

ACUTE TOXICITIES OF ORGANIC CHEMICALS TO FATHEAD

MINNOWS (PIMEPHALES PROMELAS)

VOLUME V

by

Center for Lake Superior Environmental Studies

University of Wisconsin-Superior

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PREFACE

Throughout history, the success of scientific endeavors has depended upon the faith and perseverance of a vision. Scientific programs are founded upon an idea from one or more individuals and it is the quality of leadership that determines each program's success.

Dr. Gilman Veith has been the guiding force of the quantitative structure-activity relationship (QSAR) program at the Environmental Research Laboratory-Duluth (ERL-D) of the U.S. Environmental Protection Agency (EPA) for the past fifteen years. The program was established at the laboratory in 1975, with toxicity testing beginning one to two years later. During the fifteen years that Dr. Veith has acted as the QSAR program manager, he has received numerous awards and honors for his work. In 1977, EPA presented him with a silver medal for superior service in recognition of his "contribution to the mission of environmental improvement." He also received three EPA Scientific and Technological Achievement Awards for outstanding research publications. In 1990, at an awards ceremony in Washington, D.C., Dr. Veith was granted a gold medal for "outstanding technical leadership and scientific vision in developing QSAR for conducting risk assessment of toxic chemicals."

Since his arrival at ERL-D in 1972, Dr. Veith has authored or co-authored over 30 peer-reviewed journal publications and has participated as the project officer for an additional four publications. His prolific writing skills also helped produce 16 reports and several book chapters dealing with environmental issues. Dr. Veith's scientific expertise has been recognized worldwide as evidenced by his rapport with environmental scientists from Russia, Germany, Japan, Italy, Norway, the Netherlands and Switzerland.

It is only appropriate that we, the editors and contributors of these

several volumes, dedicate this volume to Dr. Gilman Veith in acknowledgment of his unwavering leadership in this effort and for his commitment toward improving our environment.

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C2H8N2	10	Ethylenediamine	43
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C3H4O	5	Acrolein (Test 2)	47
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C6H15NO3	10	Triethanolamine	137
C6H20Cl4	14	2,3,4,6-Tetrachlorophenol	139
C7H3Cl2NO	9	3,5-Dichloro-4-hydroxybenzotrile	141
C7H3I2NO	9	3,5-Diiodo-4-hydroxybenzotrile	143
C7H4F3NO3	14	3-Trifluoromethyl-4-nitrophenol	145
C7H5NO3	5	4-Nitrobenzaldehyde	147
C7H5NS	16	Benzothiazole	149
C7H6N2O4	13	2,4-Dinitrotoluene	151
C7H7NO2	16	Salicylaldoxime	153
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C7H8O	14	o-Cresol	157
C7H8O	14	Cresol (Mixed)	159
C7H9N	10	Benzylamine	161
C7H9N	15	2-Ethylpyridine	163
C7H9N	10	N-Methylaniline	165
C7H9N	10	4-Toluidine (Test 2)	167
C7H10N2	15	2-(2-Aminoethyl)pyridine	169

EMPIRICAL FORMULA	CODE	CHEMICAL	PAGE
C7H10N2	10	2,4-Diaminotoluene	171
C7H12O4	7	3,3-Dimethylglutaric Acid (Static)	173
C7H13N3O3S	21	Oxamyl	175
C7H14N2O2S	21	Aldicarb	177
C8H8	13	Styrene	179
C8H10	13	Ethylbenzene (Test 2)	181
C8H10	13	o-Xylene (Test 1)	183
C8H10	13	o-Xylene (Test 2)	185
C8H10	13	m-Xylene	187
C8H10	13	Xylene, Mixed	189
C8H18O	4	1-Octanol (Test 5)	191
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C8H19O3PS2	22	Demeton	195
C8H20Sn	24	Tetraethyltin	197
C9H7N	15	Quinoline	199
C9H9N	15	3-Methylindole	201
C9H10O2	8	Ethyl Benzoate	203
C9H11NO	6	4'-Aminopropiophenone	205
C9H12O	14	2,3,6-Trimethylphenol	207
C9H12O	14	2,4,6-Trimethylphenol	209
C9H14O	6	Isophorone	211
C9H21N	10	Nonylamine	213
C9H21O2PS3	22	Terbufos	215
C10H10O2	6	1-Benzoylacetone	217

EMPIRICAL FORMULA	CODE	CHEMICAL	PAGE
C10H1004	8	Dimethyl Phthalate	219
C10H12N3O3PS2	22	Azinphos-methyl	221
C10H14O	3	Butyl Phenyl Ether	223
C10H16	1	(R)-(+)-Limonene	225
C10H16O	6	(1S)-(-)-Camphor	227
C10H24N4	15	1,4-Bis(3-aminopropyl)piperazine	229
C11H16N2O2	21	Aminocarb	231
C11H25N	10	Undecylamine	233
C12H8Cl2OS	12	4-Chlorophenyl Sulfoxide	235
C12H10OS	12	Phenyl Sulfoxide	237
C12H11N	10	Diphenylamine	239
C12H15NO3	21	Carbofuran	241
C12H20O4	8	Dibutyl Fumarate (Test 4)	243
C12H22	1	Dicyclohexyl	245
C12H27N	10	Dodecylamine	247
C13H19N3O4	22	Flucythrinate	249
C13H29N	10	Tridecylamine	251
C14H14NO4PS	22	O-Ethyl-O(p-nitrophenylphenyl)phosphonothioate	253
C14H14OS	12	Benzyl Sulfoxide	255
C16H36Sn	24	Tetrabutyltin	257
C18H30O	14	2,4,6-Tri-tert-butylphenol	259
C19H12O6	8	Dicumarol	261
C20H26N4O4S	23	Nicotine Sulfate (Test 2)	263
C21H22N2O2·1/2- (H2SO4)	22	Strychnine Hemisulphate Salt	265

<u>EMPIRICAL FORMULA</u>	<u>CODE</u>	<u>CHEMICAL</u>	<u>PAGE</u>
C22H25O3	22	Resmethrin	267
C23H22O6	22	Rotenone (Test 2)	269
C24H20Sn	24	Tetraphenyltin	271
C24H38O4	8	Diethyl Phthalate	273
C24H54OSn2	24	Bis(tributyltin) Oxide	275
C25H22O3ClN	22	Fenvalerate (Test 2)	277
NaN3	11	Sodium Azide	279

INTRODUCTION

The completion of this fifth volume of Acute Toxicities of Organic Chemicals to Fathead Minnows (Pimephales promelas) marks a milestone for our QSAR research program. The five volumes contain original data from 777 acute toxicity tests using 651 different chemicals and encompassing 12 years of effort.

In April, 1989, a new data file called ATOC (Acute Toxicity of Organic Chemicals) was added to the AQUIRE (Aquatic Information Retrieval) data base currently available on-line to government agencies. The ATOC file contains test data on 525 of the 651 chemicals contained in volumes I-V of Acute Toxicities of Organic Chemicals to Fathead Minnows (Pimephales promelas). Other supplemental information has been added to the data base in the past two years and is reflected in the present volume.

Individual tests from volumes I-V were reanalyzed for 24-, 48- and 72-hr LC50s (concentrations causing 50% mortality of the fish) and EC50s (concentrations causing 50% of the fish to show an adverse effect). The results are recorded in Appendix C. Another component of the QSAR research program at ERL-D has been the study of behavioral toxicity syndromes. Of the chemicals contained in volumes I-V, 309 were evaluated using behavioral and morphological signs of stress which occurred during acute toxicity testing (Drummond and Russom 1990). The goal of that study was to classify chemicals according to general mode of action, and the chemicals used are listed in Appendix A. Cumulative appendices containing molecular formulas, CAS numbers and chemical names have been updated and are reported herein (Appendices A and B).

