



APPENDIX A. Ecological Effects Data

TABLE 1. Acute Freshwater Fish Toxicity Study Results for DDVP

Species Name	Type	a.i.	Endpoint	ppb (A.I.)	Confidence Limits	μmols	MRID and Study Classification
Bluegill sunfish <i>Lepomis macrochirus</i>	Static	0.04	96 hr LC50	>180000	N.R.	814.55	TN 949 Supplemental
Bluegill sunfish <i>Lepomis macrochirus</i>	Static	0.46	96 hr LC50	800	0.6-1.0	3.62	TN 920 Supplemental
Bluegill sunfish <i>Lepomis macrochirus</i>	Flow-thru	42.39	96 hr LC50	4300	N.R.	19.46	43284101 Supplemental
Bluegill sunfish <i>Lepomis macrochirus</i>	Static	98.1	64 hr LC50	1350	N.A.	6.11	TN 109 Supplemental
Bluegill sunfish <i>Lepomis macrochirus</i>	Static	100	96 hr LC50	869	0.7-1.0	3.93	40098001 Core Mayer & Ellersieck
Bluegill sunfish <i>Lepomis macrochirus</i>	Flow-thru	4-E	96 hr LC50	4300	3.7-4.9	19.46	43284701 Core
Cutthroat trout <i>Oncorhynchus clarki</i>	Static	90	96 hr LC50	213	0.141-.321	0.96	ACC223859 Supplemental
Cutthroat trout <i>Oncorhynchus clarki</i>	Static	100	96 hr LC50	170	0.14-.206	0.77	40098001 Acceptable Mayer & Ellersieck
Fathead minnow <i>Pimephales promelas</i>	Static	100	96 hr LC50	11600	7.8-17.2	52.49	40098001 Acceptable Mayer & Ellersieck
Guppy <i>Poecilia reticulata</i>	Static	FORM	24 hr LC50	5810	N.R.	26.29	05000811 Supplemental
Lake trout <i>Salvelinus namaycush</i>	Static	90	96 hr LC50	183	0.093-.363	0.83	ACC223859 Supplemental
Lake trout <i>Salvelinus namaycush</i>	Static	100	96 hr LC50	187	0.11-.32	0.85	40098001 Acceptable Mayer & Ellersieck
Mosquitofish <i>Gambusia affinis</i>	Static	100	96 hr LC50	5270	2.6-10.4	23.85	40098001 Supplemental Mayer & Ellersieck
Rainbow trout <i>Oncorhynchus mykiss</i>	Flow-thru	42.39	96 hr LC50	750	N.R.	3.39	4384702 Supplemental
Rainbow trout <i>Oncorhynchus mykiss</i>	Static	98.1	96 hr LC50	100	0.78-1.27	0.45	TN 104 Supplemental
Rainbow trout <i>Oncorhynchus mykiss</i>	Static	100	24 hr LC50	500	N.R.	2.26	40098001 Supplemental Mayer & Ellersieck
Rainbow trout <i>Oncorhynchus mykiss</i>	Static	100	96 hr LC50	100	N.R.	0.45	N.R. Supplemental

Species Name	Type	a.i.	Endpoint	ppb (A.I.)	Confidence Limits	μmols	MRID and Study Classification
Rainbow trout <i>Oncorhynchus mykiss</i>	Flow-thru	4-E	96 hr LC50	750	0.6-0.9	3.39	43284702 Supplemental

TABLE 2. Acute Freshwater Fish Toxicity Study Results for Naled

Chemical	Species Name	Type	a.i.	96 Hr LC50 (ppb)	96 Hr LC50 μmols	Corr A.I.	CL	Curve slope	MRID And Classification
Naled	Bluegill sunfish <i>Lepomis macrochirus</i>	Static	90	2200	5.78		N.R.	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled (Dibrom 8 EC)	Bluegill sunfish <i>Lepomis macrochirus</i>	Flow-thru	58	240	0.63	139	0.127-.357	4.26	00263578 Supplemental
Naled (Ortho Dibrom LVC 10)	Bluegill sunfish <i>Lepomis macrochirus</i>	Flow-thru	15	4000	10.50	600	3400-4600	N.R.	00160741 Acceptable
Naled (Ortho Fly Killer D)	Bluegill sunfish <i>Lepomis macrochirus</i>	Flow-thru	36	1200	3.15	432	1.0-1.3	6.44	00263580 Supplemental
Naled/Xylene (Dibrom 8-E mixture)	Bluegill sunfish <i>Lepomis macrochirus</i>	Static	58/20	1200	3.15	696	1.018-1.415	NR	TN 364
Naled	Channel catfish <i>Ictalurus punctatus</i>	Static	90	710	1.86		N.A.	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Cutthroat trout <i>Oncorhynchus clarki</i>	Static	90	127	0.33		115-139	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Fathead minnow <i>Pimephales promelas</i>	Static	90	3300	8.67		N.R.	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Lake trout <i>Salvelinus namaycush</i>	Static	90	87.0	0.23		53-142	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Largemouth bass <i>Micropterus salmoides</i>	Static	90	1900	4.99		N.R.	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Rainbow trout <i>Oncorhynchus mykiss</i>	Static	Tech	160	0.42		150-170	N.R.	05003107 Acceptable
Naled	Rainbow trout <i>Oncorhynchus</i>	Static	90	195	0.51		126-302	N.R.	40098001 Acceptable Mayer

