Data Evaluation Report on the Acute Toxicity of XDE-638 to Common Carp (*Cyprinus carpio*)
PMRA Submission Number {.....} EPA MRID Number 45831009

Data Requirement:	PMRA DATA CODE	
	EPA DP Barcode	D288160
	OECD Data Point	
	EPA MRID	45831009
	EPA Guideline	§72-1

Test material: XDE-638 **Purity:** 97.5%
Common name: Penoxsulam
Chemical name: IUPAC: Not reported
CAS name: 2-(2,2-Difluoroethoxy)-N-(5,8-dimethoxy[1,2,4]triazolo[1,5-C]pyrimidin-2-yl)-6-(trifluoromethyl)benzenesulfonamide
CAS No.: Not reported
Synonyms: None reported

Primary Reviewer: Rebecca Bryan **Signature:** Rebecca Bryan
Staff Scientist, Dynamac Corporation **Date:** 10/17/03

QC Reviewer: Christie E. Padova **Signature:** C E Padova
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Woodyard

Reference/Submission No.:

Company Code:
Active Code:
EPA PC Code: ~~19903T~~
119031

Date Evaluation Completed:

CITATION: Marino, T.A., *et al.* 2001. Revised Report for XDE-638: An Acute Toxicity Study with the Common Carp, *Cyprinus carpio* Linnaeus. Unpublished study performed by Toxicology & Environmental Research and Consulting, The Dow Chemical Company, Midland, MI. Laboratory Study No. 001223R. Study submitted by Dow AgroSciences, LLC, Indianapolis, IN. Study initiated October 3, 2000 and completed February 1, 2001; revised reported completed September 10, 2001.

EXECUTIVE SUMMARY:

In a 96-hour acute toxicity study, juvenile Common Carp (*Cyprinus carpio*) were exposed to XDE-638 (penoxsulam) at nominal concentrations of 0 (negative and solvent controls) and 100 ppm (limit test). Mean-measured concentrations were <10 (LOQ, controls) and 101 ppm a.i.

After 96 hours of exposure, no mortality or sub-lethal effects were observed in any control or test group. The 96-hour LC_{50} was >101 ppm a.i., which categorizes XDE-638 as practically nontoxic to juvenile Common carp (*Cyprinus carpio*) on an acute toxicity basis. The NOAEC and LOAEC were 101 and >101 ppm a.i., respectively.

This study is scientifically sound. However, since the Common Carp is not recognized as an acceptable species for use in an acute toxicity study with freshwater fish (§72-1), this study is classified as SUPPLEMENTAL.

Results Synopsis

Test Organism Size/Age (mean Weight or Length):	Juvenile; 0.868 ± 0.195 g, 32 ± 2 mm (mean of all surviving fish at study termination)
Test Type (Flow-through, Static, Static Renewal):	Static

96-Hour
LC_{50}: >101 ppm a.i.
NOAEC: 101 ppm a.i.
LOAEC: >101 ppm a.i.
Endpoints affected: None

I. MATERIALS AND METHODS

GUIDELINES FOLLOWED: The study protocol was based on procedures outlined in the OECD Guidelines for Testing of Chemicals, No. 203 (1992); and the EEC Method C.1, Acute Toxicity for Fish (1992). Deviations from U.S. EPA guideline §72-1 included:

- The species used in this study was the Common Carp (*Cyprinus carpio*), which is not recognized as an acceptable species for use in the acute toxicity test to freshwater fish.
- The initial weight and length of the fish were not specified.
- The storage conditions of test chemical was not reported.
- The size of the test vessels (12 L with a fill volume of 10 L) was less than required (fill volume of 15-30 L).
- The water hardness (66 mg $CaCO_3$/L) was slightly greater than recommended (40-48 mg $CaCO_3$/L).
- The pH range (6.7-7.5) slightly exceeded recommendations (7.2-7.6).
- The instantaneous biomass loading rate (0.521 g/L) slightly exceeded the maximum limit (≤0.5 g/L) for species maintained at ≥17°C.

These deviations do not affect the validity of the study; however, this study does not fulfill guideline

requirements.

COMPLIANCE: Signed and dated GLP, Confidentiality, and Quality Assurance statements were provided. This study was conducted in accordance with the GLP standards of the OECD, EC, and U.S. EPA.

A. MATERIALS:

1. Test Material XDE-638 (penoxsulam)

Description: Pink powder

Lot No./Batch No. : ND05167938

Purity: 97.5%

Stability of Compound Under Test Conditions: The stability of the test substance in the dilution water during the course of the study was verified by analytical determination at 0 (96.2% of nominal) and 96 hours (105% of nominal; Table 3, p. 21).

Storage conditions of test chemical: Not reported.

