,840	0.04	2.0	150	0.0003	0.13	1	15	4	0.48	20	0.0018
	large	5,840	0.04	1.3	150	0.0002	0.13	1	15	4	0.48	20	0.0011
Cat (2596-63)	small	1,752	0.04	2.8	150	0.0004	0.13	1	15	4	0.48	20	0.0025
	large	1,986	0.04	1.2	150	0.0002	0.13	1	15	4	0.48	20	0.0011
Assume Dust Formulation													
Cat (2596-49)	small	1,320	0.37	57	150	0.0701	0.13	1	15	4	0.48	20	0.48
	medium	1,320	0.37	34	150	0.0421	0.13	1	15	4	0.48	20	0.29
	large	1,320	0.37	21	150	0.0263	0.13	1	15	4	0.48	20	0.18
Dog (2596-50,62)	small	2,219	0.37	48	150	0.0589	0.13	1	15	4	0.48	20	0.40
	large	3,738	0.37	22	150	0.0271	0.13	1	15	4	0.48	20	0.18
Cat (2596-83)	small	1,402	0.37	60	150	0.0744	0.13	1	15	4	0.48	20	0.51
	large	2,920	0.37	47	150	0.0582	0.13	1	15	4	0.48	20	0.40
Cat (2596-139)	small	1,168	0.37	50	150	0.0620	0.13	1	15	4	0.48	20	0.42
	medium	1,168	0.37	30	150	0.0372	0.13	1	15	4	0.48	20	0.25
	large	1,168	0.37	19	150	0.0233	0.13	1	15	4	0.48	20	0.16
Dog (2596-84)	small	2,219	0.37	48	150	0.0589	0.13	1	15	4	0.48	20	0.40
	large	3,738	0.37	22	150	0.0271	0.13	1	15	4	0.48	20	0.18
Dog (2596-139)	small	5,840	0.37	126	150	0.1551	0.13	1	15	4	0.48	20	1.06

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Table E.1. Residential Post-application Non-cancer Incidental Oral Dose Assuming a Liquid or Dust Formulation for Pet Collars.

Animal Type	Animal Size	Application Rate (mg ai)	$F_{aihands}$	DE	SA_H	HR	F_m	ET	Replenish-ment interval (min)	N_Replen	SE	Freq_HtM	Incidental oral 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)	
	medium	5,840	0.37	54	150	0.0665	0.13	1	15	4	0.48	20	0.45
	large	5,840	0.37	34	150	0.0423	0.13	1	15	4	0.48	20	0.29
Cat (2596-63)	small	1,752	0.37	75	150	0.0931	0.13	1	15	4	0.48	20	0.63
	large	1,986	0.37	32	150	0.0395	0.13	1	15	4	0.48	20	0.27

1. Application rates are label defined and adjusted for 20% removal of the pet collar. Refer to Table A.2.
2. Dermal Exposure (mg/day) = [Transfer Coefficient (cm^2/hr)] * [Application Rate (label defined) * Fraction Application Rate (0.0017; Davis, M. et. al and MRID 50881801) ÷ Surface Area of Cat/Dog (Cat: Small, 1,500; Medium, 2,500; Large, 4,000 cm^2 - Dog: Small, 3,000; Medium, 7,000; Large, 11,000 cm^2)] x [Exposure Time (Adults, 0.77 hours/day; Children, 1.0 hours/day))
3. Incidental Oral Dose (mg/kg/day) = [Hand Residue Loading (mg/cm^2)] × [Fraction of Hand Mouthed (0.13) × Surface Area of 1 Child Hand (150 cm^2)] x [Exposure Time (1.0 hrs/day) × # of Replenishment Intervals/hr (4 int/hr)) × (1-((1-Saliva Extraction Factor (0.5))^(Number of Hand-to-Mouth Events per Hour (20 events/hr)) ÷ (# of Replenishment Intervals/hr))] / [Body Weight (11 kg child 1 to < 2 years old years old)]
   Where the Hand Residue Loading (mg/cm^2) = [Fai_{hands} (Solid, 0.37; Liquids; 0.040) x Dermal Exposure (mg/day)] ÷ [Surface Area of 1 Child Hand (150 cm^2) x 2]