Chemical	Species Name	Type	a.i.	96 Hr LC50 (ppb)	96 Hr LC50 μ mol	Corr A.I.	CL	Curve slope	MRID And Classification
	<i>mykiss</i>								& Ellersieck
Naled	Rainbow trout <i>Oncorhynchus mykiss</i>	Static	90	345	0.91		300-396	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled (Ortho Dibrom LVC 10)	Rainbow trout <i>Oncorhynchus mykiss</i>	Flow-thru	15	900	2.36	135	800-1100	N.R.	00160740 Acceptable
Naled (Ortho Fly Killer D)	Rainbow trout <i>Oncorhynchus mykiss</i>	Flow-thru	36	340	0.89	122	0.215-1.64	3.0	00263580 Supplemental
Naled (Orthp Dibrom 8 EC)	Rainbow trout <i>Oncorhynchus mykiss</i>	Flow-thru	58	130	0.34	75	0.12-0.14	12.64	00263578 Supplemental
Naled/Xylene (Dibrom 8)	Rainbow trout <i>Oncorhynchus mykiss</i>	Static	58/20	215	0.56	125	185-250	NA	TN 1061 Acceptable
Naled	Striped bass <i>Morone saxatilis</i>	Static	90	500	1.31		100-2400	NA	05000819 Supplemental

TABLE 3. Freshwater Aquatic Invertebrate Acute Toxicity Study Results for DDVP, Guideline 72-2

Chemical	Species Name	Age	Type	AI	Studytime	Toxicity (ppb*)	CL	μ mol	Curve slope	MRID and Classification
DDVP	Daphnid <i>Simocephalus serrulatus</i>	1st-I	Static	100	48 hr EC50	0.26	0.16-.42	0.0012	N.R.	40098001 Acceptable Mayer & Ellersieck
DDVP	Mud snail <i>Simocephalus serrulatus</i>	0.63 g	Static	90	96 hr LC50	>25.7	N.R.	0.1163	N.R.	77620 Supplemental
DDVP	Scud <i>Gammarus fasciatus</i>	N.R.	Static	Tech	96 hr LC50	400 ppm	320-490	1810.1186	N.R.	05017538 Acceptable
DDVP	Scud <i>Gammarus fasciatus</i>	Adult	Static	100	96 hr LC50	0.50	0.37-0.7	0.0023	N.R.	40098001 Supplemental Mayer & Ellersieck
DDVP	Stonefly <i>Pteronarcys californica</i>	yr	Static	100	96 hr LC50	0.10	.07-.15	0.0005	N.R.	40098001 Acceptable Mayer & Ellersieck
DDVP	Water flea <i>Daphnia magna</i>	N.R.	Static	.46	48 hr EC50	1000	800-1400	4.5253	N.R.	N.R. Acceptable
DDVP	Water flea <i>Daphnia pulex</i>	1st-I	Static	100	48 hr EC50	0.066	.05-.09	0.0003	N.R.	40098001 Acceptable Mayer & Ellersieck

Table 4. Freshwater Aquatic Invertebrate Acute Toxicity Study Results for Naled, Guideline 72-2

