

Appendix G.

Ecotoxicity Information

Registrant-Submitted Ecotoxicity Studies

Freshwater Fish: Acute Exposure (Mortality) Studies

Available data show that EPTC is slightly toxic on an acute basis to several surrogate freshwater fish species (**Table 1**). The acute 96-hour median lethal toxicity thresholds (*i.e.*, LC_{50s}) for EPTC range from 14 to 27 mg a.i./L for bluegill sunfish, rainbow trout, cutthroat trout, and lake trout. Fish toxicity studies with EPTC formulations (2.3 - 77.1% a.i.) are also available for consideration in this risk assessment. These studies suggest that the tested formulations and technical grade EPTC exhibit similar toxicity on an acute basis, with 96-hour LC_{50s} ranging from 16 to 24 mg a.i./L..

Table 1. Freshwater Fish Acute Toxicity Data.					
Common Name	%AI	Study parameters	Test Results	MRID	Classification/ Category
Bluegill sunfish <i>Lepomis macrochirus</i>	98.6	96 hour study 10 fish/treatment 0, 0(solvent), 1.8, 4.2, 10, 24, 56 mg/L. Nominal concentrations used. Static study.	96-h LC₅₀ = 14 (10-24) mg/L² NOAEC = 4.2 mg/L LOAEC = 10 mg/L based on sublethal effects (darkened, quiescent and at the surface) and mortality (1 fish). At 24 mg/L and above, 100% mortality.	00144208	Acceptable/ Slightly toxic
Bluegill sunfish <i>Lepomis macrochirus</i>	99	96 hour study 10 fish/treatment 0, 0(solvent), 5.6, 10, 18, 32, 56 mg/L. Nominal concentrations used. Static study.	96-h LC ₅₀ = 18 (10 - 32) mg/L ^{2,3} . NOAEC = 5.6 mg/L LOAEC = 10 mg/L based on sublethal effects (at times throughout the study, some fish either at the surface or on the bottom). Mortality and /or loss of equilibrium observed at ≥ 18 mg/L.	00131271	Acceptable/ Slightly toxic ¹

Table 1. Freshwater Fish Acute Toxicity Data.					
Common Name	%AI	Study parameters	Test Results	MRID	Classification/ Category
Bluegill sunfish <i>Lepomis macrochirus</i>	not reported	Mixture of two products: Banvel + Eradicane 6.7 EC (EPTC + R-25788 (inert safener)). 96-h. acute study. 10 fish/treatment at 0 (control), 56, 100, 180, 320, 580 mg/L (nominal). Assumed static study.	96-h. LC ₅₀ : 398 (326-486) mg formulation/L NOAEC: 180 mg/L LOAEC: 320 mg/L based on sublethal effects. Discoloration and abnormal behavior observed at ≥ 320 mg/L.	00027992	Supplemental/ Practically nontoxic for mixture
Bluegill sunfish <i>Lepomis macrochirus</i>	77.1	Eptam 6E. 20 fish/treatment. Nominal concentrations: 0, 9.9, 13.4, 18.2, 24.2, 32, 42.3 mg/L	96-h LC ₅₀ : 23 (21.5-24.2) mg formulation/L; 17.4 (16.6 – 18.7) mg a.i./L NOAEC: 18 mg/L LOAEC: 24 mg/L Mortalities observed at 24 mg/L and above. No sublethal effects reported.	00034684	Supplemental/ Slightly toxic for formulation
Bluegill sunfish <i>Lepomis macrochirus</i>	47	96-h Acute fish study. Knoxweed 42 formulation. 20 fish/concentration level. 0, 10, 18, 32, 42, 56 mg/L nominal concentrations in a static bioassay.	96-h EC ₅₀ : 24 (17-34) mg formulation/L; 11 (8 – 16) mg a.i./L NOAEC: 10 mg/L LOAEC: 18 mg/L (mortality) Slight loss of equilibrium at ≥ 32 mg/L.	00022361	Acceptable for formulation/ Slightly toxic for formulation
Bluegill sunfish <i>Lepomis macrochirus</i>	97.8	Control, solvent control, 5.6, 10, 18, 24, 32, 42, 56 mg/L. 10-20 fish per concentration level. Static study. Nominal concentrations.	LC ₅₀ : 23 (19-27) mg/L NOAEC: 10 mg/L LOAEC: 18 mg/L based on mortality. At 32 mg/L, fish remained on their sides at bottom of tank.	00021834	Acceptable/ Slightly toxic
Bluegill sunfish <i>Lepomis macrochirus</i>	not reported	Eptam 6E. Control, solvent control, 10, 18, 24, 32, 56 mg/L. 10-20 fish per concentration level. Static study. Nominal concentrations.	LC ₅₀ : 25 (24 – 27) mg formulation/L Slope: 16.08 (9.2 – 22.9) NOAEC: 10 mg/L LOAEC: 18 mg/L based on mortality. At 24 mg/L, fish remained on their sides at bottom of tank.	00021834	Acceptable/ Slightly toxic