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Table E.2. Residential Post-Application Non-Cancer Incidental Oral Exposure Risk Estimates from TCVP Pet Collars Using 99.62% Liquid/0.38% Dust Ratio.						
EPA Reg. No./ Animal	Lifestage	Application Rate (mg ai)[1]	Animal Size	Liquid Incidental Oral Dose (mg/kg/day)[2]	Dust Incidental Oral Dose (mg/kg/day)[3]	99.62% Liquid/0.38% Dust Combined Incidental Oral MOE **(LOC = 1000)**[4]
2596-49: Cat	Children 1 < 2	1154.86	Small	0.0019	0.48	**750**
			Medium	0.0011	0.29	1300
			Large	0.0007	0.18	2000
2596-50, 62: Dog	Children 1 < 2	1941.8	Small	0.0016	0.40	**900**
		3270.4	Large	0.0007	0.18	2000
2596-83: Cat	Children 1 < 2	1226.4	Small	0.0020	0.51	**710**
		2555	Large	0.0016	0.40	**910**
2596-139: Cat	Children 1 < 2	3,650	Small	0.0017	0.42	**850**
			Medium	0.0010	0.25	1400
			Large	0.0006	0.16	2300
2596-84: Dog	Children 1 < 2	2,770	Small	0.0016	0.40	**900**
		4,670	Large	0.0007	0.18	2000
2596-139: Dog	Children 1 < 2	7,300	Small	0.0042	1.06	**340**
			Medium	0.0018	0.45	**790**
			Large	0.0011	0.29	1200
2596-63: Cat	Children 1 < 2	2,190	Small	0.0025	0.63	**570**
		2,480	Large	0.0011	0.27	1300

1. Application rates are label defined. Refer to Table A.2.
2. Liquid and Dust HTM Doses from Table E.1.
3. 99.62% Liquid/0.38% Dust Combined MOE = Incidental Oral NOAEL (2.8 mg/kg/day) ÷ [(Liquid HtM Dose * 0.9962) + (Dust HtM Dose * 0.0038)].

Table E.3. Residential Post-Application Non-Cancer Exposure and Risk Estimates from TCVP Dust/Powder and Pump/Trigger Spray Formulations.						
EPA Reg. No./ Animal	Lifestage	Application Rate (mg ai)[1]	Animal Size	Dermal Exposure (mg/day)[2]	Incidental Oral Dose (mg/kg/day)[3]	Incidental Oral MOE **(LOC = 1000)**[4]
Dusts/Powders						
47000-123: Dog	Children 1 < 2	170	Small	1.0	0.0087	**320**
		430	Medium	1.1	0.0093	**300**
		680	Large	1.1	0.0095	**300**
47000-123: Cat	Children 1 < 2	43	Small	0.52	0.0043	**640**
		100	Medium	0.74	0.0063	**450**
		150	Large	0.70	0.0059	**480**
2596-78: Cat	Children 1 < 2	280	Small	3.4	0.0287	**98**
		470	Large	2.1	0.0180	**160**
2596-79: Dog	Children 1 < 2	470	Small	2.9	0.0240	**120**
		940	Medium	2.4	0.0205	**140**
		1,200	Large	1.9	0.0163	**170**
Pump/Trigger Sprays						
2596-126, 140: Cat (Trigger)	Children 1 < 2	250	Small	1.9	0.00172	1,600
		350	Large	0.99	0.00090	3,100
2596-140: Cat (Pump)	Children 1 < 2	51	Small	0.39	0.00035	8,000
		71	Large	0.20	0.00018	15,000

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Table E.3. Residential Post-Application Non-Cancer Exposure and Risk Estimates from TCVP Dust/Powder and Pump/Trigger Spray Formulations.						
EPA Reg. No./ Animal	Lifestage	Application Rate (mg ai)[1]	Animal Size	Dermal Exposure (mg/day)[2]	Incidental Oral Dose (mg/kg/day)[3]	Incidental Oral MOE **(LOC = 1000)**[4]
2596-125, -140: Dog (Trigger)	Children 1 < 2	350	Small	1.3	0.00120	2,300
		400	Medium	0.65	0.00059	4,800
		700	Large	0.72	0.00066	4,300

1. Application rates are label defined. Refer to Table A.2.
2. Dermal Exposure (mg/day) = [Transfer Coefficient (cm^2/hr)] * [Application Rate (label defined) * Fraction Application Rate (Dust, 0.00048; Spray, 0.0081) ÷ Surface Area of Cat/Dog (Cat: Small, 1,500; Medium, 2,500; Large, 4,000 cm^2 - Dog: Small, 3,000; Medium, 7,000; Large, 11,000 cm^2)] x [Exposure Time (Adults, 0.77 hours/day; Children, 1.0 hours/day))]
3. Incidental Oral Dose (mg/kg/day) = [Hand Residue Loading (mg/cm^2)] × [Fraction of Hand Mouthed (0.13) × Surface Area of 1 Child Hand (150 cm^2)] x [Exposure Time (1.0 hrs/day) × # of Replenishment Intervals/hr (4 int/hr)) × (1-((1-Saliva Extraction Factor (0.5))^(Number of Hand-to-Mouth Events per Hour (20 events/hr)) ÷ (# of Replenishment Intervals/hr))] / [Body Weight (11 kg child 1 to < 2 years old years old)]
   Where the Hand Residue Loading (mg/cm^2) = [Fai_{hands} (Dusts, 0.37; Liquids; 0.040) x Dermal Exposure (mg/day)] ÷ [Surface Area of 1 Child Hand (150 cm^2) x 2]
4. MOE = Incidental Oral NOAEL (2.8 mg/kg/day) ÷ Incidental Oral Dose (mg/kg/day).