Fathead minnow acute toxicity testing conducted at ERL-D and the

University of Wisconsin-Superior has slowed somewhat in the last couple of years due to changing emphases in research. Emphasis has shifted towards early-life stage tests and the use of the medaka (Oryzias latipes) as a test organism. Volume V of the toxicity data base series incorporates all additional fathead minnow acute toxicity test data to date. It is anticipated that the future volumes will be published less frequently because the number of chemicals tested each year will decline. Although the level of fathead minnow acute toxicity testing has changed, the commitment of supplying the scientific community with high quality data will remain steadfast.

METHODS

Test Chemicals

Test chemicals were obtained from various suppliers (Table 1). For all but 11 compounds, purities ranged from 95-99+%. Purities for each compound are included on the toxicity test summary sheets.

Analytical Techniques

One of three techniques was used to analyze toxicants in water samples from fish exposure tanks during each test: gas-liquid chromatography (GLC), high performance liquid chromatography (HPLC), and UV-visible spectrophotometry.

Gas-liquid chromatographic analyses were either performed by direct aqueous injection or by solvent extraction and subsequent analysis. Compounds analyzed by direct aqueous injection either followed the method described by Knuth and Høglund (1984) or were chromatographed using a wide bore capillary column. Compounds analyzed after solvent extraction were chromatographed on

Table 1. Name and Address of Suppliers of Test Chemicals

<u>Name</u>	<u>Address</u>
Aldrich Chemical Co.	940 W. St. Paul Ave., Milwaukee, WI 53233
Alfred Bader Library of Rare Chemicals; Division of Aldrich Chemical Co.	940 W. St. Paul Ave., Milwaukee, WI 53233
American Cyanamid Co. Organic Chemicals Division	1-T Cyanamid Plaza, Wayne, NJ 07470
J.T. Baker Chemical Co.	223 Red School Lane, Dept. LB-TR Phillipsburg, NJ 08865
Burdick and Jackson Laboratories, Inc.	1953 S. Harvey St., Muskegon, MI 49442
Chem Service, Inc.	660 Tower LA, P. O. Box 3108 West Chester, PA 19381-3108
Dow Chemical Co.	2020-T Willard H. Dow Center Midland, MI 48674
Eastman Kodak Co.	343 State St., Rochester, NY 14650
Fairfield American Corp.	238 Wilson Ave., Newark, NJ 07105
Foxboro Co.	Bristol Park, Foxboro, MA 02035
Lancaster Synthesis Ltd.	P. O. Box 1000, Industrial Drive Windham, NH 03087
MCB Manufacturing Chemists, Inc.; Division of EM Industries, Inc.	2909 Highland Ave., Cincinnati, OH 45212
Mobay Chemical Corp.	Mobay Rd., Pittsburgh, PA 15205
Pfaltz and Bauer, Inc.	172 East Aurora St., Waterbury, CT 06708
Shell Development Co.	One Shell Plaza, Houston, TX 77002
Sigma Chemical Co.	P. O. Box 14508, St. Louis, MO 63178

various packed columns, wide bore capillary or capillary columns using flame ionization, electron capture or nitrogen-phosphorous detection. Standards of extracted compounds were prepared in methylene chloride, pentane, hexane or octane.

High performance liquid chromatography was accomplished using a C₁₈ type column and various combinations of a methanol-water, acetonitrile-water or an acidified water phase in combination with methanol or acetonitrile. Standards were prepared in distilled water from stock solutions prepared in methanol or acetonitrile.

All compound analyses included one spike and one duplicate sample for every 6 to 12 water samples (exception: no duplicates for flucythrinate). Calibration curves for each compound were established by linear regression of 3 to 5 standards. For GLC and HPLC analyses, peak areas were used.

Water Quality

Five water quality parameters routinely measured for each test included: water temperature, dissolved oxygen, total hardness, total alkalinity and pH. Water temperature for all tests was determined using a partial immersion mercury thermometer. Measurements were made in each exposure chamber daily where fish survived, and in the case of 15 tests, duplicate tanks were also measured. Temperature measurements for 17 tests were taken sporadically using a partial immersion mercury thermometer. Eleven of the 17 tests were part of a simultaneous multiple species testing project which utilized a continuous chart recorder for monitoring water temperature (Holcombe et al., 1987). Four of the 17 tests were part of a study measuring toxicity of pentachlorophenol at different pH values. The desired test temperature was 25 ± 1.0 C with a measured grand mean value of 23.9 ± 2.3 C (n=127) for all tests. The extreme

range of mean test temperatures was 16.6 to 26.5 C. Eleven tests were completed in 17.4 ± 0.7 C dilution water for the accommodation of multiple test species.

For the majority of tests, dissolved oxygen was determined for all treatment and control chambers during a 96-hr test if surviving fish existed in the chambers. The number of treatments varied from one to five. Dissolved oxygen measurements for 20 tests were taken on a minimum of one complete set of duplicate tanks (6) at least once and often twice during each test. For six tests, oxygen concentrations were measured irregularly at the beginning and/or end of the exposure period. These measurements were generally taken from a high, medium, low and control exposure chamber. Determinations were made with an oxygen sensitive electrode (Yellow Springs Instrument, Yellow Springs, OH 45387, Model 54 polarograph) which was calibrated weekly using the azide modification of the Winkler Method (APHA, 1980). Test mean concentrations were usually between 60 and 100 percent of saturation. In five tests certain tanks had measured concentrations exceeding saturation (101-112%) and in four tests certain tanks were below 60 percent saturation (41-53%) on some days. Test results were not considered to have been adversely impacted by these high or low values and are included in the data base.

Total hardness and total alkalinity measurements were made on the control (except in those tests completed with the single-cell toxicity screening system where only one exposure chamber existed) and generally one or more treatment chambers. The chambers were sampled once during the exposure duration. Alkalinity values varied with some tests due to the addition of NaOH or HCl to the stock solution for increased solubility of the toxicant. The compleximetric or EDTA (ethylenediaminetetraacetic acid) method (APHA, 1980) was used to determine hardness, while alkalinity was determined by

potentiometric titration (APHA, 1980).

For approximately 28 toxicity tests, hydrogen ion concentration (pH) was measured once in the control and in one to five of the treatment tanks. In the majority of tests, measurements were taken daily in either one or five treatment and control chambers depending upon fish survival. pH measurements were continually monitored in four tests conducted with pentachlorophenol, designed to compare the relationship between toxicity and test pH (Spehar et al., 1985). Tests were conducted at pH levels of 6.5, 7.5, 8.0 and 8.5. The test water was monitored with a Corning Model 12 pH meter and a recorder. pH measurements for the remaining tests contained in this volume were made with a meter, calibrated prior to each test. Hydrogen ion concentrations varied in those tests where NaOH or HCl was used to adjust the stock solutions. The reported mean pH value is the arithmetic mean of pH measurements, not the mean of the hydrogen ion concentration.

The majority of tests were conducted at the U.S. EPA Environmental Research Laboratory in Duluth, MN with the remainder completed at the University of Wisconsin-Superior campus in Superior, WI. Most of the tests conducted in Duluth used Lake Superior water which was filtered through sand and/or a cotton fiber filter. A few tests used unfiltered Lake Superior water and in one test, the water was sterilized with ultraviolet light prior to diluter entry. Tests completed at the University of Wisconsin-Superior campus used dechlorinated water from the City of Superior, WI. The two waters were similar in all measured chemical parameters (Table 2).

