APPENDIX C: Ecological Effects Data for Tribufos.

Data from Submitted Studies (yellow highlighted rows indicate the most sensitive endpoint for each taxon considered):

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASSIFICATION	COMMENTS
BIRDS					
ACUTE					
Mallard duck (*Anas platyrhynchos*)	LD_{50} = 871 mg/kg-bw	Technical (92%)	00049258 00120771	Supplemental (does not fulfill guideline requirements)	Submitted for List B review; 8 birds/test group and no food consumption data
Bobwhite quail (*Colinus virginianus*)	LD_{50} = 151 mg/kg-bw (128 – 178)	Technical (92%)	00049258 00120771	Acceptable	None
Bobwhite quail (*Colinus virginianus*)	LC_{50} = 1519 mg/kg-diet	Technical	416188-04	Acceptable	NOAEC = 556 ppm
Mallard duck (*Anas platyrhynchos*)	LC_{50} = >5000 mg/kg-diet	Technical	416188-05	Acceptable	LOAEC = 313; NOAEC – could not be determined
CHRONIC					
Bobwhite quail (*Colinus virginianus*)	NOAEC = 150 mg/kg-diet	Technical	407571-01	Acceptable	Based on egg shell thickness decreased at 280 ppm; reduced egg production and hatchling survival at 410 ppm
MAMMALS					
ACUTE					
Rat	LD_{50} = 192 mg a.i./kg-bw		41954903	Acceptable	None
CHRONIC					
Sprague-Dawley rat	NOAEL = 32 ppm (1.7 mg a.i./kg/day) LOAEL = 260 ppm (15 mg a.i./kg/day)		42040201	Acceptable	Based on significant increase in number of litters with stillborn pups and pup death (including cannibalism) through lactation; decrease in F1 and F2 pup body weights; and significant increase in F1 gestation period
TERRESTRIAL INVERTEBRATES					
Honey bee (*Apis mellifera*)	LD_{50} = >24.17 µg a.i./bee	Variable, mixed with pyrolite dust	00001999 (Atkins and	Supplemental	3% mortality at 24.17 µg a.i./bee

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASSIFICATION	COMMENTS
			Anderson 1967)		
AMPHIBIAN					
Fowlers toad (*Bufo fowleri*)	96-hr LC_{50} = 0.450 mg a.i./L	Technical	M&E	Supplemental	Static
FRESHWATER FISH					
ACUTE					
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.63 mg a.i./L	Technical	416188-06	Acceptable	Flow-through; NOAEC = 0.27 mg a.i./L
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.49 mg a.i./L	Formulated product (DEF® 6) (72.3% a.i.)	416188-07	Acceptable	Flow-through
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.620 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.570 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.520 mg a.i./L	Formulated product (DEF® 6) (72.3% a.i.)	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 1.30 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.740 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.540 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.640 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.640 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.780 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.245 mg a.i./L	Technical	M&E	Supplemental	Static
Bluegill sunfish (*Lepomis macrochirus*)	96-hr LC_{50} = 0.270 mg a.i./L	Technical	M&E	Supplemental	Static
Channel catfish (*Ictalurus punctatus*)	96-hr LC_{50} = 0.350 mg a.i./L	Technical	M&E	Supplemental	Static
Channel catfish (*Ictalurus punctatus*)	96-hr LC_{50} = 1.54 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout	96-hr LC_{50} = 1.7	Technical	416188-	Supplemental	Test

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASSIFICATION	COMMENTS
(*Oncorhynchus mykiss*)	mg a.i./L		08		concentrations varied substantially during the exposure period; no NOAEC – all concentrations demonstrated signs of toxicity
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 0.9 mg a.i./L	Formulated product (DEF® 6) (72.3% a.i.)	416188-09	Unacceptable	Test concentrations varied substantially during the exposure period; and controls were contaminated by test compound; NOAEC = 0.27 mg a.i./L
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 0.66 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.0 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 0.780 mg a.i./L	EC (72% a.i.)	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.7 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.3 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 0.830 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.45 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.0 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 0.750 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.7 mg a.i./L	Technical	M&E	Supplemental	Static
Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 1.8 mg a.i./L	Technical	M&E	Supplemental	Static

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASSIFICATION	COMMENTS
Fathead minnow (*Pimephales promelas*)	LC_{50} = 0.92 mg a.i./L	Technical	458637-06	Acceptable	Flow through; NOAEC = 0.27 mg a.i./L (based on behavioral signs of toxicity at 0.59 mg a.i./L)
CHRONIC					
Fathead minnow (*Pimephales promelas*)	NOAEC = 0.00335 mg a.i./L LOAEC = 0.00838 mg a.i./L	Technical	458637-03	Supplemental	Flow through; based on reduction in post-hatch survival and clinical signs of toxicity; not adequate for RQ calculation [a high level of analytical variation (>20%) was observed in mean results]
Bluegill sunfish (*Lepomis macrochirus*)	NOAEC = 3.5 µg a.i./L (ACR of 69.7 = 0.245/x)	N/A	N/A	N/A	Based on an acute to chronic ratio using sheepshead minnow endpoints [0.767/0.011= 69.7 (ACR)]
ESTUARINE/MARINE FISH					
ACUTE* and *CHRONIC					
Sheepshead minnow (*Cyprinodon variegatus*)	96-hr LC_{50} = 0.767 mg a.i./L	Technical	418963-02	Acceptable	None
Sheepshead minnow (*Cyprinodon variegatus*)	NOAEC = 11 µg a.i./L LOAEC = 19 µg a.i./L	Technical	458637-07	Acceptable	Flow through; based on clinical signs of intoxication, post-hatch survival, and growth
FRESHWATER INVERTEBRATES					
ACUTE					
Daphnid (*Daphnia magna*)	48-hr EC_{50} = 0.11 mg a.i./L	Technical	416899-01	Acceptable	Static test; NOAEC = 0.01 mg a.i./L
Daphnid (*Daphnia magna*)	48-hr EC_{50} = 0.061 mg product/L	Formulated product (DEF® 6) (72.3% a.i.)	416899-02	Acceptable	Static test; NOAEC = 0.015 mg product/L
Daphnid (*Daphnia magna*)	48-hr EC_{50} = 0.0068 mg a.i./L	Technical	M&E	Supplemental	Static
Scud (*Gammarus lacustris*)	48-hr LC_{50} = 0.23 mg/L (210 – 250) 96-hr LC_{50} = 0.10 mg/L (78-	Technical	R2023118	Supplemental	One-pager

