APPENDIX C: Ecological Effects Data

Invalid studies are not included (including studies that used formulations not currently registered for use in the U.S.).

ALACHLOR:

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
BIRDS					
Birds - Acute					
Bobwhite quail (*Colinus virginianus*)	LD_{50} = 1499 mg a.i./kg-bw	Technical	00079523	Acceptable	None
Birds – Sub-Acute					
Mallard duck (*Anas platyrhynchos*)	LC_{50} = > 5630 mg a.i./kg-diet	Technical	430870-01	Acceptable	No mortalities attributed to treatment NOAEC = 1,000 mg a.i./kg-diet (based on reduction in body weight)
Bobwhite quail (*Colinus virginianus*)	LC_{50} = >5620 mg a.i./kg-diet	Technical	430871-01	Acceptable	No mortalities NOAEC = 1,000 mg a.i./kg-diet (based on reduction in body weight)
Birds - Chronic					
Mallard duck (*Anas platyrhynchos*)	NOAEC = <50 mg a.i./kg-diet (NOAEC not determined) LOAEC = 50 mg a.i./kg-diet	Technical	449515-01	Supplemental	There were significant treatment-related reductions in hatchling weight at all test conc.
Bobwhite quail (*Colinus virginianus*)	NOAEC = 50 mg a.i./kg-diet LOAEC = 150 mg a.i./kg-diet	Technical	449515-02	Acceptable	Based on reduction in mean hatchling weight
MAMMALS					
Mammals - Acute					
Rat	LD_{50} = 930 mg/kg-bw	Technical	00139383	Acceptable	None
Mammals - Chronic					
Sprague Dawley rat	NOAEL = 30 mg/kg-diet LOAEL = >30 mg/kg-diet	Technical	00075062	Acceptable	No reproductive effects at the highest dose tested (30 mg/kg-diet); reduced renal weights and reduced ovary weights at 30 mg/kg-diet (NOAEL = 10 mg/kg-

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
					diet)
TERRESTRIAL INVERTEBRATES					
Honey bee (*Apis mellifera*)	LD_{50} = >36.3 µg a.i. /bee (only 0.41% mortality at highest treatment level)	Formulation (Lasso, 45% a.i.)	00028772 (Atkins *et al*. 1973)	Supplemental	No LD_{50} level established
TERRESTRIAL PLANTS					
Terrestrial Plants – Vegetative Vigor					
Terrestrial plants	<u>Monocot:</u> Plant dry weight: Rye grass NOAEL – 0.037 lb a.i./acre; EC_{25} – 0.068 lb a.i./acre <u>Dicot</u>: Cucumber NOAEL – 0.67 lb a.i./acre; EC_{25} – 1.4 lb a.i./acre	Technical	424686-01	Supplemental	Tier II vegetative vigor study; no solvent control was included in the study; TGAI was used instead of a TEP
Terrestrial Plants – Seedling Emergence					
Terrestrial plants	<u>Monocot:</u> Plant dry weight: Rye grass NOAEL – 0.0023 lb a.i./acre; EC_{25} – 0.0067 lb a.i./acre <u>Dicot</u>: Plant phytotoxicity: Lettuce NOAEL – 0.019 lb a.i./acre; EC_{25} – 0.034 lb a.i./acre	Technical	424687-01	Supplemental	Tier II seedling emergence; ; no solvent control was included in the study; TGAI was used instead of a TEP
AQUATIC INVERTEBRATES					
Freshwater Invertebrates - Acute					
Daphnid (*Daphnia*	48-hr EC_{50} = 21 mg a.i./L	Technical	40098001	Supplemental	Raw data not checked yet