Test Fish

Fathead minnows used in the tests were cultured at the U.S. EPA Environmental Research Laboratory-Duluth and the University of Wisconsin-

TABLE 2. Comparison of Certain Chemical Parameters in Dechlorinated City of Superior, WI Water Used for Tests Conducted at the UW-Superior Campus and Water Used for Tests Conducted at U.S. EPA ERL-Duluth, Duluth, MN

Parameter	Dechlorinated Laboratory Water+	Lake Superior Water++
pH	6.5-7.8	7.4-8.2
Total Hardness*	41.3-58.6	44.0-53.0
Chloride*	3.6-4.1	1.2-1.3
Specific Conductance**	91-138	78-86
Total Non-Filterable Residue*	-	<1
Sodium*	1.6-1.8	1.1-1.2
Calcium*	12.9-14.6	13.0-14.7
Magnesium*	3.1-3.3	2.9-3.6
Potassium*	0.52-0.53	0.48-0.59
Aluminum***	0.60-1.9	1-26
Cadmium***	<0.1	<0.1
Chromium***	<0.1	2-20
Cobalt***	<0.5	<0.5
Copper***	2.0-6.0	0.3-3.2
Iron***	160-194	2-83
Lead***	<0.1	7-20
Manganese***	6.6-7.8	0.2-11.5
Nickel***	<1.0-1.3	<0.5
Zinc***	2.2-3.0	1.0-2.7

* Values in mg/L

** Values in umhos/cm

*** Values in ug/L

+ Data from UW-Superior

++ Data from Biesinger and Christensen (1972) except for specific conductance and total non-filterable residue which were measured by UW-Superior.

Superior campus. The laboratories used identical culturing methods. Adults were held at 25 C in flowing water with a controlled photoperiod of 16-hr light. They were fed frozen adult brine shrimp (Artemia sp.). Culture chambers were provided with asbestos or plastic pipes (cut in half longitudinally) as spawning substrates, to which the naturally spawned and fertilized embryos became attached to the undersides. The substrates, with intact embryos, were then transferred into another 25 C bath where hatching occurred, or the substrates were removed just prior to hatching, then placed in a rearing bath. Larvae were fed 40- to 48-hr old brine shrimp nauplii (Bio-Marine Research, Inc., Hawthorne, CA or San Francisco Bay Brand, Inc., Newark, CA) in excess two times daily (once daily on weekends).

Fish that were 27-74 days old were used in the toxicity tests, with most of the older fish used in the simultaneous multiple species testing project. Only groups of fish having healthy appearance and no history of unusual thermal exposure or abnormally high mortality rate were used for toxicant exposure. Test fish were not fed 24 hr before or during a test.

Prior to initiating a test, prospective test fish were pooled if reared in more than one tank. At the start of a test, individuals were removed from the common pool of fish with a net and distributed at random among the exposure chambers. The number of organisms exposed at each concentration in the simultaneous multiple species testing project varied. The numbers ranged from 20-40 fish per treatment depending upon organism availability. The majority of tests were initiated by adding 20, 10 or 5 fish per treatment and control for the mini, electronic and single-cell toxicity screening systems, respectively (see Exposure Apparatus for description). Three static tests were conducted in which 5 fish were added per treatment. For several tests utilizing duplicate tanks, the number of fish added per tank ranged from 5-25

(10-50 per treatment). Fish loading did not exceed $0.5 \text{ g}\cdot\text{L}^{-1}\cdot\text{day}^{-1}$ at any time in the flow-through test systems or the two static-renewal tests. Fish loading was approximately $2.0 \text{ g}\cdot\text{L}^{-1}$ in a static test with 3,3-dimethylglutaric acid.

Death was the major test endpoint. The number of dead fish was noted approximately every 24 hr after the beginning of a test, at which time they were also removed. For chemicals that were part of the simultaneous multiple species testing or pentachlorophenol pH studies, only general behavioral changes were noted when they occurred. Therefore, an EC50 value was not calculable based upon this data. In the majority of tests, observations of fish behavior and toxic signs were made at 2-8, 24, 48, 72 and 96 hr except when a chemical was tested using the single-cell toxicity screening system. Due to the small test chambers of the single-cell toxicity screening system and the electronic diluter, general behavioral changes were difficult to observe and, therefore, were not always recorded. In the remaining tests reported herein, changes in behavior and body morphology are briefly outlined in the remarks section. Some toxicants caused no noticeable behavioral response prior to death, and a few were not toxic at any concentration tested. For these chemicals, exposure concentrations near water solubility were attempted.

These observations (Table 3) were recorded on a checklist (Figure 1) specifically designed for acute bioassays using the fathead minnow. The checklist was formatted to convert observational data into a numerically coded form. These data were subsequently analyzed for behavioral and morphological changes to classify chemicals into various groups. Forty different signs of stress in fathead minnows were evaluated earlier for their usefulness as indices for classifying chemicals. Of these, relatively few were determined

TABLE 3. Definitions of Coded Behavior and Toxic Signs Used in the Checklist

-
- 10 (Loss of Equilibrium)
11. Loss occurs without other signs of stress - Fish appear normal until losing equilibrium. Roll over easily - no control. Death usually not imminent.
12. Loss with other signs of stress - Fish show other signs (hyperactive, swim upside down, etc) of stress either before, or after, losing equilibrium. Stress usually evident for some time before death occurs.
- 20 (General Activity)
21. Hyperactive - Fish appear hyperexcitable, may dart around tank with great intensity without any apparent provocation (stimuli). Other descriptions include: irritated; erratic or wild swimming movements; agitated swimming; swimming hurriedly; frenzied swimming.
22. Hypoactive - Lethargic; swimming slower than normal; slowed reactions; quiescent; nearly motionless.
23. Agonistic behavior - Aggressive, combative interaction between individuals; chasing/biting/nipping sequences evident.
- 30 (Locomotor Activity)
31. Tail-up swimming - Vertical swimming movements; fish may appear to be "dancing on their heads" along the tank bottom (vertical includes tilted).
32. Tail-down swimming - Vertical swimming movements; fish more inclined to stay near surface; may gulp air at surface.
33. 'Corkscrew' swimming - Swimming in circles along a horizontal plane; fish appear to be revolving around a central point or moving spirally about an axis.
34. 'Spiral' swimming - Corkscrew swimming except that the fish are moving vertically, either from top to bottom or vice-versa.
35. Interrupted swimming - Normal swimming movements or rest periods punctuated by periods of strenuous swimming; hyperactive periods; bursts of activity are not necessarily due to outside stimuli; spontaneous.
36. Uninterrupted swimming - Sustained swimming over long periods of time (hyperactive category also may apply).

