Appendix A

Ecological Effects Data Summary

Toxicity to Terrestrial Animal

Based on the results for the avian acute/subacute dietary toxicity tests, propargite is found to be practically non-toxic to avian species on an acute and subacute oral dietary toxicity basis. The results for these tests are tabulated below.

Oral Acute/Subacute Avian Toxicity Dietary Studies:

Species	% ai	LC50 (ppm)	Toxicity	MRID No.	Study
		LD50 (mg/kg)	Category	Author/Year	Classification
Mallard duck (Anas platyrhynchus)	88	LD ₅₀ >4640	practically non- toxic	43414529 A.G. Murray <i>et</i> <i>al</i> (1992)	Acceptable
Northern bobwhite quail (Colinus virginianus)	88	LC ₅₀ = 3401	practically nontoxic	00113471/Fink/ (1977)	Acceptable
Northern bobwhite quail (Colinus virginianus)	57	$LC_{50} > 5620$	practically nontoxic	00076407	Supplemental
Mallard duck (Anas platyrhynchus)	88	LC ₅₀ >4640	practically nontoxic	00052454/Fink/ (1974)	Acceptable

Table 1-Avian Acute/Subacute Toxicity

Results of avian reproductive toxicity testing with propargite are tabulated below.

Species	% ai	NOAEC (ppm)	Endpoints Affected	MRID No. Author/Year	Study Classification
Northern bobwhite quail (Colinus virginianus)	85	84.7=NOAEC	Growth	410417-02 J. B. Beavers <i>et</i> <i>al</i> (1988)	Acceptable
Mallard duck (Anas platyrhynchus)	85	NOAEC = 43.2	Reproduction and growth	410417-01 J. B. Beavers <i>et</i> <i>al</i> (1988)	Acceptable

Table2-Avian Reproduction

The avian reproduction study testing bobwhite quail showed that significant reductions in mean eggs laid per hen, 14 day surviving chicks, and adult female body weight gain were seen at 949 ppm measured concentration levels (410417-02 ppm). Significant reduction in the mean body weight of hatchlings was seen at 84.7 ppm and 949 ppm levels, but not at the 288 ppm measured-concentration level. After 14 days the reduction in body weight of offspring was less significant at the 84.7 ppm level, but still statistically significant at the 949 ppm test concentration. The NOEL for growth effects is 84.7 ppm. The NOEL for reproductive effects is 288 PPM with an LOEL of 949 PPM.

The avian reproduction study testing mallard duck demonstrated that measured concentrations of 288 ppm in feed propargite produced dramatic reductions in reproductive performance in mallard ducks. Numbers of eggs laid and eggs set were severely reduced (410417-01). Mean body weight change in adult males and females was also severely effected at this dose level. The NOEL for reproductive and growth parameters in mallard ducks is therefore \geq 84.7 ppm of propargite.

Mammals, Acute and Chronic

Wild mammal testing is required on a case-by-case basis, depending on the results of lower tier laboratory mammalian studies, intended use pattern and pertinent environmental fate characteristics. In most cases, rat or mouse toxicity values obtained from the Agency's Health Effects Division (HED) substitute for wild mammal testing. Based on a laboratory rat LD_{50} value of 2639 mg/kg, propargite is practically non-toxic to small mammals on an acute oral basis (Table below).

Table 3 Mammalian acute toxicity									
Species	% ai	Test Type	Toxicity Value	Affected Endpoints	Study Classification	MRID			
Laboratory rat (<i>Rattus</i> norvegicus)	90.3	Rat acute oral LD ₅₀	LD50 = 2639 mg/kg	None	Acceptable	42857001			

There are two registrant submitted multigenerational reproduction toxicity studies (MRIDs 41750901 and 41352401). Based on the results of these studies, the most sensitive chronic exposure endpoint between the two studies was a NOAEL value as low as 80 ppm. The affected endpoint was increased mortality among male rats (Table below). Other less sensitive affected endpoints include decreased body weight in females at a NOEAL of 400 ppm.

Propargite is classified as a carcinogen by HED. However, propargite was not found to be mutagenic in either eukaryotic and prokaryotic cell systems. On January 23, 1992, the Cancer Peer Review Committee (CPRC) determined that based on the evidence presented, propargite was classified a Group B2, "likely" human carcinogen. It was concluded that administration of propargite was associated with the appearance of extremely rare jejunal tumors in male and female Sprague-Dawley rats. There was an increase in the incidence of undifferentiated sarcoma of the jejunum in males and females receiving 800 ppm propargite compared to concurrent and historical controls. This was the only concentration level tested in the experiment. Thus, there was no NOEAC produced. The MRID and study title are 42837201 and Special Two Year Oncogenicity; rat OPPTS 870.4200 [§83-2]. The data generated in this study will be considered for generating the action area for the CRLF assessment.

