

Appendix B – Toxicity of Formulated Products Containing 1,3-D and Chloropicrin

Toxicity of formulated products containing the active ingredient 1,3-D to non-target fish and aquatic invertebrates is as important part of the action considered in this Opinion. Most of the formulated products containing 1,3-D also contain the active ingredient chloropicrin. Due to this large number of formulated products containing the same two active ingredients, as well as the reported toxicity of chloropicrin, a robust prediction of the toxicity of these formulated products to both fish and aquatic invertebrates was conducted and is described here. The data utilized in this mixtures analysis includes labeled use rates, expected environmental concentrations (EECs), and taxa-specific toxicity values. These same data are used throughout this Opinion.

Usage specifications on product labels were used to calculate expected environmental concentrations occurring in aquatic habitat. Information supplied on product labels include the proportion of each active ingredient in the formulated product, maximum use rates, and maximum product use amounts. This information was used to calculate concentrations in a bin 2 aquatic habitat scenario, which represents shallow flowing streams common throughout the action area. Expected environmental concentration (i.e., EEC) of formulated products were calculated using data reported in a field study of 1,3-D (Heim, 2002). In this study, single chemical application rates of 327.43 lbs a.i./A for 1,3-D produced measured runoff (bin 0) concentrations of 17.2 ppb. In order to make this measured bin 0 concentration applicable to an aquatic habitat, a conversion factor of 0.435 was used to convert these bin 0 concentrations to bin 2 EECs. The derivation of the conversion factor is discussed in Chapter 11 and Appendix C. As described in Chapter 11, equivalent EECs are not available for chloropicrin and NMFS assumes that 1,3-D concentrations are adequate surrogates for chloropicrin EECs. Therefore, EECs of each of the active ingredients in each formulated product were calculated using the following equation:

$$EEC = ((\text{maximum use rate})(\text{field study EEC})/(\text{field study application rate})) * \text{bin conversion}$$

Therefore, the equation for calculating the EEC for 1,3-D resulting from use of the formulated product Telone C-35 becomes:

$$EEC = ((255.6 \text{ lbs a.i./A})(17.2 \text{ ppb})/(327.43 \text{ lbs a.i./A})) * 0.435 = 5.84 \text{ ppb}$$

The following tables show the resulting Bin 2 EECs for both 1,3-D and chloropicrin in all formulated products registered for use on vegetable crops (Table 1), field crops (Table 2), fruit and nut crops (Table 3), nursery crops (Table 4) and mint (Table 5).

Table 1. Calculated Bin 2 EECs of each active ingredient in formulated products registered for use on vegetable crops.

Formulated Product	Amount 1,3-D (lbs/gallon product)	Amount chloropicrin (lbs/gallon product)	Maximum product use (gal/A)	Maximum use rate 1,3-D (lbs/A)	Maximum use rate chloropicrin (lbs/A)	1,3-D EEC (ppb)	Chloropicrin EEC (ppb)
Telone C-35	7.10	3.89	36	255.6	140.04	5.84	3.20
In-Line	6.81	3.73	30.8	209.75	114.88	4.79	2.63
Pic-Clor 15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Pic-Clor 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Pic-Clor 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Pic-Clor 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Pic-Clor 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Telone C-15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Tri-form 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Tri-form 35	7.10	3.90	62.5	443.75	243.75	10.14	5.57
Tri-form 40	6.70	4.50	77.3	517.91	347.85	11.83	7.95
Tri-form 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Tri-form 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Tri-form 70 EC	3.40	8.10	37	125.8	299.7	2.87	6.85
Tri-form 80 EC	2.30	9.50	31.5	72.45	299.25	1.66	6.84
Tri-form 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Tri-form 70	3.70	8.70	40	148	348	3.38	7.95
Tri-form 80	2.50	10.30	34	85	350.2	1.94	8.00

Table 2. Calculated Bin 2 EECs of each active ingredient in formulated products registered for use on field crops.