TABLE 3 (Cont). Definitions of Coded Behavior and Toxic Signs Used in the Checklist

-
- 40 (Schooling Behavior)
41. Loose, random school - Fish not as tightly grouped as controls or completely scattered throughout tank; no evidence of schooling.
- 50 (Location in Tank)
51. Located near surface - Most fish located near water surface.
52. Located near bottom - Most fish located near bottom of tank.
- 60 (Startle Response)
Response of fish to either a visual stimulus (shadow of hand passing over tank) or vibrational stimulus (rapping end of tank with a knuckle).
61. Overreactive - Fish appear extremely frightened and either crowd very closely together or exhibit a strong fright/flight reaction.
62. Narcotized, Anesthetized - Unreactive; comatose; little or no response to outside stimuli.
- 70 (Body Movements)
71. Increase in respiration - Increase in ventilation/opercular rate per unit of time.
72. Increase in cough rate (Gill purge) - Increase in the frequency of coughing (sudden interruptions during the ventilation process).
73. Increase in fin movement - One example would be an increase in what are descriptively called "tail propeller" movements. 'Fin flickering' - rapid raising and lowering or extension/retraction of fins is another example.
74. Convulsive movements - Sudden violent shaking; head or body spasms; jerky, shudder movements that occur intermittently.
75. Abnormal opercular activity - Opercular rate is irregular, erratic, or opercula appear to flutter. Any exotic deviation.
76. Tetany, paralysis - Musculature rigid, morbid state; muscle contraction may last for 24 hours or more; or may occur intermittently. Complete or partial loss of voluntary motion; loss of muscle coordination; loss may be associated with vertebral damage as evidenced by hemorrhage in the spinal area.

TABLE 3 (Cont). Definitions of Coded Behavior and Toxic Signs Used in the Checklist

80 (Body Pigmentation)

81. Color lighter than normal - Body pigmentation absent or nearly absent; color of skin appears light.
82. Color darker than normal - Body heavily pigmented; skin appears much darker than usual.
83. Tail section darker only - Posterior end of fish darker than the anterior section.

90 (Body of Live Fish)

91. Edema - Bodies of both alive and dead fish appear distended or bloated. Body splits under extreme expansion.
92. Shedding mucus - Extreme amounts of mucus evident stringing from gills or body; losing mucus coating abnormally fast.
93. Abnormal gills - Opercula flared and/or color of gills is abnormal.
95. Hemorrhagic - Bleeding (cutaneous or subcutaneous) evident around fins, gills, eyes, kidney area, anus, etc.
96. Scoliosis, lordosis - Lateral curvature of the spine, crooked backbone. (Curvature of the spine forward, backbone bent - tail may appear bent upward, includes kyphosis.)
98. Synarthrosis - Jaws locked in open position; jointed together; an immovable articulation.

BEHAVIORAL CODE

- 10 Loss of Equilibrium
 - 11 - loss w/o other signs of stress
 - 12 - loss with other stresses
- 20 General Activity
 - 21 - hyperactive
 - 22 - hypoactive
 - 23 - agonistic behavior
- 30 Locomotor Activity
 - 31 - tail-up swimming
 - 32 - tail-down swimming
 - 33 - 'corkscrew' swimming
 - 34 - 'spiral' swimming
 - 35 - interrupted swimming
 - 36 - uninterrupted swimming
- 40 Schooling Behavior
 - 41 - loose, random school
- 50 Location in Tank
 - 51 - located near surface
 - 52 - located near bottom
- 60 Startle Response
 - 61 - overreactive
 - 62 - narcotized, anesthetized
- 70 Body Movements
 - 71 - increase in respiration
 - 72 - increase in cough rate
 - 73 - increase in fin movement
 - 74 - convulsive movements
 - 75 - abnormal opercular activity
 - 76 - tetany, paralysis
- 80 Body Pigmentation
 - 81 - color lighter than normal
 - 82 - color darker than normal
 - 83 - tail section darker only

GENERAL PATHOLOGY

- 90 Body of Live Fish
 - 91 - edema
 - 92 - shedding mucus
 - 93 - abnormal gills
 - 95 - hemorrhagic
 - 96 - scoliosis, lordosis
 - 98 - synarthrosis

UNIQUE OBSERVATIONS

- 100 New Terminology
 - 101 -
 - 102 -
 - 103 -
 - 104 -

FISH BEHAVIOR CHECKLIST

Compound: _____ Test Date _____

Observer(s): _____

Fish Species: _____

<u>Initial Response*</u>	<u>Behavioral Code Numbers</u>	<u># Alive</u>
Conc.	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
<u>24 Hours</u>		
Conc.	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
<u>48 Hours</u>		
Conc.	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
<u>72 Hours</u>		
Conc.	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
<u>96 Hours</u>		
Conc.	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	
	_____ mg/l	

*Initial response characterizing the first 0-8 hours of exposure

Figure 1. Numerical behavioral code and checklist used for systematically recording effect observations.

to be important for future consideration (Drummond et al., 1986). In a recent study (Drummond and Russom, 1990), chemicals were categorized according to three mode-of-action response syndromes: hypoactivity, hyperactivity and physical deformity syndrome (Table 4). Definitions for these three syndromes are as follows:

Table 4. Mode of action response syndromes used to categorize chemicals to which fathead minnows (Pimephales promelas) were exposed.

Syndrome	Major signs of acute toxicity
Hypoactivity syndrome (Hypo-AS)	Spontaneous locomotor activity is depressed; hypoactive. Little or no response to outside stimuli (loss of startle response). Opercular rate rapid and shallow. Body coloration usually very dark (blackish). No unusual change in body morphology other than possible mild abdominal edema or tetany (assumed to be reversible). Most fish die within 24 h.
Hyperactivity syndrome (Hyper-AS)	Spontaneous locomotor activity accelerated; hyperactive. Fish usually overreactive to outside stimuli (extremely hyperactive fish, however, do not respond to outside stimuli). Increase in both the rate and amplitude of opercular movements. Body coloration tends to darken to a tan/brown color. Severe abdominal edema usually evident. Most fish die within 24 h but mortality often continues for several more days. Fish sometimes "just die" and exhibit very few signs of stress.
Physical deformity syndrome (Physical-DS)	Spontaneous locomotor activity is usually depressed. Fish usually overreactive to outside stimuli. Some chemicals may elicit increased locomotor activity or an underreactive response to stimuli. Increase in both rate and amplitude of opercular movements. Body coloration usually darker than normal. As the exposure progresses, there is a high incidence of convulsions, spasms, tetany, scoliosis/lordosis and hemorrhage in the vertebral area. Pattern of response is characterized by numerous signs of stress. Most fish die within 24-96 h. Mortality pattern appears to be time-concentration dependent, i.e., additional mortalities would be expected at lower concentrations if the exposure continued.

From: Drummond & Russom 1990.

Upon test termination, subsamples of control fish were counted, placed into plastic freezer containers and weighed en masse for those tests that comprised the simultaneous multiple species testing project and for one test that was completed with a pesticide. The average weight of the individual fish was calculated by dividing the number of fish into the total sample weight. Individual lengths were not recorded. For the majority of tests, individual control fish were weighed (wet weight) and measured (standard length).

Exposure Apparatus

Exposure of fish to chemicals was done either in a static, renewal or flow-through system. A static exposure was conducted with 3,3-dimethylglutaric acid and renewal exposures were conducted with two compounds (N,N-diethylacetamide and L-arabinose) due to limited quantities of the chemicals. Exposures were completed in 2-L battery jars or a 500-mL beaker, containing 1.5 L (N,N-diethylacetamide and L-arabinose) and 250 mL (3,3-dimethylglutaric acid) of test water, respectively. Test solutions were renewed at 48 hr for N,N-diethylacetamide and L-arabinose and measured at 0, 24, 48, 72 and 96 hr. An analytical method for measuring the concentrations of 3,3-dimethylglutaric acid was not developed; therefore, nominal values were used.