Table 1. Freshwater Fish Acute Toxicity Data.					
Common Name	%AI	Study parameters	Test Results	MRID	Classification/ Category
Rainbow trout <i>Onchorhynchus mykiss</i>	99	96 hour study 10 fish/vessel Mean measured 0, 0 (solvent), 3.2, 5.6, 10, 18, 32 mg/L. Static study	96-h LC ₅₀ = 21 (10-32) mg/L NOAEC = 3.2 mg/L LOAEC = 5.6 mg/L based on sublethal effects (fish on bottom). Other sublethal effects observed at higher concentration levels (darkening, loss of equilibrium, at surface). Mortality observed at 18 mg/L and above.	00131272	Acceptable/ Slightly toxic ¹
Rainbow trout <i>Onchorhynchus mykiss</i>	97.8	Control, solvent control, 10, 18, 21, 24, 32 mg/L. 10-20 fish/concentration level. Static study. Nominal concentrations.	LC ₅₀ : 19 (17-21) mg/L NOAEC: 10 mg/L LOAEC: 18 mg/L based on mortalities at 18 mg/L and above. Signs of intoxication were observed at ≥ 21 mg/L	00021834	Acceptable/ Slightly toxic
Rainbow trout <i>Onchorhynchus mykiss</i>	not reported	Eptam 6E. Control, solvent control, 10, 18, 24, 32, 56 mg/L. 10-20 fish per concentration level. Assumed static study. Nominal concentrations.	LC ₅₀ : 21 (19-23) mg formulation/L NOAEC: 10 mg/L LOAEC: 18 mg/L based on mortalities at 18 mg/L and above. Signs of intoxication were observed at ≥ 24 mg/L.	00021834	Acceptable/ Slightly toxic for formulation
Rainbow trout <i>Onchorhynchus mykiss</i>	2.3	Eptam formulation: 96-h LC ₅₀ . 20 fish/concentration level. 0 (assumed), 18, 32, 56, 100, 180 mg/L (nominal). Static study.	LC ₅₀ >180 mg formulation/L (>4.1 mg/L a.i.). No mortalities were observed.	00025286	Supplemental/ At most, moderately toxic
Rainbow trout <i>Onchorhynchus mykiss</i>	47	96-h Acute fish study. Knoxweed 42 formulation. 10-20 fish/concentration level. 0, 0 (solvent) 10, 18, 32, 42, 56 mg/L nominal concentrations in a static bioassay.	96--h LC ₅₀ : 22 (18-27) mg formulation/L; 10 (8 – 13) mg a.i./L NOAEC: 10 mg/L LOAEC: 18 mg/L. Mortality and clinical signs (fish remaining on their sides with an apparent respiration inhibition) at ≥18 mg/L.	00022361	Acceptable for formulation/ Slightly toxic for formulation