Formulated Product	Amount 1,3-D (lbs/gallon product)	Amount chloropicrin (lbs/gallon product)	Maximum product use (gal/A)	Maximum use rate 1,3-D (lbs/A)	Maximum use rate chloropicrin (lbs/A)	1,3-D EEC (ppb)	Chloropicrin EEC (ppb)
Telone C-35	7.10	3.89	26	184.6	101.14	4.22	2.31
In-Line	6.81	3.73	30.8	209.75	114.88	4.79	2.63
Pic-Clor 15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Pic-Clor 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Pic-Clor 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Pic-Clor 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Pic-Clor 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Telone C-15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Tri-form 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Tri-form 35	7.10	3.90	62.5	443.75	243.75	10.14	5.57
Tri-form 40	6.70	4.50	77.3	517.91	347.85	11.83	7.95
Tri-form 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Tri-form 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Tri-form 70 EC	3.40	8.10	37	125.8	299.7	2.87	6.85
Tri-form 80 EC	2.30	9.50	31.5	72.45	299.25	1.66	6.84
Tri-form 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Tri-form 70	3.70	8.70	40	148	348	3.38	7.95
Tri-form 80	2.50	10.30	34	85	350.2	1.94	8.00

Table 3. Calculated Bin 2 EECs of each active ingredient in formulated products registered for use on fruit and nut crops.

Formulated Product	Amount 1,3-D (lbs/gallon product)	Amount chloropicrin (lbs/gallon product)	Maximum product use (gal/A)	Maximum use rate 1,3-D (lbs/A)	Maximum use rate chloropicrin (lbs/A)	1,3-D EEC (ppb)	Chloropicrin EEC (ppb)
Telone C-35	7.10	3.89	50	355	194.5	8.11	4.44
In-Line	6.81	3.73	84	572.04	313.32	13.07	7.16
Pic-Clor 15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Pic-Clor 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Pic-Clor 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Pic-Clor 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Pic-Clor 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Telone C-15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Tri-form 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Tri-form 35	7.10	3.90	62.5	443.75	243.75	10.14	5.57
Tri-form 40	6.70	4.50	77.3	517.91	347.85	11.83	7.95
Tri-form 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Tri-form 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Tri-form 70 EC	3.40	8.10	37	125.8	299.7	2.87	6.85
Tri-form 80 EC	2.30	9.50	31.5	72.45	299.25	1.66	6.84
Tri-form 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Tri-form 70	3.70	8.70	40	148	348	3.38	7.95
Tri-form 80	2.50	10.30	34	85	350.2	1.94	8.00

Table 4. Calculated Bin 2 EECs of each active ingredient in formulated products registered for use on nursery crops.

Formulated Product	Amount 1,3-D (lbs/gallon product)	Amount chloropicrin (lbs/gallon product)	Maximum product use (gal/A)	Maximum use rate 1,3-D (lbs/A)	Maximum use rate chloropicrin (lbs/A)	1,3-D EEC (ppb)	Chloropicrin EEC (ppb)
Telone C-35	7.10	3.89	79	560.9	307.31	12.82	7.02
In-Line	6.81	3.73	84	572.04	313.32	13.07	7.16
Pic-Clor 15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Pic-Clor 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Pic-Clor 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Pic-Clor 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Pic-Clor 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Telone C-15	8.70	1.60	66.7	580.29	106.72	13.26	2.44
Tri-form 30	7.50	3.30	66.7	500.25	220.11	11.43	5.03
Tri-form 35	7.10	3.90	62.5	443.75	243.75	10.14	5.57
Tri-form 40	6.70	4.50	77.3	517.91	347.85	11.83	7.95
Tri-form 40 EC	6.20	4.23	71	440.2	300.33	10.06	6.86
Tri-form 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Tri-form 70 EC	3.40	8.10	37	125.8	299.7	2.87	6.85
Tri-form 80 EC	2.30	9.50	31.5	72.45	299.25	1.66	6.84
Tri-form 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Tri-form 70	3.70	8.70	40	148	348	3.38	7.95
Tri-form 80	2.50	10.30	34	85	350.2	1.94	8.00

Table 5. Calculated Bin 2 EECs of each active ingredient in formulated products registered for use on mint.