Flow-through exposures were made with several types of systems. A modified 2-L cycling proportional diluter (Mount and Brungs, 1967) with a dilution factor of 0.5 was used for the simultaneous multiple species testing project, with duplicate tanks for each concentration. A test with hexanal also utilized a cycling proportional diluter and duplicate tanks; however, the dilution factor was changed to 0.6. Fifteen chemicals tested at the UW-

Superior facility were conducted with a modified continuously proportioning mini-diluter (Benoit et al., 1982). For six of the tests, the toxicant was diluted by a factor of 0.60-0.65 and the flow booster and self-siphoning, flow-splitting cells were removed such that the proportionally diluted stock solution fed directly into non-duplicated test tanks. In nine tests, the toxicant was diluted by a factor of 0.50 and was split between duplicate tanks. A series of chemicals tested between 1981-1982 utilized the continuous flow mini-diluter system with the exception of using one chamber per treatment instead of four.

The remainder and majority of flow-through tests utilized one of the following three systems: a continuous-flow modified mini-diluter (Benoit et al., 1982), an ABC (Analytical Bio-Chemistry Laboratories, Inc., Model #65201) solenoid-operated electronic diluter or a single-cell toxicity screening system. Exposures were not duplicated.

The modified mini-diluters were of two types: high-flow and low-flow. The majority of the mini-diluters had a 0.65 dilution factor; however, three tests were run at 0.80. The high-flow diluters had a flow rate from the toxicant dilution cell of 63 mL·min⁻¹ with a flow to each test chamber of 25 mL·min⁻¹; while the low-flow diluter had a flow rate from the toxicant dilution cell of 29 mL·min⁻¹ with a flow to each test chamber of 10 mL·min⁻¹. The high- and low-flow systems had 18 and 14.4 volume additions·day⁻¹, respectively. The low-flow systems were used for costly and relatively insoluble chemicals.

The electronic diluter was a self-contained unit consisting of six covered 475 mL pyrex storage dishes (Corning #3250) serving as test chambers. The toxicant concentrations were 100, 80, 60, 40 and 20 percent of the toxicant stock. In cases where test chemical quantities were limited, toxicant concentrations were condensed to 100, 66 and 33 percent of the

toxicant stock. Each chamber received 5 or 7 mL·min⁻¹ of test solution into a 250 mL test volume, providing 40 or more volume additions·day⁻¹. The electronic diluter was used for expensive and volatile chemicals or when acute toxicity was very close to water solubility. Biodegradable chemicals were also tested in this system since it could be easily sterilized, preventing bacterial growth.

The single-cell toxicity screening system (David L. DeFoe, personal communication), was used only for solid chemicals of low solubility which did not kill fish in a static test. A glass U-shaped column was prepared as a "water solution equilibrators" by packing chemical-coated glass wool into the column. The chemical, which had been dissolved in acetone, was applied to the glass wool and the acetone was evaporated. Following a 24-hr flushing period, the water from the column was used for testing. A constant concentration of toxicant was maintained. The "solution equilibrated" toxicant was delivered to a 475 mL pyrex storage dish where analytical measurements were made for five consecutive days. If the five test fish showed no signs of stress during 96 hr of exposure, the chemical was considered "nontoxic" and no further testing was conducted. A control chamber was not used in conjunction with the treatment.

Test chemicals were prepared for proportional dilution by one of the following methods: undiluted stock, diluted stock, emulsified stock, liquid-liquid equilibrators, liquid-solid equilibrators and a glass wool column equilibrators. Undiluted stocks were pumped directly from the commercial source. Diluted stocks were prepared in 18.9 L stainless steel carbonation vessels or 19 L glass bottles. Lake Superior water plus the liquid or solid toxicant were added to the vessels and stirred or blended vigorously. Emulsified stocks were prepared for four chemicals using a blender system.

Predetermined portions of the emulsions were added to the mixing cell during each diluter cycle causing the emulsions to be below the maximum solubility for each chemical after mixing in the diluter. Approximately 21 tests were conducted with some form of a liquid-liquid or liquid-solid equilibrators. In most cases, 2.8-L culture flasks atop magnetic stirrers were used. A pump forced lake water into this closed system which contained a layer of the chemical. This type of solution equilibrators was used with liquid chemicals of varying specific gravities. A form of a liquid-solid equilibrators was used for the chemical flucythrinate (Spehar et al., 1983). The equilibrators consisted of a 2.8-L glass (Pyrex) flask filled with dilution water and 300 g of sand (containing ~2% flucythrinate) connected to a reservoir filled with 11 L of water. A concentration of ~5 ug/L of flucythrinate was maintained by recirculating the solution through this flask and reservoir. The remaining solid chemicals of limited water solubility were placed on a glass wool column as previously described.

When the pH of the stock was outside of the 7 to 8 range, the pH was adjusted to approximately that of Lake Superior water (pH 7.7) with either NaOH or concentrated HCl. Three solvent carriers (acetone, methanol and dimethylformamide) were individually used for five of the tests, facilitating the dissolution of toxicants in water.

Data Analysis

The estimated LC50 (concentration causing 50% mortality of the fish) and EC50 (concentration causing 50% of the fish to show an adverse effect) with corresponding 95% confidence intervals were calculated using the corrected average of the analyzed tank concentrations and the Trimmed Spearman-Kärber Method (Hamilton et al., 1977). In cases of duplicate exposures, data were

pooled to obtain a single estimate of LC50 and EC50 per test. The EC50s are based upon loss of equilibrium as manifested by the fish's inability to maintain an upright position when swimming. Calculations were made for 96 hr of exposure and also for intermediate exposure times. The mean toxicant concentrations used in the calculations were corrected for analytical recoveries of spiked water samples. Some LC50 data may vary slightly from previously published literature due to the inclusion of a spike recovery factor in this volume.

Confidence limits could not be calculated under the following conditions: lack of monotonically increasing deaths or effects with exposure concentrations, no complete (100%) effect concentration, no unaffected (0%) concentration and no concentration with a partial (>0 and <100%) effect.

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TOXICITY TEST SUMMARY EXPLANATION

<u>Field</u>	Explanation
[1]	Chemical name in IUPAC or common form. A statement within parentheses indicates if test has been repeated.
[2]	Starting date of chemical exposure.
[3]	Chemical Abstracts Service Registry Number without hyphens. Some numbers were unavailable (unavail.).
[4]	Empirical formula of the chemical.
[5]	Molecular weight of chemical.
[6]	Source of chemical tested.
[7]	Purity of chemical tested. Either stated by source or measured analytically. Some purities were unavailable (unavail.).
[8]	Analytical instrumentation used to measure chemical concentrations.
[9]	Chemical concentration before dilution and/or method of generating stock solution.
[10]	Test organism used for exposure.
[11]	Age of organism at start of exposure.
[12]	Grand mean of the exposure temperature and pooled standard deviation value in parentheses.
[13]	Volume of toxicant solution in exposure chamber.
[14]	Grand mean of the dissolved oxygen and pooled standard deviation value in parentheses.
[15]	Chamber volumes added per day.
[16]	Mean total hardness value and standard deviation in parentheses.
[17]	Mean arithmetic pH value and standard deviation in parentheses.
[18]	Mean total alkalinity value and standard deviation in parentheses.
[19]	Nominal toxicant concentration of chambers.
[20]	Date of test chamber sampling for chemical analysis.
[21]	Analytically determined toxicant concentration in given chamber.
[22]	Mean concentration of chamber from above column.
[23]	Mean concentration corrected for percent recovery.
[24]	Mean percent recovery for toxicant analytical method, standard deviation in parentheses and the number of samples taken.
[25]	Mean standard length of control fish at test termination.
[26]	Standard deviation of mean standard length above.
[27]	Loading value of test chamber, based on mean wet weight/tank volume/24-hr period.
[28]	Mean wet weight of control fish at test termination.
[29]	Standard deviation of mean wet weight above.
[30]	Additional observations on test animal behavior and appearance or information pertaining to the chemical exposure.
[31]	The initial number of organisms in each exposure chamber.
[32]	The elapsed time from the start of exposure to the observation.
[33]	Number of organisms observed dead.
[34]	Trimmed Spearman-Kärber 96 hr LC50 or EC50 value. Some values were not determined (not det.) or not calculable (not cal.).
[35]	95% confidence limits ([lower value]-[upper value]) for LC50 and EC50 estimates.
[36]	Number of organisms observed exhibiting behavioral effects, described in remarks [30], includes death as an effect.
[37]	Plots of LC50 and EC50 concentration (circle) and confidence limits (bars) with time of exposure.