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
magna)					
Chironomid (*Chironomus plumosus*)	48-hr EC_{50} = 3.2 mg a.i./L	Technical	40098001	Supplemental	Raw data not checked yet
Daphnid (*Daphnia magna*)	48-hr EC_{50} = 10 mg/L (formulation) 48-hr EC_{50} = 4.5 mg a.i./L (accounting for % a.i. in formulation)	Formulation (45% a.i.) (title of report says 'technical', but DER says formulation – which was apparently confirmed by a phone call)	00028549	Supplemental	DER states that this study is 'core' for a formulated product
Daphnid (*Daphnia magna*)	48-hr EC_{50} = 22 mg/L (formulation) 48-hr EC_{50} = 10 mg a.i./L (accounting for % a.i. in formulation)	Formulation (45% a.i.)	00028552	Supplemental	DER states that this study is 'core' for a formulated product
Daphnid (*Daphnia magna*)	48-hr EC_{50} = 7.7 mg a.i./L	Formulation (45% EC)	40098001	Supplemental	Raw data not checked yet
Chironomid (*Chironomus plumosus*)	48-hr EC_{50} = 2.5 mg a.i./L	Formulation (45% EC)	40098001	Supplemental	Raw data not available on SAN drive
Freshwater Invertebrate - Chronic					
Daphnid (*Daphnia magna*)	NOAEC = 0.11 mg a.i./L LOAEC = 0.23 mg a.i./L	Technical	437747-07	Acceptable	Based on reduced adult length
Estuarine/Marine Invertebrate - Acute					
Mysid (*Mysidopsis bahia*) or (*Americamysis bahia*)	96-hr LC_{50} = 2.4 mg a.i./L	Technical	445243-02	Acceptable	None
Copepod (*Tigriopus japonicus*)	96-hr LC_{50} = 7.3 mg a.i./L	Technical	Lee *et al.* 2007	Supplemental	A non-native species was used in the study; the concentrations tested were not reported; water quality parameters were not described
Eastern oyster (*Crassostrea virginica*)	96-hr shell deposition EC_{50} = 1.6 mg a.i./L	Technical	445243-03	Acceptable	None
Estuarine/Marine Invertebrate - Chronic					

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
Copepod (*Tigriopus japonicus*)	NOAEC < 0.1 µg a.i./L LOAEC < 0.1 µg a.i./L	Technical	E104287 (Lee *et al*. 2008)	Supplemental	A definitive endpoint could not be established because effects (increase in the generation time for adults in the F_0 and F_1 generations) were seen at all of the conc. tested; a non-native species was used in the study.
AMPHIBIANS					
Amphibian Acute					
African clawed frog (*Xenopus laevis*)	96-hr LC_{50} = 6.1 mg a.i./L	Technical	E66376 (Osano *et al.*, 2002)	Supplemental (can be used quantitatively)	The study was non-guideline (no guidelines currently exist for an amphibian acute toxicity test) but scientifically valid; used embryos at stage 8 (midblastula) to stage 11 (early gastrula); sublethal effects involved edemas, axial flexures, and gut and eye abnormalities (EC_{50} = 3.6 mg a.i./L)
Fire-bellied toad (*Bombina orientalis*)	96-hr LC_{50} not calculated (52.7% mortality at 2.7 mg a.i./L)	Technical	E81388 (Kang *et al.*, 2005)	Supplemental (can be used qualitatively)	The study was non-guideline (no guidelines currently exist for an amphibian acute toxicity test) but scientifically valid; the tests were conducted using newly fertilized embryos; increased rates of various embryonic abnormalities occurred at 1.4 mg a.i./L and higher concentrations
FISH					
Freshwater Fish Acute					
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 2.8 mg a.i./L	Technical	00023615	Acceptable	None
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 4.3 mg a.i./L	Technical	40098001	Supplemental	Raw data not checked yet
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.8 mg a.i./L	Technical	00023616	Supplemental (adequate for RQ calculation)	Information on the size and source of fish, test vessel material, period food withheld , and other aspects of the test

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
					procedure not provided.
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 2.4 mg a.i./L	Technical	40098001	Supplemental	Raw data not checked yet
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 9.1 mg a.i./L	Formulation (EC, 43% a.i.)	E18805 (Howe *et al*., 1998)	Supplemental (can be used quantitatively)	The toxicity of the 50:50 mixture of atrazine + alachlor appeared significantly greater than additive (indicating chemical synergy) for leopard frog, American toad, and hannel catfish, but NOT rainbow trout.
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 6.2 mg /L (formulation) 96-hr LC_{50} = 2.8 mg a.i./L (accounting for % a.i. in formulation)	Formulation (Lasso, 45% a.i.)	00028551	Supplemental	DER states that this study is 'core' for a formulated product
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 3.7 mg /L (formulation) 96-hr LC_{50} = 1.7 mg a.i./L (accounting for % a.i. in formulation)	Formulation (Lasso, 45% a.i.)	00028550	Supplemental	DER states that this study is 'core' for a formulated product – not clear if the endpoint was corrected for %a.i.
Channel catfish (*Ictalurus punctatus*)	96-hr LC_{50} = 16.7 mg a.i./L	Formulation (EC, 43% a.i.)	E18805 (Howe *et al*., 1998)	Supplemental (can be used quantitatively)	The toxicity of the 50:50 mixture of atrazine + alachlor appeared significantly greater than additive (indicating chemical synergy).
Freshwater Fish - Chronic					
Rainbow trout (*Oncorhynchus mykiss*)	NOAEC = 0.187 mg a.i./L LOAEC = 0.388 mg a.i./L	Technical	438626-01	Acceptable	Early life-stage study; endpoints based on reduced growth (length and wet weight); posthatch survival reduced at the 1.63 ppm level
Estuarine/Marine Fish - Acute					
Sheepshead minnow (*Cyprinodon variegates*)	96-hr LC_{50} = 3.9 mg a.i./L	Technical	445243-01	Acceptable	None
Estuarine/Marine Fish - Chronic					
No data					