OECD requires water solubility, stability in water and light, pK_a, P_{ow}, and vapor pressure of the test compound. OECD requirements were not reported.

2. Test organism:

Species: Common Carp (*Cyprinus carpio* Linnaeus)

Age at test initiation: Juvenile

Weight at test initiation: Not provided; the weight of all surviving fish measured at test termination averaged 0.868 ± 0.195 g

Length at test initiation: Not provided; the length of all surviving fish measured at test termination averaged 32 ± 2 mm

Source: Osage Catfisheries, Inc., Osage Beasch, MO.

B. STUDY DESIGN:

1. Experimental Conditions

a) Range-finding Study: A 4-day static range-finding study was conducted with common carp and XDE-638 at nominal concentrations of 0 (negative and solvent controls) and 100 ppm. The test solution was sonicated for approximately 4 hours to complete dissolution of test material prior to addition of fish. After 96 hours, the LC_{50} was >100 ppm based on biological observations. The

definitive nominal test concentration was determined based on the range-finding results.

b) Definitive Study:

Table 1: Experimental Parameters

Parameter	Details	Remarks / Criteria
Acclimation period: Conditions: (same as test or not) Feeding: Health: (any mortality observed)	At least 14 days prior to testing. Same as test Standard diet once per day except during the 48 hours prior to testing. <5% mortality during the last 48 hours of acclimation.	*EPA requires: minimum 14 days; no feeding during test OECD requires minimum of 12 days.*
Duration of the test	96 hours	*EPA/OECD requires: 96 hours*
Test condition static/flow through Type of dilution system- for flow through method. Renewal rate for static renewal	Static N/A N/A	*EPA: Must provide reproducible supply of toxicant, with a consistent flow rate of 5-10 vol/24 hours, and meter systems calibrated before study and checked twice daily during test period*
Aeration, if any	No aeration during testing.	*EPA requires: no aeration; OECD permits aeration*
Test vessel Material: (glass/stainless steel) Size: Fill volume:	Glass beakers 12 L 10 L	The test vessel size and fill volume were less than required. *EPA requires: Size 19 L (5 gal) or 30 x 60 x 30 cm* *Fill volume: 15-30 L of solution*
Source of dilution water	The dilution water was pumped to the laboratory from the upper Saginaw Bay of Lake Huron. The	

Parameter	Details	Remarks Criteria
		*EPA 1975; Soft reconstituted water or water from a natural source, **not** dechlorinated tap water;* *OECD permits dechlorinated tap water.*
Water parameters: Hardness pH Dissolved oxygen Total Organic Carbon Particulate Matter Metals Pesticides Chlorine Temperature {Salinity for marine or estuarine species} Intervals of water quality measurement	 66 mg $CaCO_3$ /L 6.7-7.5 5.7-10.5 mg/L (≥67%) 2,400 ng/mL <LOD (<1000 ng/mL, total suspended solids) See Table 1, p. 19 <LOD (Table 2, p. 20) 22 ppb 21.8-22.0°C N/A DO, pH, and temperature were determined daily. Temperature was continuously recorded from one test vessel.	The hardness was slightly higher than recommended. The pH range exceeded recommendations. Results from inorganic and organic analysis of the dilution water are provided in Tables 1 and 2, pp. 20-21. ***Hardness and pH*** *EPA requires hardness of 40-48 mg/L as $CaCO_3$ and pH of 7.2-7.6; 8.0-8.3 for marine-stenohaline fishes, 7.7-8.0 for estuarine-euryhaline fishes; monthly range <0.8. OECD allows hardness of 10-250 mg/L as $CaCO_3$ and pH between 6 and 8.5.* ***Dissolved Oxygen*** *Renewal: ≥60% during 1st 48 hrs and ≥ 40% during 2nd 48 hrs* *Flow-through: ≥60% through out test. OECD requires at least 80% saturation value.* ***Temperature*** *EPA requires 12 °C for coldwater species and 17-22 °C for warmwater species. OECD requires range of 21 - 25 °C for bluegill and 13-17 °C for rainbow trout.* ***Salinity*** *30-34 ‰ (parts per thousand) salinity, weekly range < 6 ‰* ***EPA water quality*** *measured at beginning of test and every 48 hours*
Concentration of test material: nominal:	0 (negative and solvent controls) and 100 ppm	This study was conducted as a limit test, demonstrating that the acute toxicity to the common carp exceeds 100 ppm.