Chemical	Species Name	Age	Type	AI	Studytime	Toxicity (ppb*)	CL	μmols	Curve slope	MRID and Classification
Naled	Daphnid <i>Simocephalus serrulatus</i>	Juv1	Static	90	48 hr EC50	1.1	0.8-1.4	0.0029	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Glass shrimp <i>Palaemonetes kadiakensis</i>	N.R.	Static	90	96 hr LC50	92.0	N.R.	0.2416	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Scud <i>Gammarus fasciatus</i>	Adult	Static	Tech	96 hr LC50	14	11-18	0.0368	N.R.	05017538 Supplemental
Naled	Scud <i>Gammarus lacustris</i>	N.R.	Static	97	48 hr LC50	0.14	N.R.	0.0004	N.R.	05009242 Supplemental
Naled	Scud <i>Gammarus fasciatus</i>	Mat.	Static	90	96 hr LC50	18.0	16-20.0	0.0473	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Sowbug <i>Asellus brevicaudus</i>	Mat	Static	90	96 hr LC50	41	N.R.	0.1077	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Stonefly <i>Pteronarcys californica</i>	N.R.	Static	90	96 hr LC50	8.0	6-11.0	0.0210	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Water flea <i>Daphnia magna</i>	N.R.	Static	91.6	48 hr EC50	0.3	0.2-0.4	0.0008	N.R.	BAONAL02 Supplemental
Naled	Water flea <i>Daphnia magna</i>	<24 hr	Static	85	48 hr EC50	0.5	0.3-0.7	0.0013	3.35	00084406 Acceptable
Naled	Water flea <i>Daphnia pulex</i>	Juv	Static	90	48 hr EC50	0.40	0.2-0.80	0.0011	N.R.	40098001 Acceptable Mayer & Ellersieck
Naled	Water flea <i>Daphnia magna</i>	<24 hr	Flow-thru	36	48 hr EC50	2.0	N.R.	0.0053	8.0	00160745 Supplemental
Naled	Water flea <i>Daphnia magna</i>	<24 hr	Flow-thru	58	48 hr EC50	1.5	1.4-1.6	0.0039	N.R.	00160700 Acceptable
Naled (Ortho Dibrom LVC 10)	Water flea <i>Daphnia magna</i>	<24 hr	Flow-thru	15	48 hr EC50	2.9	2.5-3.4	0.0076	5.3	00160742 Supplemental

TABLE 5. Aquatic Invertebrate Chronic Toxicity Study Results for DDVP and Naled (Flow-through)

Chemical	Species Name	AI	Study Time	LOAEC (ppb)	μmols	Curve Slope	NOAEL (ppb)	MRID and Study Classification
Dichlorvos	<i>Mysid Americamysis bahia</i>	98	28 D	0.032	0.000145	N.A.	0.0014	43854301 Acceptable
Naled	<i>Mysid Americamysis bahia</i>	89.2	31 D	0.2	0.000525	N.A	<0.2	45031701 Supplemental
Naled	Water flea <i>Daphnia magna</i>	97.3	21 D	0.098	0.000257	0.045	0.000118	42908801 Acceptable

TABLE 6. Chronic Toxicity Study Results for Fish, both Fresh and Saltwater, for DDVP and Naled (Flow-through)

Chemical	Species Name	a.i.	Study Time	LOAEC (ppb)	umols	Curve slope	NOAEL	MRID and Study Classification
Dichlorvos	Sheepshead minnow <i>Cyprinodon variegatus</i>	98	34 D	1840	8.326545	N.A.	960	43790401 Acceptable
Dichlorvos	Rainbow trout <i>Oncorhynchus mykiss</i>	98	61 D	10.1	0.045705	5.2		43788001 Acceptable
Naled	Fathead minnow <i>Pimephales promelas</i>	94.4	35 D	15.0	0.039391	6.9		42602201 Acceptable

TABLE 7. Aquatic Plant Toxicity Study Results, for DDVP and Naled (Static)

CHEMICAL	COMMONNAME	AI	STUDYTIME	EC50 (ppm)	umols	mmol	CL	CURVE SLOPE	NOEL	EPAIDENT
Dichlorvos	Algae <i>Isochrysis galbana</i>	98	48 hr	14	63.35415	0.063354	N.R.	N.R.	N.R.	40228401 Supplemental
Dichlorvos	Green algae <i>Dunaliella tertiolecta</i>	98	48 hr	>100	452.52964	0.45253	N.R.	N.R.	N.R.	40228401 Supplemental
Dichlorvos	Marine diatom <i>Skeletonema costatum</i>	98	48 hr	28	126.7083	0.126708	N.R.	N.R.	N.R.	40228401 Supplemental
Dichlorvos	Marine diatom <i>Thalassiosira pseudonana</i>	98	48 hr	17	76.930039	0.07693	N.R.	N.R.	N.R.	40228401 Supplemental
Naled	Bluegreen algae <i>Anabaena flos-aquae</i>	94.4	5 D	0.64	1.6806723	0.001681	0-Infi.	N.R.	0.06	42529604 Acceptable