CHEMICAL: _____ [1] _____ TEST DATE: __ [2] __

CAS NUMBER: ___ [3] ___ MF: _____ [4] _____ MWT: ___ [5] ___
CHEMICAL SOURCE: _____ [6] _____ PURITY: ___ [7] ___

METHOD OF CHEMICAL ANALYSIS: _____ [8] _____

TOXICANT STOCK: _____ [9] _____
ORGANISM: _____ [10] _____ AGE: ___ [11] ___

***** TEST CONDITIONS *****

TEMPERATURE (C) : [12] (___) TANK VOLUME (L) : ___ [13] ___
DISSOLVED OXYGEN (MG/L) : [14] (___) ADDITIONS (V/D) : ___ [15] ___
HARDNESS (MG/L CaCO3) : [16] (___) PH : ___ [17] ___ (___)
ALKALINITY (MG/L CaCO3) : [18] (___)

***** TOXICANT CONCENTRATIONS (UG/L) *****

DATE CONTROL A B C D E
NOMINAL: _____ [19] _____

_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
___ [20] ___	_____	_____	_____	_____	___ [21] ___	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

AVERAGE: _____ [22] _____

COR AVE: _____ [23] _____
PERCENT RECOVERY ___ [24] ___

***** FISH SIZES *****

MEAN LENGTH(mm) : ___ [25] ___ MEAN WEIGHT(G) : ___ [28] ___
SD LENGTH(mm) : ___ [26] ___ SD WEIGHT(G) : ___ [29] ___
LOADING (G/L/D) : ___ [27] ___

***** REMARKS *****

_____ [30] _____

TOXICITY TEST SUMMARIES

CHEMICAL: Carbon Tetrachloride

TEST DATE: 09/08/87

CAS NUMBER: 56235

MF: CCl4

MWT: 153.82

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 500 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 21.7 (0.14)	TANK VOLUME (L)	: 1.8
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.43)	ADDITIONS (V/D)	: 12.8
HARDNESS (MG/L CaCO3)	: 49.2 (1.10)	PH	: 6.8 (0.06)
ALKALINITY (MG/L CaCO3)	: 39.6 (0.40)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	10	20	39	78	156
09/08/87	<1.6 <1.6	9.27 9.61	11.9 15.1	20.0 28.3	42.3 33.2	76.8 74.0
09/09/87	<1.6	8.64	14.6	31.2	39.2	85.4
09/10/87	<1.6 <1.6	8.29 7.95	12.5 14.7	19.8 24.1	44.6 33.2	
09/11/87	<1.6	7.19	11.8	20.2		
09/12/87	<1.6 <1.6	7.62 8.37	10.9 11.9	20.0 27.7	30.4	
AVERAGE:	<1.60 <1.60	8.09 8.64	11.8 14.1	20.0 27.8	43.5 34.0	76.8 79.7
COR AVE:	<1.70 <1.70	8.62 9.20	12.5 15.0	21.3 29.6	46.3 36.2	81.8 84.9
PERCENT RECOVERY	93.9	(12.3)	N=4			

FISH SIZES

MEAN LENGTH (mm) : 17.4
SD LENGTH (mm) : 3.134

MEAN WEIGHT (G) : 0.098
SD WEIGHT (G) : 0.0486
LOADING (G/L/D) : 0.0425

REMARKS

Affected fish lost equilibrium prior to death. Measured concentrations were lower than nominal concentrations due to volatility.

CHEMICAL: Chloroform

TEST DATE: 04/06/87

CAS NUMBER: 67663

MF: CHCl₃

MWT: 119.38

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 275 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.3 (0.22)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.18)	ADDITIONS (V/D)	: 40.4
HARDNESS (MG/L CaCO ₃)	: 44.6 (0.48)	PH	: 7.6 (0.09)
ALKALINITY (MG/L CaCO ₃)	: 43.9 (0.30)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	56.6	113	170	226	283
04/06/87	<5.0	58.6	101	126	198	234
04/07/87	<5.0	62.5	90.5	121	202	248
04/08/87	<5.0	59.2	101	142	212	256
04/09/87	<5.0	54.2	86.2	123	183	214
04/10/87	<5.0	45.0	83.2	116	180	213
AVERAGE:	<5.00	55.9	92.4	126	195	233
COR AVE:	<5.10	57.0	94.2	128	199	238
PERCENT RECOVERY	98.1	(4.5)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.9	MEAN WEIGHT (G)	: 0.095
SD LENGTH (mm)	: 3.281	SD WEIGHT (G)	: 0.0553
		LOADING (G/L/D)	: 0.0941

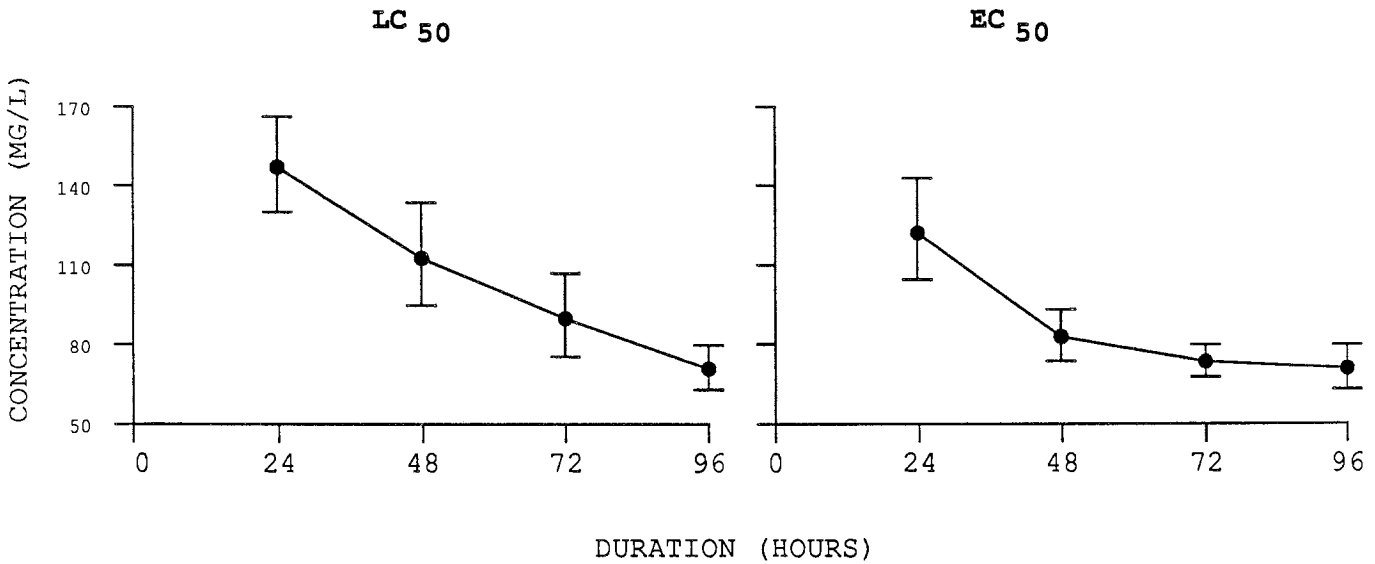
REMARKS

Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. The test fish were hyperactive, darkly colored and they lost equilibrium prior to death.