Formulated Product	Amount 1,3-D (lbs/gallon product)	Amount chloropicrin (lbs/gallon product)	Maximum product use (gal/A)	Maximum use rate 1,3-D (lbs/A)	Maximum use rate chloropicrin (lbs/A)	1,3-D EEC (ppb)	Chloropicrin EEC (ppb)
Telone C-35	7.10	3.89	33	234.3	128.37	5.35	2.93
In-Line	6.81	3.73	not specified	N/A	N/A	N/A	N/A
Pic-Clor 15	8.70	1.60	26.5	230.55	42.4	5.27	0.97
Pic-Clor 30	7.50	3.30	30.5	228.75	100.65	5.23	2.30
Pic-Clor 40 EC	6.20	4.23	not specified	N/A	N/A	N/A	N/A
Pic-Clor 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Pic-Clor 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Telone C-15	8.70	1.60	26.5	230.55	42.4	5.27	0.97
Tri-form 30	7.50	3.30	30.5	228.75	100.65	5.23	2.30
Tri-form 35	7.10	3.90	33	234.3	128.7	5.35	2.94
Tri-form 40	6.70	4.50	35	234.5	157.5	5.36	3.60
Tri-form 40 EC	6.20	4.23	not specified	N/A	N/A	N/A	N/A
Tri-form 60 EC	4.49	6.73	42.6	191.27	286.7	4.37	6.55
Tri-form 70 EC	3.40	8.10	37	125.8	299.7	2.87	6.85
Tri-form 80 EC	2.30	9.50	31.5	72.45	299.25	1.66	6.84
Tri-form 60	4.70	7.20	48.6	228.42	349.92	5.22	8.00
Tri-form 70	3.70	8.70	40	148	348	3.38	7.95
Tri-form 80	2.50	10.30	34	85	350.2	1.94	8.00

These calculated EECs were used with taxa-specific toxicity values to predict toxicity resulting from the formulated product. These toxicity predictions used mortality as the endpoint. Reported 96-hr LC₅₀ values (i.e., the concentration killing 50% of the test organisms) for rainbow trout are 2780 ppb for 1,3-D and 11 ppb for chloropicrin. For both chemicals, a standard probit slope of 4.5 was used to describe the concentration-response relationship. Reported 48-hr LC₅₀ values for Daphnia are 6200 ppb for 1,3-D and 120 ppb for chloropicrin, and a standard probit slope of 4.5 was also used. Using calculated EECs, standard slope, and reported LC₅₀ values, the %mortality resulting from each ingredient of the formulated product was calculated using the following equation (in Microsoft Excel):

$$\% \text{ mortality single chemical} = \text{NORMDIST}((\text{slope} * (\log(\text{EEC}) - \log(\text{LC}_{50})))$$

Since 1,3-D and chloropicrin elicit toxicity in exposed animals via different mechanisms of toxicity, cumulative toxicity was calculated using response-addition. Calculations of response-addition of chemicals A and B (i.e., TOXmix), or the sum of the toxic response, were done using the following equation:

$$\text{TOXmix} = 100 * ((\text{mortality A} + \text{mortality B}) - (\text{mortality A} * \text{mortality B}))$$

Where mortality is a function of taxa-specific 48-hr or 96-hr LC₅₀ values, product-specific EECs, and the standard probit slope of 4.5 for mortality.

Formulated products are predicted to show no mortality in Daphnia, and those calculations are not shown here. In fish, the resulting toxicity (Cumulative Mortality %) of formulated products is driven solely by chloropicrin. Predicted toxicities of all formulated products are shown here for registered uses on vegetable crops (Table 6), field crops (Table 7), fruit and nut crops (Table 8), nursery crops (Table 9), and mint (Table 10).

Table 6. Predicted cumulative toxicity (% mortality) in fish from formulated products registered for use on vegetable crops.