TAXON	ENDPOINT	FORMULATION	MRID	STUDY CLASSIFICATION	COMMENTS
	150)				
Scud (*Gammarus fasciatus*)	96-hr EC_{50} = 0.10 mg a.i./L	Technical	M&E	Supplemental	Static
Scud (*Gammarus pseudolimnaeus*)	96-hr EC_{50} = 0.027 mg a.i./L	Technical	M&E	Supplemental	Static
Crayfish (*Orconectes nais*)	96-hr EC_{50} = >5.60 mg a.i./L (over the solubility limit of 2.3 ppm)	Technical	M&E	Supplemental	Static
Stonefly (*Pteronarcys californica*)	96-hr EC_{50} = 2.10 mg a.i./L	Technical	M&E	Supplemental	Static
Midge (*Chironomus plumosus*)	48-hr EC_{50} = 0.040 mg a.i./L	Technical	M&E	Supplemental	Static
CHRONIC					
Daphnid (*Daphnia magna*)	NOAEC = 1.0 µg a.i./L	Technical	416188-10	Unacceptable	Solution measurements were not adequate to establish exposure concentrations; dead daphnids replaced with live ones in one chamber; based on reduced mean length (all daphnids in two highest test concentrations died within 8 days)
Daphnid (*Daphnia magna*)	NOAEC = 1.56 µg a.i./L LOAEC = 3.23 µg a.i./L	Technical	439782-01	Acceptable	Static renewal; based on reduced number of young/adult/day and reduced adult length
ESTUARINE/MARINE INVERTEBRATES					
ACUTE* and *CHRONIC					
Eastern oyster (*Crassostrea virginica*)	EC_{50} = 39.6 µg a.i./L	Technical	420832-01	Acceptable	Flow through shell deposition; NOAEC = 18.6 µg a.i./L
Mysid (*Mysidopsis bahia*)	96-hr LC_{50} = 11.53 µg/L	Technical	418963-01	Acceptable	NOAEC = <1.26 µg/L
Mysid (*Mysidopsis*	NOAEC = 0.26 µg a.i./L	Technical	458637-02	Supplemental	Analytical variation in the

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bahia)	(highest concentration tested, no endpoints affected)				measured test concentrations exceeded 20% among replicate results; but no effects seen at any concentration
PLANTS					
TERRESTRIAL					
Vegetative vigor (Tier II)	Monocot (corn, dry weight): NOAEC = 0.48 lb a.i./acre EC_{25} = 1.8 lb a.i./acre EC_{50} = >2.1 lb a.i./acre Dicot (buckwheat, dry weight): NOAEC = 0.48 lb a.i./acre EC_{25} = 1.3 lb a.i./acre EC_{50} = 1.8 lb a.i./acre	DEF 6 (70.8% a.i.)	458637-04	Acceptable	None
Seedling emergence (Tier II)	Monocot (onion, plant height): NOAEC = 0.45 lb a.i./acre EC_{25} = >2.0 lb a.i./acre EC_{50} = >2.0 lb a.i./acre Dicot (soybean, plant height): NOAEC = 0.22 lb a.i./acre EC_{25} = >2 lb a.i./acre EC_{50} = >2.0 lb a.i./acre	DEF 6 (70.8% a.i.)	458637-04	Acceptable	None
AQUATIC					
Duckweed (*Lemna gibba*)	NOEAC = <0.0172 mg a.i./L EC_{05} = 0.140 mg a.i./L EC_{50} = 1.10 mg a.i./L	Technical	458637-05	Supplemental	Based on reduced frond count; effects were seen at the lowest concentration; test solutions were only renewed on Day 7. The analytical verification on

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					Day 14 indicated that the test material was not stable over a 7 day period.
Algae (*Selenastrum capricornutum*)	EC_{25} = 0.093 mg a.i./L EC_{50} = 0.148 mg a.i./L	Technical	416188-13	Acceptable	Tier II, 7-day test; NOAEC = 0.0585 mg a.i./L
BIOACCUMULATION					
Bluegill sunfish (*Lepomis macrochirus*)	Bioconcentration factors: 300X – edible tissue 1300X – nonedible tissue 730X – whole fish	Technical	41618811	Acceptable	Mean concentration of 6.2 µg/L continuously exposed for 35 days; after 14 days of depuration, 71-88% of residues were eliminated from fish tissues