CHEMICAL	COMMONNAME	AI	STUDYTIME	EC50 (ppm)	umols	mmol	CL	CURVE SLOPE	NOEL	EPAIDENT
Naled	Duckweed <i>Lemna gibba</i>	94.4	14 D	>1.8	4.7268908	0.004727	N.R.	N.R.	<1.8	42529601 Supplemental
Naled	Freshwater diatom <i>Navicula pelliculosa</i>	94.4	5 D	.012	0.0315126	3.15E-05	0.01-.014	N.R.	0.002	42529603 Acceptable
Naled	Green algae <i>Selenastrum capricornutum</i>	94.4	5 D	0.02	0.052521	5.25E-05	0.015-.033	N.R.	N.R.	42529605 Supplemental
Naled	Marine diatom <i>Skeletonema costatum</i>	94.4	5 D	0.015	0.0393908	3.94E-05	0.009-.023	1.49	0.002	42529602 Acceptable

TABLE 8. Avian Acute and Sub-Acute Toxicity Study Results for DDVP

Chemical	Species Name	Age	Type	a.i.	Study Time	LC50 (Dietary) Or LD50 (Oral)	Mmols	Toxlevel	Cl	Curveslope	Noael	MRID and Study Classification
Dichlorvos	Bobwhite quail <i>Colinus virginianus</i>	N.R.	Dietary	0.46	8 D	>4640	20.99738	PPM	N.R.	N.R.	N.R.	ACC232017 Acceptable
Dichlorvos	Japanese quail <i>Coturnix japonica</i>	14 D	Dietary	94.8	8 D	298	1.348538	PPM	257-345	6.5	N.R.	0022923 Supplemental
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	5 D	Dietary	94.8	8 D	1317	5.959815	PPM	1043-167	2.3	N.R.	0022923 Acceptable
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	16 D	Dietary	94.8	8 D	>5000	22.62648	PPM	N.A.	N.R.	<1250	0022923 Supplemental
Dichlorvos	Ring-necked pheasant <i>Phasianus colchicus</i>	10 D	Dietary	94.8	8 D	568	2.570368	PPM	473-673	5.5	N.R.	0022923 Acceptable
Dichlorvos	Bobwhite quail <i>Colinus</i>	17 WKS	Oral	96.5	14 D	8.8	0.039823	MGK	6.2-13.4	3.69	1.0	40818301 Acceptable

Chemical	Species Name	Age	Type	a.i.	Study Time	LC50 (Dietary) Or LD50 (Oral)	Mmols	Toxlevel	Cl	Curveslope	Noael	MRID and Study Classification
	<i>virginianus</i>											
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	5 MOS	Oral	93	14 D	7.8	0.035297	MGK	6-10.1	N.R.	N.R.	00160000 Acceptable
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	N.R.	Oral	.46	14 D	>4650	21.04263	MGK	N.R.	N.R.	4650	ACC232017 Acceptable
Dichlorvos	Ring-necked pheasant <i>Phasianus colchicus</i>	3 MOS	Oral	93	14 D	11.3	0.051136	MGK	9-14.3	N.R.	N.R.	HCOSTA01 Supplemental

TABLE 9. Avian Acute and Sub-Acute Toxicity Study Results, for Naled

CHEMICAL	COMMONNAME	AGE	TYPE	AI	STUDYTIME	LC50 (ppm) /LD50 (MGK)	mmols	CL	CURVE SLOPE	MRID and Study Classification
Naled	Bobwhite quail <i>Colinus virginianus</i>	14 D	Dietary	95	8 D	2117	5.559349	1.5-2.9	N.R.	00022923 Acceptable
Naled	Japanese quail <i>Coturnix japonica</i>	17 D	Dietary	95	8 D	1327	3.484769	1178-149	N.R.	00022923 Supplemental
Naled	Mallard duck <i>Anas platyrhynchos</i>	10 D	Dietary	95	8 D	2724	7.153361	1068-150	8.9	00022923 Acceptable
Naled	Ring-necked pheasant <i>Phasianus colchicus</i>	10 D	Dietary	95	8 D	2538	6.664916	2221-289	6	00022923 Acceptable
Naled	Canada goose <i>Branta canadensis</i>	N.R.	Oral (LD50)	93	14 D	36.9	0.096901	27.2-50	N.R.	00160000 Supplemental
Naled	Mallard duck <i>Anas platyrhynchos</i>	N.R.	Oral (LD50)	93	14 D	52.2	0.13708	37.8-72	N.R.	00160000 Acceptable
Naled	Sharp-tailed grouse	Adult	Oral	93	14 D	64.9	0.170431	37.3-111	N.R.	00160000