Table 4-Mammalian chronic toxicity									
Species	% ai	Test Type	Toxicity Value	Affected Endpoints	Study Classification	MRID			
Laboratory	87.2	Chronic	LOAEL=800	Body wt in	Acceptable	41750901			

Rat		Toxicity	ppm NOAEL=400 ppm for females LOAEL = 400 ppm NOAEL=80 ppm for males	females and males and increased mortality in male rats.		
Laboratory rat (Rattus norvegicus)	87.2	Reproductive toxicity to offspring	LOAEL=800 ppm NOAEL= 400 ppm	Decrease pup and adult wt.	Acceptable	41352401

Insects

The honeybee acute contact tests demonstrated the lowest LD50 for bees to be 15 μ g ai/bee and the honeybee-toxicity of residues on foliage study demonstrated that when bees were exposed to residues of Omite at 1.5 lb ai/acre (a product formulation with propagite as the active ingredient). Thus, propargite is deemed as practically non-toxic to bees on an acute contact basis (Kopwalski, 1993). The results of all the honey acute toxicity study are tabulated below.

Additionally based on a insect predator toxicity study testing omite (a product formulation with propagite as the active ingredient) acute toxicity to the predaceous beetle, *Stethorus punctum*, propargite had low toxicity to the *S. punctum*. The table below demonstrates the results.

Table 5-Non-target insect acute contact toxicity								
Species	Study Type	% ai	Toxicity Endpoint	Toxicity Classification	MRID No. Author/Year	Study Classification		
Honeybee (Apis mellifera)	Acute contact test	88.3	$LD_{50} = 15$ µg ai/bee	Practically non-toxic	43185001/Kopwalksi/ 1993	Acceptable		
Honeybee (Apis mellifera)	Acute contact test	Not reported	LD ₅₀ > 18.13 μg /bee	Practically non-toxic	00036935/Atkins/1981	Acceptable		
Honeybee (Apis mellifera)	Acute toxicity of residues on foliage	32	$LC_{50} >$ 1.5 lb ai/acre	Practically non-toxic	00060628/Johansen/1965	Acceptable		
Honeybee (Apis mellifera)	Pesticidal Effect on Honeybee Brood	30	LD50 > 100 µg /larvae	Practically non-toxic	00074486/Atkins/1980	Supplemental		
Predaceous beetle (<i>Stethorus</i> <i>punctum</i>)	Acute Toxicity to insect predator	32%	48 hr. LD ₅₀ > 0.625 lb ai/100 gal	Low toxicity to bees.*	00009033/Asquith/1978	Acceptable		

Note: Based on the endpoint results of this study (LD₅₀ > 0.625 lb ai/100 gal), the reviewer of this toxicity study deemed coumaphos as low toxicity to bees. However, there are no bee toxicity classifications for the unit of lbs ai/100 gal. Thus, this toxicity description given by the reviewer is not an official toxicity classification for bees. There are no bee toxicity classifications for the unit of lbs ai/100 gal.

Toxicity to Aquatic Animals

The results of acute testing show that propargite is categorized as highly toxic to coldwater, warm-water fish species, and invertebrate species. Results of freshwater animal acute toxicity testing are tabulated below.

Table7-Freshwa	Table7-Freshwater Animal Acute Toxicity							
Test Type	Species	% ai	EC50/ LC50 (μg/L)	Toxicity Category	MRID No. Author/Year	Study Classification		
Acute LC50 Test with a Freshwater Invertebrate	Waterflea (Daphnia magna)	76.2	48 hr EC ₅₀ = 74 ai	Highly toxic	43759002 Davis /1995	Acceptable		
Acute LC50 Test with a Freshwater Invertebrate	Waterflea (Daphnia magna)	100	48 hr EC ₅₀ = 91 ai	Highly toxic	00068752	Acceptable		
Sediment Effect Toxicity Test with Freshwater Invertebrate	Waterflea (Daphnia magna)	88.64	48 hr EC ₅₀ not established. (See note 1 below)	Not established	4337150	Supplemental		
Acute LC50 Test with a Freshwater Coldwater Fish	Rainbow trout (Oncorhynchus mykiss)	76.2	LC ₅₀ = 143 ai	Highly toxic	43759001/Davis/ (1995)	Acceptable		
Acute LC50 Test with a Coldwater Fish	Rainbow trout (Oncorhynchus mykiss)	Tech	LC ₅₀ = 118 ai	Highly toxic	0066498/Kuc/ (1977)	Acceptable		