Table 1. Freshwater Fish Acute Toxicity Data.					
Common Name	%AI	Study parameters	Test Results	MRID	Classification/ Category
Mosquito fish <i>Gambusia affinis</i>	77.1	Eptam 6E formulation. 96 hour acute toxicity study. 10 fish/concentration level. 3.16, 10.0, 20.0, 31.6 mg/L. Assumed controls were used and static study (not provided in DER).	96-h. LC ₅₀ : 16 (13.7 – 19.1) mg formulation/L; 13 (10.6 – 14.7) mg a.i./L NOAEC: 10 mg/L LOAEC: 20 mg/L based on signs of toxicity (discoloration, behavior). Test and statistical methodology either poorly described or not provided.	00084743 00108342	Supplemental/ Slightly toxic for formulation
Goldfish <i>Carassius auratus</i>	2.3	Eptam formulation. 96-h. study. 0, 3.2, 10, 18, 32, 56 and 100 mg/L nominal concentrations. 5 fish/concentration level.	96-h LC ₅₀ > 100 mg/L (>2.3 mg a.i./L) NOAEL: 2.3 mg a.i./L LOAEL > 2.3 mg a.i./L. No sublethal effects reported.	00025287	Supplemental/ Practically nontoxic for formulation
Goldfish <i>Carassius auratus</i>	77.1	Eptam 6E formulation. Nominal. Static. Concentration levels based on the amount of total formulation. 0, 21, 24, 28, 32, 37 mg/L. 10 per concentration tested.	96-h LC ₅₀ : 27 mg formulation/L; 20.6 mg a.i./L NOAEC: 24 mg/L LOAEC: 28 mg/L based on mortality.	00034683	Supplemental/ Slightly toxic
Cutthroat trout <i>Salmo clarkii</i> Lake trout <i>Salvelinus namaycush</i>	95	96-h LC ₅₀ study. No concentrations available in DER. Nominal based on 1999 RED.	Cutthroat trout 96-h LC ₅₀ : 17 (15 - 19) mg/L Lake trout 96-h LC ₅₀ : 16 (14.8 – 17.7) mg/L	40094602	Supplemental/ Slightly toxic

¹Based on LC₅₀ (mg/L): < 0.1 very highly toxic; 0.1-1 highly toxic; >1-10 moderately toxic; >10-100 slightly toxic; >100 practically nontoxic

² **Bold** value used to calculate risk quotients

³ Range is 95% confidence interval for endpoint

EPTC has the potential to volatilize during aquatic toxicity tests; measured test concentrations from daphnid, duckweed and algal studies show that EPTC volatilizes from water at levels ranging from 2 to about 50% losses. These data suggest that test concentrations at the end of 96-h non-renewal fish studies would be 20 to 25 percent less than initial nominal concentrations. Applying an average between initial and predicted final test concentrations, estimated mean test concentrations would be 10 to 13 percent less than nominal test concentrations; thus, fish LC₅₀ values are approximately 10 percent lower than the toxicity values listed above.

Freshwater Fish: Chronic Exposure (Growth/Reproduction) Studies

No freshwater fish chronic studies are available for EPTC. Thus, the potential direct chronic effects (*e.g.*, reproduction, growth) to the DS cannot be quantitatively assessed at this time.

Freshwater Invertebrates: Acute Exposure Studies

Available toxicity data indicated that EPTC is slightly to moderately toxic on an acute basis to freshwater invertebrate species. The acute 48-hour EC_{50s} for EPTC range from 6.5 to 14 mg a.i./L for daphnids. The acute 96-hour EC_{50s} on the technical material for the isopod and scud (2 studies) are 23, 66 and 23 mg/L, respectively. The 48-hour acute toxicities of the sulfoxide degradate and a mixture of two products, banvel + eradican 6.7 EC are 22 and 267 mg/L, respectively.

Table 2. Freshwater Invertebrate Acute Toxicity Data

Common Name	%AI	Study parameters	Test Results	MRID	Classification/Category
Water flea <i>Daphnia magna</i>	98.4	48-h static study Treatments: 1.8, 3.2, 5.6, 10, 18, 32, 56, and 100 mg/L. Mean measured concentrations from 1.7 to 93 mg/L.	48-h LC₅₀: 6.5 (4.8-8.4) mg a.i./L². NOAEC: 1.7 mg a.i./L (mean measured). LOAEC: 3.2 mg a.i./L (nominal) based on immobility.	42945601	Acceptable/ Moderately toxic
Water flea <i>Daphnia magna</i>	98.6	48-h static study. Nominal concentrations: 0, 0 (solvent control), 5.6, 10, 18, 32, 56, 100 mg/L. 20 daphnids/treatment.	48-h LC ₅₀ : 14 (12-17) ³ mg a.i./L (nominal). NOAEC: 5.6 mg a.i./L LOAEC: 10 mg a.i./L based on sublethal effects and lethality. No reported sublethal effects.	00144209	Acceptable/ Slightly toxic
Water flea <i>Daphnia magna</i>	99	48-h static study. Mean measured concentrations 0, 0 (solvent), 1.7, 3.6, 6.2, 9.6 mg/L. 20 daphnids/treatment.	48-h LC ₅₀ : 7.5 (5.9–9.5) mg a.i./L NOAEC: 3.2 mg/L LOAEC: 5.6 mg/L based on lethality.	00131273	Acceptable/ Moderately toxic
Water flea <i>Daphnia magna</i>	98 sulfoxide degradate R078202	48-h static study (R078202) sulfoxide degradate; measured initial concentrations at 5.6, 10, 18, 32, 57 and 100 mg/L (approx. 4% loss in 48 hours). 20 daphnids/treatment	48-h LC ₅₀ = 22 (20-26 mg a.i./L). Probit slope: 10.74 NOAEC = 10 mg/L LOAEC = 18 mg/L based on immobilization. Sublethal effects not reported	45442201	Supplemental/ Slightly toxic ¹