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
AQUATIC PLANTS					
Aquatic Non-Vascular Plants					
Aquatic plant (nonvascular) (*Selenastrum capricornutum*)	NOAEC = 0.35 **µg** a.i./L EC_{50} = 1.64 **µg** a.i./L	Technical	427638-01	Acceptable	NOAEC based on reduced cell density
Aquatic plant (nonvascular) (*Anabaena flos-aquae*)	NOAEC = 19 mg a.i./L (highest conc. tested) EC_{50} = >19 mg a.i./L	Technical	446497-01	Acceptable	None
Aquatic plant (nonvascular) (*Navicula pelliculosa*)	NOAEC = 1.0 mg a.i./L EC_{50} = 2.63 mg a.i./L	Technical	446497-04	Acceptable	NOAEC based on % inhibition
Aquatic plant (nonvascular) (*Skeletonema costatum*)	NOAEC = 0.098 mg a.i./L EC_{50} = 0.21 mg a.i./L	Technical	446497-03	Acceptable	NOAEC was based on reduced cell density
Aquatic Vascular Plants					
Aquatic plant (vascular) (*Lemna gibba*)	NOAEL = 0.339 **µg** a.i./L IC_{50} = 2.3 **µg** a.i./L	Technical	446497-02	Acceptable	NOAEC based on % inhibition
MISC.					
Fish Bio-concentration Channel catfish (*Ictalurus punctatus*)	Mean conc. of residues in whole fish measured on days 7 and 30 were 0.79 and 0.41 mg/kg, respectively	Technical	00087855b (McAllister 1979)	Supplemental	The conc. of alachlor in the water during the 30-day testing period ranged from an average of 0.022 to 0.10 mg/kg (rather than a constant conc.)

ALACHLOR Degrates/Safeners:

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
ALACHLOR SULFONIC ACID (MON 5775)					
Daphnid (*Daphnia magna*)	EC_{50} = >104 mg a.i./L	Technical	43774703	Acceptable	None
Rainbow trout (*Oncorhynchus mykiss*)	LC_{50} = >104 mg a.i./L	Technical	43774704	Acceptable	None
Aquatic plant (nonvascular) (*Selenastrum capricornutum*)	NOAEC = 120 mg a.i./L (highest conc. tested) EC_{50} = >120 mg a.i./L	Technical	450460-01	Acceptable	None
Aquatic plant (nonvascular) (*Anabaena flos-aquae*)	NOAEC = 120 mg a.i./L (highest conc. tested) EC_{50} = >120 mg a.i./L	Technical	450460-02	Acceptable	None
Aquatic plant (nonvascular) (*Navicula pelliculosa*)	NOAEC = 2.5 mg a.i./L EC_{50} = 3.6 mg a.i./L	Technical	450460-03	Acceptable	NOAEC based on reduced cell density
Aquatic plant (nonvascular) (*Skeletonema costatum*)	NOAEC = 2.0 mg a.i./L EC_{50} = 5.0 mg a.i./L	Technical	450460-04	Acceptable	Endpoints based on reduced biomass and growth rate
Aquatic plant (vascular) (*Lemna gibba*)	NOAEC = 120 mg a.i./L (highest conc. tested) EC_{50} = >120 mg a.i./L	Technical	450460-05	Acceptable	None
OXANILIC ACID DEGRADATE OF ALACHLOR (MON 5760)					
Daphnid (*Daphnia magna*)	EC_{50} = >95 mg a.i./L	Technical	43774705	Acceptable	None
Rainbow trout (*Oncorhynchus mykiss*)	LC_{50} = >100 mg a.i./L	Technical	43774706	Acceptable	None
2,6-DIETHYLANILINE					
African clawed frog (*Xenopus laevis*)	96-hr LC_{50} = 19.4 mg a.i./L	Technical	E66376 (Osano *et al.*, 2002)	Supplemental (can be used quantitatively)	The study was non-guideline (no guidelines currently exist

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASS-IFICATION	COMMENTS
					for an amphibian acute toxicity test) but scientifically valid; sublethal effects involved axial flexure, and gut and eye abnormalities (EC_{50} = 9.2 mg a.i./L)