CHEMICAL	COMMONNAME	AGE	TYPE	AI	STUDYTIME	LC50 (ppm) /LD50 (MGK)	mmols	CL	CURVE SLOPE	MRID and Study Classification
	<i>Tympanuchus phasianellus</i>		(LD50)							Supplemental

For Northern bobwhite, there were no overt signs of toxicity in any of the remaining treatment levels (130, 260, and 520 ppm a.i.) throughout the test. There were, however, treatment related reductions in adult male body weight and feed consumption (first two weeks) at the 520 ppm a.i. level, when compared to control. These results indicate a reduction in “feed consumption that may have been related to palatability or chemically induced anorexia.” When compared to the control, there were no statistically significant effects on any reproductive parameter measured at any test concentration. Although not statistically significant, there was a slight reduction from the control (mean=46, sd 19) in egg production at the 520 ppm a.i.test concentration (mean=38, sd 11) that, according to the authors, appeared to be treatment related.

The highest toxicity level tested (1560 ppm ai) resulted in overt signs of toxicity starting on Week 2, resulting in a diet was subsequently replaced with control diet on Day 2 of Week 2. Signs of toxicity included loss of coordination, lethargy, wing droop and ruffled appearance. Two out of the three mortalities found in this group were considered treatment related.

TABLE 10. Avian Reproduction Toxicity Study Results for Naled

CHEMICAL	COMMONNAME	AI	STUDYTIME	LOAEL (ppm)	LOAEL (mmols)	NOAEL	NOAEL (mmols)	EPAIDENT
Naled	Bobwhite quail <i>Colinus virginianus</i>	90.6	22WKS	130	0.341387	<130	0.341387	44517901 Acceptable
Naled	Mallard duck <i>Anas platyrhynchos</i>	90.6	22WKS	>520	1.365546	260	0.682773	44517902 Acceptable

TABLE 11. Avian Reproduction Toxicity Study Results, for DDVP

CHEMICAL	COMMONNAME	AI	STUDYTIME	LOAEL (ppm)	mmols	NOAEL	mmols	EPAIDENT
Dichlorvos	Bobwhite quail <i>Colinus virginianus</i>	98	20WKS	100	0.45253	30	0.135759	43981701 Acceptable

CHEMICAL	COMMONNAME	AI	STUDYTIME	LOAEL (ppm)	mmols	NOAEL	mmols	EPAIDENT
Dichlorvos	Bobwhite quail <i>Colinus virginianus</i>	0.46	1 Gen	>20	0.090506	20		ACC229323 Supplemental
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	98	22WKS	12	0.054304	<12	0.054304	43981702 Supplemental
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	98	20WKS	15	0.067879	5	0.022626	44233401 Acceptable
Dichlorvos	Mallard duck <i>Anas platyrhynchos</i>	0.46	1 Gen	2	0.009051	<2		ACC232017 Supplemental

Table 12. Naled and DDVP Toxicity to Honey Bees

CHEMICAL	COMMON NAME	TAXONOMIC	AGE	TYPE	AI	STUDYTIME	LD50	TOXLEVEL	NOAEL
Naled	Honey bee	<i>Apis mellifera</i>	NR	C	Tech	48 hr	0.48	UGB	<0.48
Naled	Honey bee	<i>Apis mellifera</i>	NR	C	Tech	48 hr	0.48	UGB	<0.48
Naled	Honey bee	<i>Apis mellifera</i>	NR	C	Tech	48 hr	0.48	UGB	<0.48
Naled	Honey bee	<i>Apis mellifera</i>	NR	C	Tech	48 hr	0.48	UGB	<0.48
Naled	Honey bee	<i>Apis mellifera</i>	NR	C	Tech	48 hr	0.48	UGB	<0.48
Dichlorvos	Honey bee	<i>Apis mellifera</i>	Adult	C	Tech	48 hr	0.5	UGB	N.R.
Dichlorvos	Honey bee	<i>Apis mellifera</i>	Worker	FO	50 EC	24 hr	<0.31	LBA	<.31
Dichlorvos	Honey bee	<i>Apis mellifera</i>	Worker	FO	42.39	24 hr	>0.5	LBA	0.5