Table 2. Freshwater Invertebrate Acute Toxicity Data

Common Name	%AI	Study parameters	Test Results	MRID	Classification/ Category
Water flea <i>Daphnia magna</i>	not reported	48-h static study (assumed). Mixture of two products: Banvel + Eradicane 6.7 EC (EPTC + R-25788). Treatments: 0 (control), 56, 100, 180, 320, 560, 1000 mg/L (nominal); 20 daphnids/treatment.	Test conducted with a mixture of two products. 48-h LC ₅₀ : 267 (221.7-320.4) mg/L NOAEC: < 100 mg/L	00016546	Supplemental/
Isopod <i>Asellus brevicaudus</i>	95	96-hour static study.	LC ₅₀ : 23 mg a.i./L	40094602	Supplemental/ Slightly toxic
Scud <i>Gammarus fasciatus</i>	95	96-hour static study.	LC ₅₀ : 66 mg a.i./L	40094602	Supplemental/ Slightly toxic
Scud <i>Gammarus fasciatus</i>	95	96-hour static study	LC ₅₀ : 23 (15 -36) mg a.i./L.	05001497	Supplemental/ Slightly toxic

¹Based on EC₅₀ (mg/L): < 0.1 very highly toxic; 0.1-1 highly toxic; >1-10 moderately toxic; >10-100 slightly toxic; >100 practically nontoxic

² **Bold** value used to calculate risk quotients

³ Range is 95% confidence interval for endpoint

⁴ Johnson , W.W. and M.T. Finley. 1980. Handbook of acute toxicity of chemicals to fish and aquatic invertebrates. U.S. Department of Interior, Fish and Wildlife Service Resource Publication 137. 98 pp. Washington, D.C.

Freshwater Invertebrates: Chronic Exposure Studies

A life-cycle study with the water flea (*Daphnia magna*) is available to assess the potential chronic risks of EPTC to freshwater invertebrates; study results are summarized in **Table 3**. An NOAEC of 0.81 mg/L based on a reduction in the number of offspring was established in the study. The 21-day LC₅₀ was 3.5 mg/L.

Table 3. Freshwater Invertebrate Chronic Toxicity Data					
Common Name	%AI	Study parameters	Test Results	MRID	Classification /Category
Water flea <i>Daphnia magna</i>	95.6	Static renewal life-cycle test. 10 daphnids/treatment. Treatments (mean measured) were 0 (neg. control), 0 (solvent control), 0.30, 0.47, 0.81, 1.3, 2.7 and 4.2 mg a.i./L.	21-day LC ₅₀ = 3.5 (2.9-4.3) mg ai./L Slope: 11.065 (3.87 - 18.26) NOAEC (survival): 1.3 mg ai./L. LOAEC (survival): 2.7 mg ai./L. NOAEC (growth): 1.3 mg ai./L. LOAEC (growth): 2.7 mg ai./L. NOAEC (reproduction): 0.81 mg/L LOAEC(reproduction): 1.3 mg/L	45075006	Acceptable

