FORMULATION:	IA	IB	T	FW	EC	R		
% a.i. SC# CHEMICAL NAME JFU 5054 Permethrin (24% emulsifiable concentrate PP557 of PP557)	Validator: R. Balcomb			Date: Oct. 18, 1977				
	Test Type: Acute 96 hr. LC_{50} to Bluegill sunfish							
	Test ID # ES-I							

CITATION: Hill, R.W., Maddock, B.G., Hart, B., and Cornish, S.K. "Determination of the Acute Toxicity of Formulation JFU 5054 to Bluegill Sunfish." ICI Brixham Laboratory Report No. BL/B/1799, May, 1977.

VALIDATION CATEGORY: Supplemental

RESULTS: A. Statistical Data

The acute toxicity of formulation JFU 5054 to the Bluegill sunfish (Leponis macrochirus) was determined at 23°C in freshwater. The following levels were determined:

24 hr. LC_{50} = 0.021 mg/L as JFU 5054
48 hr. LC_{50} = 0.015 mg/L
96 hr. LC_{50} = 0.0108 mg/L

During the 96 hour test period there were no deaths in the four lowest concentrations tested: 0.01, 0.0068, 0.0047, 0.0033 mg/L. No toxic symptoms were observed at, or below, 0.0047 mg/L of JFU 5054 and this was designated the "no effect" level.

The LC_{50} values were determined by direct reading of the geometric mean survival period (GMSP)-toxicant concentration graph. The GMSP was calculated with the formula:

$$GMSP = \exp.\left\{ \sum_{i=1}^{N} N_i \sqrt{(\log_e t_1)^{N_1} \cdot (\log_e t_2)^{N_2} \ldots (\log_e t_N)^{N_N}} \right.$$

where Ni is the number of fish which died at time ti and $\sum_{i=1}^{n} N_i$ is total number of fish used.

The toxicant concentrations in the above analysis were nominal values and not measured concentrations. The measured concentrations were 50 to 82% of the nominal values with the exception of the 0.047 mg/L concentration where the measured level was 126% of the nominal (0.595 mg/L). The experimenters attribute discrepancies to difficulties of extracting an emulsion and to adsorption.

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B. Toxic Symptoms

At the highest concentration level (.047 mg/L) hyperactivity began after five minutes with jaw spasms and hyperactivity becoming severe at 20 minutes elapse time. After 75 minutes the fish darkened in color and the first death was at 90 minutes. At the .033 mg/L and .022 mg/L levels similar observations were made, however, deaths were not recorded under 450 and 735 minutes respectively.

At the 0.0068 mg/L concentration of toxicant, symptoms were observed after 1,440 minutes but no deaths were recorded. No symptoms were observed at the two lowest levels: 0.0047 and 0.003 mg/L.

VALIDATION CATEGORY/RATIONALE: This study was determined supplemental for the following reasons: (1) LC_{50} values are not statistically derived test estimates with 95% confidence limits (also see review of this statistical procedure by N. Cook, 10182-EUP-7, ID # (es) (103.0) (E2) 8/1/77).

(2) Nominal values for the concentration of intoxicant were used in the presented statistical analysis in favor of the available measured values. The measured values would produce lower LC_{50} values. Furthermore, there is so much variability in the measured concentrations at the 0.0068 and 0.010 mg/L nominal concentration levels that it is statistically impossible to distinguish between the means of these values:

Nominal Concentrations	Number Measured Values	$\bar{x}$ conc.	SD	t-test Value
0.0068	5	0.0056	0.0021	+(.05)[8]=2.305
				0.459
0.0010	5	0.0062	0.0024	+(.5)[8]=0.706

Given this kind of experimental variability the accuracy of any derived LC_{50} values is questionable.

CATEGORY REPAIRABILITY/RATIONALE: Not repairable. See item #2 in Validation Category/Rationale.