Chloroform

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	10	10	10	10	10	10	* * * * *
24				3	9	10	* (MG/L) *
48		4	5	10	10	10	* 96 HR LC50: 70.7 *
72	1	5	9	10	10	10	* CONF. LIM: *
96	2	9	10	10	10	10	* (62.8-79.6) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	10	10	10	10	10	10	* * * * *
24		2	5	10	10	10	* (MG/L) *
48		7	10	10	10	10	* 96 HR EC50: 70.7 *
72	1	9	10	10	10	10	* CONF. LIM: *
96	2	9	10	10	10	10	* (62.8-79.6) *
							* * * * *



CHEMICAL: Formaldehyde

TEST DATE: 08/17/87

CAS NUMBER: 50000

MF: CH2O

MWT: 30.03

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 90%

METHOD OF CHEMICAL ANALYSIS: UV-visible Spectrophotometry

TOXICANT STOCK: 8500 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 21.7 (0.31)	TANK VOLUME (L)	: 2.8
DISSOLVED OXYGEN (MG/L)	: 7.4 (1.10)	ADDITIONS (V/D)	: 8.2
HARDNESS (MG/L CaCO3)	: 50.8 (2.06)	PH	: 6.8 (0.02)
ALKALINITY (MG/L CaCO3)	: 37.0 (3.35)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.75	7.50	15.0	30.0	60.0
08/17/87	0.12 0.07	4.32 4.53	9.18 8.92	17.4 19.2	29.8 34.8	58.4 56.3
08/18/87	0.10	4.74	8.96	19.7	35.0	66.0
08/19/87	<.04 <.04	5.09 5.30	9.74 9.89	20.0 19.2	31.9 35.0	54.5 53.4
08/20/87	0.05	3.90	7.39	16.1	32.0	49.9
08/21/87	<.04 <.04	3.85 3.93	6.43 6.40	14.0 15.3	25.3	50.9
AVERAGE:	<0.07 <0.05	4.50 4.42	8.58 8.15	17.8 17.5	30.5 33.9	57.5 53.2
COR AVE:	<0.08 <0.05	4.73 4.64	9.02 8.57	18.7 18.3	32.1 35.7	60.4 55.9
PERCENT RECOVERY	95.1	(5.6)	N=6			

FISH SIZES

MEAN LENGTH (mm) :	17.3	MEAN WEIGHT (G) :	0.074
SD LENGTH (mm) :	2.627	SD WEIGHT (G) :	0.0369
		LOADING (G/L/D) :	0.0322

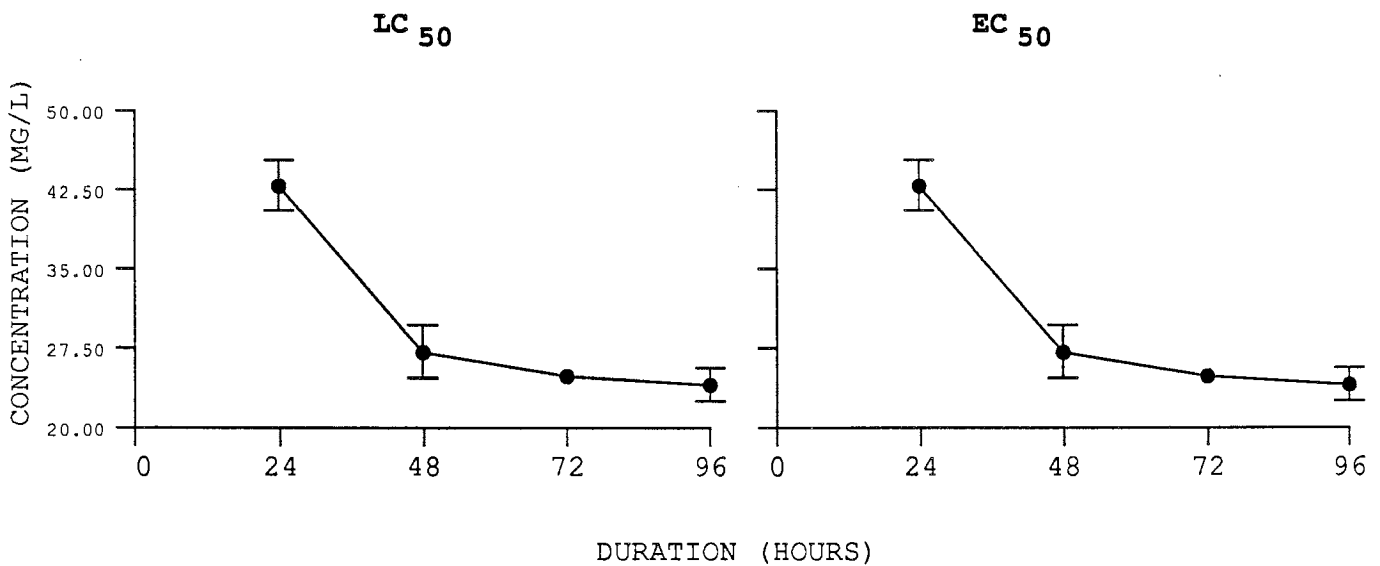
REMARKS

The stock solution was prepared from an excess of para-formaldehyde which decomposed and formed formaldehyde gas. The gas was bubbled through water for 50 min and the resulting solution was filtered then adjusted to the desired concentration. Behavioral observations were not recorded.

Formaldehyde

***** MORTALITIES *****											***** RESULTS *****											
HOUR	CON	A	B	C	D	E																
INITIAL	10	10	10	10	10	10	10	10	10	10	10	* * * * *										
24									1	10	10	* * * * *										
48								7	10	10	10	* (MG/L) *										
72								10	10	10	10	* * * * *										
96				1				10	10	10	10	* 96 HR LC50: 24.1 *										
												* * * * *										
												* CONF. LIM: *										
												* (22.6-25.7) *										
												* * * * *										

***** EFFECT *****											***** RESULTS *****												
HOUR	CON	A	B	C	D	E																	
INITIAL	10	10	10	10	10	10	10	10	10	10	10	* * * * *											
24										1	10	10	* * * * *										
48								7	10	10	10	* (MG/L) *											
72								10	10	10	10	* * * * *											
96				1				10	10	10	10	* 96 HR EC50: 24.1 *											
												* * * * *											
												* CONF. LIM: *											
												* (22.6-25.7) *											
												* * * * *											



CHEMICAL: Ethanal (Test 2)

TEST DATE: 04/06/87

CAS NUMBER: 75070

MF: C2H4O

MWT: 44.05

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 6000 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 27-33 D