¹ **Bold** value used to calculate risk quotients

Estuarine/Marine Acute Animal Studies

Table 4. Saltwater Animal Toxicity				
Assessment Endpoint	Species	Toxicity Value Used in Risk Assessment	Citation MRID # (Author & Date)	Comments
Marine Fish Acute Direct Toxicity to Delta smelt	Sheepshead minnow <i>Cyprinodon variegattis</i> Longnose killifish <i>Fundulus similis</i>	96-h LC₅₀ = 17 mg a.i./L 96-h LC ₅₀ = >5.0 mg a.i./L	46145903 Blankenship <i>et al.</i> (2003) Meyer (1986)	Acceptable/Slightly Toxic NOAEC = 10 mg a.i./L LOAEC = 18 mg a.i./L (mort. and sublethal effects) Supplemental but scientifically sound.
Marine Fish Chronic Direct Toxicity to Delta smelt	--	No Data Available	Data Gap	--
Saltwater Invertebrate Acute Toxicity Indirect Toxicity to Delta smelt via prey items	Eastern oyster <i>Crassostrea virginica</i> Saltwater	96-h EC ₅₀ = 1.8 mg a.i./L 48-h LC ₅₀ = >20 mg a.i./L 96-h LC ₅₀ = 3.7mg a.i./L	46145901 Blankenship <i>et al.</i> (2003) Meyer (1986) 46145902 Blankenship <i>et al.</i> (2003)	Acceptable/Moderately Toxic NOAEC = <0.34 mg a.i./L LOAEC = 0.72 mg a.i./L (shell deposition) Supplemental/Highly Toxic Acceptable/ Moderately Toxic NOAEC = <2.3 mg a.i./L LOAEC = 2.3 mg a.i./L

Table 4. Saltwater Animal Toxicity				
Assessment Endpoint	Species	Toxicity Value Used in Risk Assessment	Citation MRID # (Author & Date)	Comments
	mysid <i>Americamysis bahia</i> White shrimp <i>Penaeus (Litopenaeus) setiferus</i>	48-h LC₅₀ = 0.6 mg a.i./L 48-h EC ₅₀ = 0.6 mg a.i./L	Meyer (1986) Butler (1965)	(mortality) Supplemental (but scientifically sound)/Highly Toxic Supplemental – not useable for endpoint selection due to lack of supporting data.
Saltwater Invertebrate Chronic Toxicity Indirect Toxicity to Delta smelt via prey items	--	No Data Available	Data Gap	--

Estuarine/Marine Chronic Animal Studies

No saltwater fish or invertebrate chronic studies are available for EPTC. Thus, the potential direct chronic effects (*e.g.*, reproduction, growth) to the DS effects cannot be quantitatively assessed at this time.

Aquatic Plants: Laboratory Data

Table 5 summarizes test results for three non-vascular and one vascular plant toxicity studies for EPTC. Based on the available data, green algae (*P. subcapitata*) is the most sensitive non-vascular plant species, with an EC₅₀ of 1.4 (1.3-1.5) mg a.i./L. The only vascular plant study available identified an EC₅₀ of 5.6 (2.9 - 9.3) mg a.i./L for duckweed.

Table 5. Non-target Aquatic Plant Toxicity					
Species	%A.I.	Study Parameters	Test Results	MRID No.	Study Classification
Green Algae <i>Pseudokirchneriella subcapitata</i>	98.4	96-hour study. Treatments (mean-measured): 0 (neg. control), 0 (solvent control), 0.11, 0.22, 0.41, 0.86, 1.6, 3.3, 7.0, and 13 mg a.i./L	4-day EC₅₀: 1.4 (1.3-1.5) mg a.i./L¹ Probit slope: 10 NOAEC: 0.9 mg a.i./L LOAEC: 1.6 mg a.i./L (based on % inhibition and cell density)	42921202 42899801	Acceptable