Formulated Product	Active Ingredient	LC50 (ppb)	Slope	EEC (ppb)	Mortality (%)	Cumulative Mortality (%)
Telone C-35	1,3-D	2780	4.5	5.84	0.0%	0.8%
	chloropicrin	11	4.5	3.20	0.8%	
In-Line	1,3-D	2780	4.5	4.79	0.0%	0.3%
	chloropicrin	11	4.5	2.63	0.3%	
Pic-Clor 15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Pic-Clor 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Pic-Clor 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Pic-Clor 60	1,3-D	2780	4.5	5.22	0.0%	26.7%

	chloropicrin	11	4.5	8.00	26.7%	
Pic-Clor 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Telone C-15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Tri-form 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Tri-form 35	1,3-D	2780	4.5	10.14	0.0%	9.2%
	chloropicrin	11	4.5	5.57	9.2%	
Tri-form 40	1,3-D	2780	4.5	11.83	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Tri-form 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Tri-form 70 EC	1,3-D	2780	4.5	2.87	0.0%	17.7%
	chloropicrin	11	4.5	6.85	17.7%	
Tri-form 80 EC	1,3-D	2780	4.5	1.66	0.0%	17.6%
	chloropicrin	11	4.5	6.84	17.6%	
Tri-form 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Tri-form 70	1,3-D	2780	4.5	3.38	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 80	1,3-D	2780	4.5	1.94	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	

Table 7. Predicted cumulative toxicity (% mortality) in fish from formulated products registered for use on field crops.

Formulated Product	Active Ingredient	LC50 (ppb)	Slope	EEC (ppb)	Mortality (%)	Cumulative Mortality (%)
Telone C-35	1,3-D	2780	4.5	4.22	0.0%	0.1%
	chloropicrin	11	4.5	2.31	0.1%	
In-Line	1,3-D	2780	4.5	4.79	0.0%	0.3%
	chloropicrin	11	4.5	2.63	0.3%	
Pic-Clor 15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	

Pic-Clor 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Pic-Clor 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Pic-Clor 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Pic-Clor 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Telone C-15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Tri-form 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Tri-form 35	1,3-D	2780	4.5	10.14	0.0%	9.2%
	chloropicrin	11	4.5	5.57	9.2%	
Tri-form 40	1,3-D	2780	4.5	11.83	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Tri-form 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Tri-form 70 EC	1,3-D	2780	4.5	2.87	0.0%	17.7%
	chloropicrin	11	4.5	6.85	17.7%	
Tri-form 80 EC	1,3-D	2780	4.5	1.66	0.0%	17.6%
	chloropicrin	11	4.5	6.84	17.6%	
Tri-form 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Tri-form 70	1,3-D	2780	4.5	3.38	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 80	1,3-D	2780	4.5	1.94	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	

Table 8. Predicted cumulative toxicity (% mortality) in fish from formulated products registered for use on fruit and nut crops.

Formulated Product	Active Ingredient	LC50 (ppb)	Slope	EEC (ppb)	Mortality (%)	Cumulative Mortality (%)
Telone C-35	1,3-D	2780	4.5	8.11	0.0%	3.8%
	chloropicrin	11	4.5	4.44	3.8%	

In-Line	1,3-D	2780	4.5	13.07	0.0%	20.1%
	chloropicrin	11	4.5	7.16	20.1%	
Pic-Clor 15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Pic-Clor 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Pic-Clor 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Pic-Clor 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Pic-Clor 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Telone C-15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Tri-form 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Tri-form 35	1,3-D	2780	4.5	10.14	0.0%	9.2%
	chloropicrin	11	4.5	5.57	9.2%	
Tri-form 40	1,3-D	2780	4.5	11.83	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Tri-form 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Tri-form 70 EC	1,3-D	2780	4.5	2.87	0.0%	17.7%
	chloropicrin	11	4.5	6.85	17.7%	
Tri-form 80 EC	1,3-D	2780	4.5	1.66	0.0%	17.6%
	chloropicrin	11	4.5	6.84	17.6%	
Tri-form 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Tri-form 70	1,3-D	2780	4.5	3.38	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 80	1,3-D	2780	4.5	1.94	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	

Table 9. Predicted cumulative toxicity (% mortality) in fish from formulated products registered for use on nursery crops.