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Appendix F – Summary of Residential Post-Application Cancer Exposure and Risks

Table F.1. Residential Post-Application Cancer Exposure and Risk Estimates from TCVP Pet Collar Using 99.62% Liquid/0.38% Dust Ratio – USING DAVIS STUDY (2008).

Animal Type	Animal Size	Lifestage	Liquid LADD[1]	Dust LADD[2]	Combined 99.62% Liquid/0.38% Dust LADD[3]	Cancer Risk Estimate[4]
2596-49: Cat	Small	Adult	1.4E-03	3.8E-02	1.6E-03	2.9E-06
	Medium		8.5E-04	2.3E-02	9.4E-04	1.7E-06
	Large		5.3E-04	1.4E-02	5.9E-04	1.1E-06
2596-50,62: Dog	Small		1.2E-03	3.2E-02	1.3E-03	2.4E-06
	Large		5.5E-04	1.5E-02	6.0E-04	1.1E-06
2596-83: Cat	Small		1.5E-03	4.1E-02	1.7E-03	3.0E-06
	Large		1.2E-03	3.2E-02	1.3E-03	2.4E-06
2596-139: Cat	Small		1.3E-03	3.4E-02	1.4E-03	2.5E-06
	Medium		7.5E-04	2.0E-02	8.3E-04	1.5E-06
	Large		4.7E-04	1.3E-02	5.2E-04	9.5E-07
2596-84: Dog	Small		1.2E-03	3.2E-02	1.3E-03	2.4E-06
	Large		5.5E-04	1.5E-02	6.0E-04	1.1E-06
2596-139: Dog	Small		3.1E-03	8.5E-02	3.5E-03	6.3E-06
	Medium		1.3E-03	3.6E-02	1.5E-03	2.7E-06
	Large		8.6E-04	2.3E-02	9.4E-04	1.7E-06
2596-63: Cat	Small		1.9E-03	5.1E-02	2.1E-03	3.8E-06
	Large		8.0E-04	2.2E-02	8.8E-04	1.6E-06

1 Liquid LADD = [Dermal Dose (mg/kg/day)] × [Days per year of exposure (180 days/yr) ÷ 365 days/year] × [Years per lifetime of exposure (50 yrs) ÷ Lifetime expectancy (78 yrs)]. Dermal dose calculated using fraction transferred value from Davis study of 0.00092.

2 Dust LADD = [Dermal Dose (mg/kg/day)] × [Days per year of exposure (180 days/yr) ÷ 365 days/year] × [Years per lifetime of exposure (50 yrs) ÷ Lifetime expectancy (78 yrs)]

3 Combined 99.62% Liquid/0.38% Dust LADD = (Liquid LADD * 0.9962) + (Dust LADD * 0.0038).

4 Cancer risk estimates = Combined 99.62% Liquid/0.38% Dust LADD × Q_1^*, where $Q_1^* = 1.83 \times 10^{-3}$ $(mg/kg/day)^{-1}$

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Table F.2. Residential Post-Application Cancer Exposure and Risk Estimates from TCVP Pet Products.				
Animal Type	Animal Size	Lifestage	LADD[1,2]	Cancer Risk Estimate[3]
Dust/Powder				
47000-123: Dog	Small	Adult	5.9E-04	1.1E-06
	Medium		6.3E-04	1.2E-06
	Large		6.4E-04	1.2E-06
47000-123: Cat	Small		2.9E-04	5.4E-07
	Medium		4.2E-04	7.8E-07
	Large		4.0E-04	7.3E-07
2596-78: Cat	Small		1.9E-03	3.6E-06
	Large		1.2E-03	2.2E-06
2596-79: Dog	Small		1.6E-03	3.0E-06
	Medium		1.4E-03	2.5E-06
	Large		1.1E-03	2.0E-06
Pump/Trigger Spray				
2596-126, 140: Cat (Trigger)	Small	Adult	5.3E-04	9.6E-07
	Large		2.8E-04	5.1E-07
2596-140: Cat (Pump)	Small		1.1E-04	2.0E-07
	Large		5.6E-05	1.0E-07
2596-125, -140: Dog (Trigger)	Small		3.7E-04	6.7E-07
	Medium		1.8E-04	3.3E-07
	Large		2.0E-04	3.7E-07

1 Total Lifetime Average Daily Dose (mg/kg/day) = Dermal LADD (mg/kg/day) + Inhalation LADD (mg/kg/day).
2 Dermal and Inhalation LADD equations provided in Appendix B.
3 Cancer risk estimates = Total LADD × Q1*, where Q1* = 1.83×10^{-3} $(mg/kg/day)^{-1}$

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