Table 5. Non-target Aquatic Plant Toxicity					
Species	%A.I.	Study Parameters	Test Results	MRID No.	Study Classification
Blue-Green Algae <i>Anabaena flos-aquae</i>	98.4	5-day study. Treatments (mean-measured): 0.55, 1.2, 2.3, 4.6, 10, 20, 41, 81 mg a.i./L	5-day EC ₅₀ : 41 mg a.i./L NOAEC: 20 mg a.i./L LOAEC: 41 mg a.i./L (based on cell density)	42883501	Acceptable
Freshwater Diatom <i>Navicula pelliculosa</i>	98.4	96-hour study. Treatments (mean-measured): Solvent control, 0.37, 0.67, 1.4, 2.8, 6.0, 11, 22, and 45 mg/L	4-day EC ₅₀ : 3.9 (3.6 - 4.2) mg a.i./L Probit slope 3.6 NOAEC: 2.8 mg a.i./L LOAEC: 6.0 mg a.i./L (based on % inhibition and cell density)	42921201	Acceptable Supplemental? Check.
Duckweed <i>Lemna gibba</i>	98.4	14-day static renewal study. Treatments (mean-measured):. Control, 0.012, 0.031, 0.092, 0.29, 0.89, 2.9, 9.3, 38.7 mg a.i./L	EC₅₀ (biomass): 5.6 (2.9 - 9.3) mg a.i./L¹ NOAEC (biomass): 0.89 mg a.i./L LOAEC (biomass): 2.9 mg a.i./L EC ₅₀ (frond no.): 6.7 (2.9 - 9.3) mg a.i./L NOAEC (frond no.): 0.29 mg a.i./L LOAEC (frond no.): 0.89 mg a.i./L	43096001	Acceptable

¹ **Bold** values used to calculate risk quotients

Toxicity to Terrestrial Plants

The results of the Tier II seedling emergence and vegetative vigor toxicity tests on non-target plants are summarized below in **Table 6**.

Table 6. Tier II Terrestrial Non-target Plant Toxicity using Eptam7E (88% a.i.)

Species	Seedling Emergence		Endpoint Affected	Vegetative Vigor		Endpoint Affected	MRID No. Author/Year	Study Classification
	EC ₂₅ (lb ai/acre)	NOAEC/[EC ₀₅] ^a		EC ₂₅ (lb ai/acre)	EC ₀₅ (lb ai/acre)			
Monocots								
Corn <i>Zea Mays</i>	>7.4 >7.4	7.4 (HT) ^b 7.4	Seedling emergence Seedling dry weight	>7.4 >3.7 < 7.4 >7.4	>7.4 >3.7 <7.4 0.087	Plant height Dry weight Phytotoxicity	42120802 ^c Farmer & Canning (1991)	Acceptable
Wild oats <i>Avena fatua</i>	>7.4 > 0.23 < 0.92 0.10	7.4 > 0.23 < 0.92 0.017	Seedling emergence Seedling dry weight Phytotoxicity	>7.4 3.5 2.1	>7.4 2.0 0.31	Plant height Dry weight Phytotoxicity	42120802 ^c Farmer & Canning (1991)	Acceptable
Winter wheat <i>Triticum aestivum</i>	---	---	---	>7.4 0.23 0.22	>7.4 0.14 0.087	Plant height Dry weight Phytotoxicity	42120802 ^c Farmer & Canning (1991)	Acceptable
Winter wheat <i>Triticum aestivum</i>	>7.4 0.23 0.18	7.4 ^b 0.14 0.029	Seedling emergence Seedling dry weight Phytotoxicity	2.9 0.22	(NOAEC =0.925) 0.087	Plant height Dry weight Phytotoxicity	43217101 ^c Yearsdon et al. (1994)	Acceptable
Purple nutsedge <i>Cyperus rotundus</i>)	0.27 0.13	0.17 0.07	Seedling emergence Seedling dry weight	>7.4 5.9 7.0	>7.4 3.4 4.8	Plant height Dry weight Phytotoxicity	42120802 ^c Farmer & Canning (1991)	Acceptable
Dicots								
Carrot <i>Daucus carota</i>	>7.4 >7.4	7.4 >0.6<7.4	Seedling emergence Seedling dry weight	>7.4 >0.6 < 7.4 >7.4	>7.4 >0.6 < 7.4 >7.4	Plant height Dry weight Phytotoxicity	43217101 ^c Yearsdon et al. (1994)	Acceptable
Soybean <i>Glycine max</i>	>7.4 1.8	7.4 0.42	Seedling emergence Seedling dry weight	>7.4 4.7 3.0	>7.4 2.2 0.41	Plant height Dry weight Phytotoxicity	42120802 ^c Farmer & Canning (1991)	Acceptable
Sugar beet (<i>Beta vulga</i> *)	>7.4 3.5	>7.4 1.8	Seedling emergence Seedling dry weight	> 7.4 6.7 2.2	> 7.4 2.6	Plant Height Dry Weight Phytotoxicity	42120802 Farmer & Canning (1991)	Acceptable