Formulated Product	Active Ingredient	LC50 (ppb)	Slope	EEC (ppb)	Mortality (%)	Cumulative Mortality (%)
Telone C-35	1,3-D	2780	4.5	12.82	0.0%	19.0%
	chloropicrin	11	4.5	7.02	19.0%	
In-Line	1,3-D	2780	4.5	13.07	0.0%	20.1%
	chloropicrin	11	4.5	7.16	20.1%	
Pic-Clor 15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Pic-Clor 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Pic-Clor 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Pic-Clor 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Pic-Clor 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Telone C-15	1,3-D	2780	4.5	13.26	0.0%	0.2%
	chloropicrin	11	4.5	2.44	0.2%	
Tri-form 30	1,3-D	2780	4.5	11.43	0.0%	6.3%
	chloropicrin	11	4.5	5.03	6.3%	
Tri-form 35	1,3-D	2780	4.5	10.14	0.0%	9.2%
	chloropicrin	11	4.5	5.57	9.2%	
Tri-form 40	1,3-D	2780	4.5	11.83	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 40 EC	1,3-D	2780	4.5	10.06	0.0%	17.8%
	chloropicrin	11	4.5	6.86	17.8%	
Tri-form 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Tri-form 70 EC	1,3-D	2780	4.5	2.87	0.0%	17.7%
	chloropicrin	11	4.5	6.85	17.7%	
Tri-form 80 EC	1,3-D	2780	4.5	1.66	0.0%	17.6%
	chloropicrin	11	4.5	6.84	17.6%	
Tri-form 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Tri-form 70	1,3-D	2780	4.5	3.38	0.0%	26.3%
	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 80	1,3-D	2780	4.5	1.94	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	

Table 10. Predicted cumulative toxicity (% mortality) in fish from formulated products registered for used on mint.

Formulated Product	Active Ingredient	LC50 (ppb)	Slope	EEC (ppb)	Mortality (%)	Cumulative Mortality (%)
Telone C-35	1,3-D	2780	4.5	5.35	0.0%	0.5%
	chloropicrin	11	4.5	2.93	0.5%	
In-Line	1,3-D	2780	4.5	N/A	N/A	N/A
	chloropicrin	11	4.5	N/A	N/A	
Pic-Clor 15	1,3-D	2780	4.5	5.27	0.0%	0.0%
	chloropicrin	11	4.5	0.97	0.0%	
Pic-Clor 30	1,3-D	2780	4.5	5.23	0.0%	0.1%
	chloropicrin	11	4.5	2.30	0.1%	
Pic-Clor 40 EC	1,3-D	2780	4.5	N/A	N/A	N/A
	chloropicrin	11	4.5	N/A	N/A	
Pic-Clor 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Pic-Clor 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Telone C-15	1,3-D	2780	4.5	5.27	0.0%	0.0%
	chloropicrin	11	4.5	0.97	0.0%	
Tri-form 30	1,3-D	2780	4.5	5.23	0.0%	0.1%
	chloropicrin	11	4.5	2.30	0.1%	
Tri-form 35	1,3-D	2780	4.5	5.35	0.0%	0.5%
	chloropicrin	11	4.5	2.94	0.5%	
Tri-form 40	1,3-D	2780	4.5	5.36	0.0%	1.5%
	chloropicrin	11	4.5	3.60	1.5%	
Tri-form 40 EC	1,3-D	2780	4.5	N/A	N/A	N/A
	chloropicrin	11	4.5	N/A	N/A	
Tri-form 60 EC	1,3-D	2780	4.5	4.37	0.0%	15.6%
	chloropicrin	11	4.5	6.55	15.6%	
Tri-form 70 EC	1,3-D	2780	4.5	2.87	0.0%	17.7%
	chloropicrin	11	4.5	6.85	17.7%	
Tri-form 80 EC	1,3-D	2780	4.5	1.66	0.0%	17.6%
	chloropicrin	11	4.5	6.84	17.6%	
Tri-form 60	1,3-D	2780	4.5	5.22	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	
Tri-form 70	1,3-D	2780	4.5	3.38	0.0%	26.3%

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	chloropicrin	11	4.5	7.95	26.3%	
Tri-form 80	1,3-D	2780	4.5	1.94	0.0%	26.7%
	chloropicrin	11	4.5	8.00	26.7%	

N/A indicates that no use rates were specified on product labels, so formulated product toxicity was not calculated.