Parameter	Details	Remarks Criteria
measured:	<10 (LOQ, negative and solvent controls) and 101 ppm a.i.	Mean-measured concentrations are provided in Table 3, p. 21. *EPA/OECD requires: Control and five treatment levels. Each conc. should be 60% of the next highest conc., and should be in a geometric series*
Solvent (type, percentage, if used)	N,N,-dimethyl formamide (DMF), 0.1 mL/L	*EPA requires: Not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests; OECD requires solvent, exceed 100 mg/L.*
Number of fish/replicates: negative control: solvent control: treated:	 30 fish, divided into 6 replicates containing 5 fish each 30 fish, divided into 6 replicates containing 5 fish each 30 fish, divided into 6 replicates containing 5 fish each	*EPA: ≥10/concentration; OECD requires at least 7 fish/concentration*
Biomass loading rate	0.521 g fish/L	*Static: ≤0.8 g/L at ≤17°C, ≤0.5 g/L at >17°C; flow-through: ≤1 g/L/day; OECD requires maximum of 1 g fish/L for static and semi-static with higher rates accepted for flow-through*
Lighting	16-hours light/8-hours dark.	*EPA requires: 16 hours light/8 hours dark); OECD requires 12 -16 hours photoperiod.*
Feeding	Animals were not fed during testing.	*EPA/OECD requires: No feeding during the study*
Recovery of chemical Level of Quantitation Level of Detection	96.2-105% of nominal 10 mg/L Not reported.	Recoveries are based on test solutions analyzed on days 0 and 4 (Table 3, p. 21).

Parameter	Details	Remarks Criteria
Positive control {if used, indicate the chemical and concentrations}	N/A	
Other parameters, if any	N/A	

2. Observations:

Table 2: Observations

Criteria	Details	Remarks/Criteria
Parameters measured including the sublethal effects/toxicity symptoms	Mortality and sub-lethal effects	
Observation intervals	24, 48, 72 and 96 hours of exposure	 *EPA/OECD requires: minimally every 24 hours*
Were raw data included?	Yes, sufficient	
Other observations, if any	N/A	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

After 96 hours of exposure, no mortality were observed in controls or 101 ppm a.i. treatment group.

Table 3: Effect of XDE-638 on mortality of Common Carp (*Cyprinus carpio*).

Treatment, ppm a.i. measured and (nominal conc.)	No. of fish at start of study	0-24 Hours		48-72 Hours		96 Hours	
		No Dead	% mortality	No Dead	% mortality	No Dead	% mortality
Negative control	30	0	0	0	0	0	0
Solvent control	30	0	0	0	0	0	0
101 (100)	30	0	0	0	0	0	0
NOAEC (mortality)	101 ppm a.i.						
LC_{50} (95% C.I.)	>101 ppm a.i.						
Positive control, if used mortality: LC_{50}:	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B. NON-LETHAL TOXICITY ENDPOINTS:

During the 96-hour study, no sub-lethal effects were observed in controls or 101 ppm a.i. treatment group.

C. REPORTED STATISTICS:

The 96-hour LC_{50}, NOAEC, and LOAEC values were visually determined, based on observed mortality data.

96-Hour
LC_{50}: >101 ppm a.i.
NOAEC: 101 ppm a.i.
LOAEC: >101 ppm a.i.
Endpoints affected: None

D. VERIFICATION OF STATISTICAL RESULTS:

The 96-hour LC_{50}, NOAEC, and LOAEC for mortality and sub-lethal effects could be determined visually.

96-Hour
LC_{50}: >101 ppm a.i.
NOAEC: 101 ppm a.i.
LOAEC: >101 ppm a.i.
Endpoints affected: None

E. STUDY DEFICIENCIES:

This study is scientifically valid. However, since this study was conducted using the Common Carp (*Cyprinus carpio*), this study does not fulfill guideline requirements for an acute toxicity study with a freshwater fish (§72-1).

F. REVIEWER'S COMMENTS:

The reviewer's conclusions were identical to the study authors.

G. CONCLUSIONS:

This study is scientifically sound. However, since the Common Carp (*Cyprinus carpio*) were used as the test species, this study does not satisfy the guideline requirements for an acute toxicity study with freshwater fish (§72-1). This study is classified as SUPPLEMENTAL. The LC_{50} was >101 ppm a.i., XDE-638 (penoxsulam) as practically nontoxic to juvenile Common Carp (*Cyprinus carpio*) on an acute toxicity basis. The NOAEC (for mortality and sub-lethal effects) was 101 ppm a.i.

96-Hour
LC_{50}: >101 ppm a.i.
NOAEC: 101 ppm a.i.
LOAEC: >101 ppm a.i.
Endpoints affected: None

III. REFERENCES:

Organisation for Economic Cooperation and Development (OECD). OECD Guidelines for Testing of Chemicals. Method 203, "Fish, Acute Toxicity Test", ISBN 92-64-12221-4. Adopted July, 1992.

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