Table 6. Tier II Terrestrial Non-target Plant Toxicity using Eptam7E (88% a.i.)								
Species	Seedling Emergence		Endpoint Affected	Vegetative Vigor		Endpoint Affected	MRID No. Author/Year	Study Classification
	EC ₂₅ (lb ai/acre)	NOAEC/[EC ₀₅] ^a		EC ₂₅ (lb ai/acre)	EC ₀₅ (lb ai/acre)			
Oilseed rape (<i>Brassica napus</i>)	>7.4 6.2	>7.4 4.0	Seedling emergence Seedling dry weight	> 7.4 > 3.7 > 3.7 > 7.4	> 7.4 < 7.4 < 7.4	Plant Height Dry Weight Phytotoxicity	42120802 Farmer & Canning (1991)	Acceptable
Morning glory (<i>Ipomea hederacea</i>)	>7.4 0.26 1.1	>7.4 0.035 0.23	Seedling emergence Seedling dry weight Phytotoxicity	> 7.4 5.9 13	> 7.4 3.0 1.4	Plant height Dry weight Phytotoxicity	42120802 Farmer & Canning (1991)	Acceptable
Velvet leaf (<i>Abutilon theophrasfz</i>)	>7.4 <3.7 <0.92 0.53	>7.4 >0.92 >0.23 0.17	Seedling emergence Seedling dry weight Phytotoxicity	> 7.4 2.0 7.4	>7.4 0.085 0.023	Plant height Dry weight Phytotoxicity	42120802 Farmer & Canning (1991)	Acceptable

^aIf the NOAEC value is above the EC₂₅, equal to the EC₂₅, or below the lowest concentration, an EC₀₅ value is used instead.

^b HT = Highest tested

^cEPTC emulsifiable liquid formulation (Eptam 7-E) 88% active ingredient.

^d **Bold** values used in risk assessment.

^e – = no data or data invalid

Data From Other Thiocarbamate Herbicide Studies

Data from submitted studies on other thiocarbamate herbicides were surveyed in an attempt to get a representative acute to chronic ratio (ACR) that could be applied to EPTC acute fish data to estimate chronic toxicity of EPTC to fish (**Table 7**). Only one chemical in this group, moninate, had acceptable data from both acute and chronic fish studies using the same species, bluegill sunfish, in this case. The ACR of 4 was used in the risk assessment to help characterize the toxicity of EPTC.

Table 7: Acute/Chronic Fish Toxicity Data from Submitted Studies for other Thiocarbamate Herbicides.				
<u>Thiocarbamate Herbicides</u>	<u>PC Code or CAS Number</u>	<u>Acute Endpoint /MRID</u>	<u>Chronic Endpoint/MRID</u>	<u>Acute to Chronic Ratio, ACR</u>
butylate	041405	BLU 0.21 ppm /40098001	FHM 0.3 ppm / 42214302 (only chronic study – no FHM acute)	NA ¹
cycloate	041301	RBT 4.5 mg a.i./L /00090620	--	--
di-allate	078801	No data in database	--	--
EPTC	041401	--	--	--
esprocarb	CAS 85785-20-2	No data in database	--	--
ethiolate	103701	No data in database	--	--
isopolinate	CAS 3134-70-1	No data in database	--	--
methiobencarb	CAS 18357-78-3	No data in database	--	--
molinate	041402	BLU 21.7 mg a.i./L /41613601	BLU 6.05 mg a.i./L /00258924	4
orbencarb	CAS 34622-58-7	No data in database	--	--
pebulate	041403	BLU 6.3 mg/L /41614805	--	--
prosulfocarb	CAS 52888-80-9	No data in database	--	--
pyributicarb	CAS 88678-67-5	No data in database	--	--
sulfallate	039001	No data in database	--	--
thiobencarb	108401, (also 283500)	No data in database	SHE 0.15ppm/ 00079112	--
tiocarbazil	110701	No data in database	--	--
tri-allate	078802	No data in database	RBT 0.038 ppm/ 44660901	--
vernolate	041404	(red not on G:) No data in database	--	--

¹Chronic higher than acute, species different – ACR not calculated.