



**US Environmental Protection Agency
Office of Pesticide Programs**

APPENDIX A ECOLOGICAL EFFECTS DATA

October 18, 2007

Avian Subacute Dietary Toxicity					
Species	% a.i.	5-Day LC50 (ppm a.i.)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow trout (<i>Oncorhynchus mykiss</i>)	92.9	1.1	Moderately to highly toxic	157315 McAllister et al. 1986	Acceptable
Rainbow trout (<i>Oncorhynchus mykiss</i>)	95.0	0.72	Highly toxic	40098001 Mayer and Ellersieck 1986	Supplemental
Bluegill sunfish (<i>Lepomis macrochirus</i>)	95.0	0.81	Highly toxic	40098001 Mayer and Ellersieck 1986	Supplemental

Freshwater Fish, Chronic

A freshwater fish early life-stage test using the TGAI is required for bensulide because (1) the end-use product is expected to be transported to water from the intended use site, (2) aquatic acute fish LC₅₀'s and the Waterflea EC₅₀, are less than 1 mg/l, and (3) the EEC in water is equal to or greater than 0.01 of acute LC₅₀, and EC₅₀ values. A further factor that triggers this test is that bensulide is very persistent in water (hydrolysis half-life is 220 days). The preferred test species is the rainbow trout.

There is one acceptable fish chronic toxicity study available to assess the potential risk to the CRLF (See table below; MRID 447204). This study is an “Early Life-Stage Toxicity Test of the Fathead, *Pimephales promelas*, Under Flow-through Conditions”. The results of the study demonstrate a NOAEC of 0.374 ppm a.i. based on larval growth and survival.

Avian Subacute Dietary Toxicity						
Species	% a.i.	NOAEL	LOAEL	Effect	MRID No. Author/Year	Study Classification
Fathead minnow (<i>Pimephales promelas</i>)	93.4	374 ppb a.i.	789 ppb a.i.	Larval growth and survival	447204-08	Acceptable

Freshwater Invertebrates, Acute

Toxicity to Freshwater Plants

The registrant has submitted two acceptable freshwater plant studies testing the technical grade active ingredient of bensulide. The species tested in these studies include the blue green algae, *Anabaena floss-aquae*, and the green algae, *Selenastrum capricornutum* (MRID 447204-03 and 447204-02 respectively). The endpoint values for the blue green algae study are an EC₅₀ > 3.58 ppm a.i. and a NOAEC of 3.58 ppm a.i. The endpoint values for the green algae study are an EC₅₀ of 1.8 ppm a.i. and an EC₀₅ of 0.93 ppm a.i. The table below provides further details regarding these studies.

Aquatic Plant Toxicity				
Species/Test Type	% a.i.	EC ₅₀ (ppm a.i.)	MRID No. Author/Year	Study Classification
green algae (<i>Anabaena floss-aquae</i>)	93.4	> 3.58 ppm a.i.	447204-03	Acceptable
green algae (<i>Selenastrum capricornutum</i>)	93.4	1.8 ppm a.i.	447204-02	Acceptable

The ECOTOX database list 10 open literature aquatic plant studies testing bensulide toxicity to the green algae species, *Pseudokirchneriella subcapitata*. None these studies produced endpoints any more sensitive than the endpoints produced in the registrant submitted studies. The table below provides further details regarding these studies listed in ECOTOX. The EC₅₀ of 1.8 ppm a.i. and an EC₀₅ of 0.93 ppm a.i produced by the registrant submitted green algae study (MRID 447204-03) will be used to assess the risk of indirect effects to bensulide to the aquatic phase of the CRLF. This endpoint is selected because it is the most sensitive endpoint among all the available aquatic plant toxicity data.

Aquatic Plant toxicity data listed by ECOTOX as acceptable for use in an OPP risk assessment (ECOTOX Reference no. 2478 for all data provided below)

Species	Effect	Measurement	Endpoint	Endpoint (ppm)	Study Duration
Green algae (<i>Pseudokirchneriella subcapitata</i>)	POP	PGRT	EC100	2.8	10 days
Green algae	POP	PGRT	EC100	5.4	10 days