Acute LC50 Test with a Coldwater Freshwater Fish	Rainbow trout (Oncorhynchus mykiss)	30	LC ₅₀ =445	Highly toxic	00043552	Supplemental
Sediment Effect Toxicity Test with Freshwater Invertebrate	Rainbow trout (Oncorhynchus mykiss)	88.64	This study was not designed to determine a specific LC_{50} level. (See note 2 below).	Not established	4337150/Davis/1994	Supplemental
Acute LC50 Test with Bluegill sunfish	Bluegill sunfish (Lepomis macrochirus)	57E	LC ₅₀ = 31	Highly toxic	00112368/1966	Supplemental
Acute LC50 Test with Carp	Carp, Cyprinus carpio	35EC	LC ₅₀ =330 ppb	Highly toxic	00090718	.Supplemental

Note 1: An EC50 was not established by this study. Mortality was 35% in 48.9 ppb water suspended residues, 50% in 39.2 ppb propargite with sediment covered tank bottoms, and 0% when aged sediments were obtained with a measured in water concentration of 3.68 ppb of propargite.

Note 2: After 96 hours of exposure the following mortality was observed: 80% for trout exposed to 73.1 ppb in water, 70% for trout exposed to 58.9 ppb in water with sediment contained on the tank bottom, and 0% for trout exposed in tanks containing pretreated aged sediment.

The results of the freshwater aquatic invertebrate life-cycle toxicity and fish early lifestage toxicity test are shown below. Based on the tabulated results, propargite is found to be toxic to freshwater invertebrates and fish on a chronic basis at low concentrations.

Species	% ai	NOAEC/ LOAEC (µg/L)	Endpoints Affected	MRID No. Author/Year	Study Classification
Waterflea (Daphnia magna)	88	9/14	reproduction	00126738/Forbis/1983	Acceptable
Fathead minnow (Cyprinus carpio)	88.9	16 to 28	growth, survival, day to mean hatch	00126739/Forbis/1983	Acceptable

Table 8-Freshwater Aquatic Invertebrate Life-Cycle Toxicity and Fish Early Life-Stage Toxicity

Toxicity to Terrestrial and Aquatic Plants

The results of the terrestrial plant toxicity test show that there were no significant adverse effects to seedling emergence or vegetative vigor at the highest concentrations tested which was 2.45 lbs ai/A. The results for these tests are tabulated below.

Species	% ai	EC25 (lb ai/A)	Endpoint Affected	MRID No. Author/Year	Study Classification
Monocots- sorghum, corn, oat, wheat, onion Dicots- carrot, cucumber, radish, soybean, sunflower, tomato	88	>2.45 lb ai/A	no observed growth effects	43848801 43848802 (Aufderheide and Kranzfelder)	Acceptable

Table-10-Non-target Terrestrial Plant Seedling Emergence/Vegetative Vigor Toxicity (Tier I)

The Tier II results indicate that the saltwater diatom, *Skeletonema costatus*, is the most sensitive non-vascular aquatic plant. Aquatic plant testing (Tier II) results are tabulated below.

Species	% ai	EC ₅₀ (µg/L or ppm)	NOAEL (µg/L or ppm)	MRID No. Author/Year	Study Classification
Vascular Plants					
Duckweed ,Lemna gibba	76.2	75000 ppb	28	43885805/Davis/1995	Acceptable
Nonvascular Plants					
Green algae Kirchneria subcapitata	88.2	>105500 ppb	4.3	43414542 D.E. Brock (1992)	Acceptable
Freshwater diatom Navicula pelliculosa	76.2	106 µg/L	99	43885807/Davis/ 1995	Acceptable
Blue-green algae Anabaena flos-aquae	76.2	> 101000 ppb	101	43885803/Davis/ 1995	Acceptable
Freshwater Green Alga Selenastrum capricornutum	76.2	66.2 µg/L	5	43885804/Davis/ 1995	Acceptable

Table- 11-Non-target Aquatic Plant Toxicity (Tier II)