TEST CONDITIONS

TEMPERATURE (C)	: 21.6 (0.19)	TANK VOLUME (L)	: 3.8
DISSOLVED OXYGEN (MG/L)	: 7.5 (0.55)	ADDITIONS (V/D)	: 15.4
HARDNESS (MG/L CaCO3)	: 46.6 (0.82)	PH	: 7.1 (0.05)
ALKALINITY (MG/L CaCO3)	: 40.5 (1.29)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	9.4	18.8	37.5	75.0	150
04/06/87	<1.6 <1.6	9.3 9.0	13.4 14.2	19.2 19.5	30.1 30.0	88.5 94.6
04/07/87	<1.6	9.4	16.9	18.5	33.3	97.0
04/08/87	<1.6 <1.6	5.2 5.6	9.2 10.3	15.0 15.7	25.5 25.2	91.8 88.9
04/09/87	<1.6	5.8	9.4	15.9	27.2	97.0
04/10/87	<1.6 <1.6	5.9 6.0	12.0 9.6	16.0 15.9	26.7 26.4	89.2 87.8
AVERAGE:	<1.60 <1.60	7.45 6.60	12.9 10.9	17.2 16.8	28.9 27.2	91.6 92.1
COR AVE:	<1.54 <1.54	7.18 6.36	12.4 10.5	16.6 16.2	27.9 26.2	88.4 88.8
PERCENT RECOVERY	103.7 (6.3)	N=5				

FISH SIZES

MEAN LENGTH (mm)	: 17.5	MEAN WEIGHT (G)	: 0.078
SD LENGTH (mm)	: 2.014	SD WEIGHT (G)	: 0.0264
		LOADING (G/L/D)	: 0.0133

REMARKS

Affected fish lost schooling behavior, had abnormally red gills, were hemorrhaging and lost equilibrium prior to death. Measured concentrations were lower than nominal concentrations due to volatility.

CHEMICAL: Acetaldoxime

TEST DATE: 08/22/88

CAS NUMBER: 107299

MF: C2H5NO

MWT: 59.07

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 95%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 889 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (0.21)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.35)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.6 (0.35)	PH	: 7.4 (0.06)
ALKALINITY (MG/L CaCO ₃)	: 39.2 (0.47)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	30.5	46.9	72.2	111	171
08/22/88				62.4	90.5	149
08/23/88	<2.0	39.1	49.9	72.6	102	157
08/24/88	<2.0	38.4	47.3	67.5	104	157
08/25/88	<2.0	35.8	46.8	65.6	102	161
08/26/88	<2.0	33.0	51.1	71.8	125	188
AVERAGE:	<2.00	36.6	48.8	68.0	105	162
COR AVE:	<2.04	37.3	49.7	69.3	107	166
PERCENT RECOVERY	98.1	(4.2)	N=5			

FISH SIZES

MEAN LENGTH (mm):	17.1	MEAN WEIGHT (G):	0.071
SD LENGTH (mm):	2.059	SD WEIGHT (G):	0.0326
		LOADING (G/L/D):	0.0394

REMARKS

Affected fish lost schooling behavior, swam near the tank surface, had increased respiration and were darkly colored. They also showed signs of edema and hemorrhaging. Equilibrium loss was observed prior to death. The 0-hr data from tanks A and B were not used because the concentrations were too low for the standard curve of 8/22/88 and could not be calculated.

Acetaldoxime

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1			12	
48		1		8	20	
72		1	2	16	20	
96		1	8	18	20	

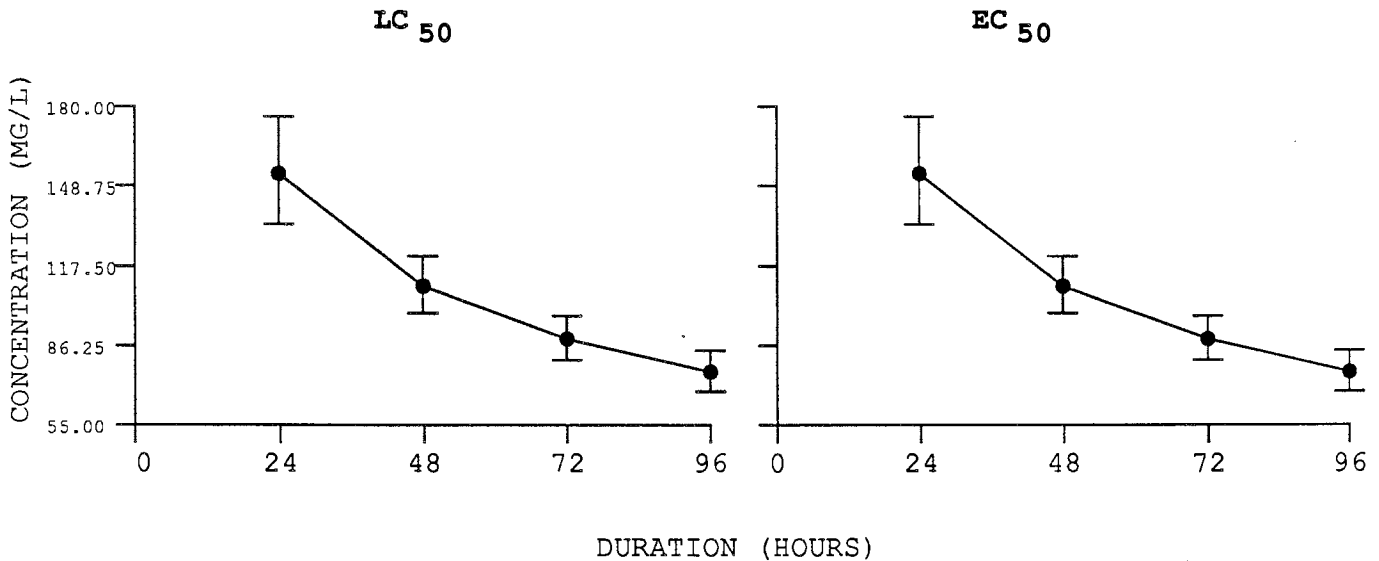
RESULTS

 (MG/L)
 96 HR LC50: 76.0
 CONF. LIM:
 (68.3-84.5)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1			12	
48		1		8	20	
72		1	2	16	20	
96		1	8	18	20	

 (MG/L)
 96 HR EC50: 76.0
 CONF. LIM:
 (68.3-84.5)



CHEMICAL: Methyl Sulfoxide

TEST DATE: 06/29/87

CAS NUMBER: 67685

MF: C2H6OS

MWT: 78.13

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 59.1 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.9 (0.34)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.16)	ADDITIONS (V/D)	: 40
HARDNESS (MG/L CaCO ₃)	: 44.3 (0.56)	PH	: 7.4 (0.08)
ALKALINITY (MG/L CaCO ₃)	: 46.2 (0.75)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	11.4	22.8	34.1	45.5	56.9
06/29/87		8.33	13.8	23.6	26.9	55.6
06/30/87		9.58	21.4	28.5	46.1	56.3
07/01/87		7.30	22.7	28.3	44.6	56.7
07/02/87		9.12	23.4	27.8	46.5	60.1
07/03/87		10.2	20.3	27.8	45.2	54.3
AVERAGE: <		8.91	20.3	27.2	41.9	56.6
COR AVE: <0.00		8.97	20.5	27.4	42.2	57.0
PERCENT RECOVERY	99.3	(7.3)	N=8			

FISH SIZES

MEAN LENGTH (mm) : 15.8
SD LENGTH (mm) : 3.259

MEAN WEIGHT (G) : 0.062
SD WEIGHT (G) : 0.0493
LOADING (G/L/D) : 0.0620

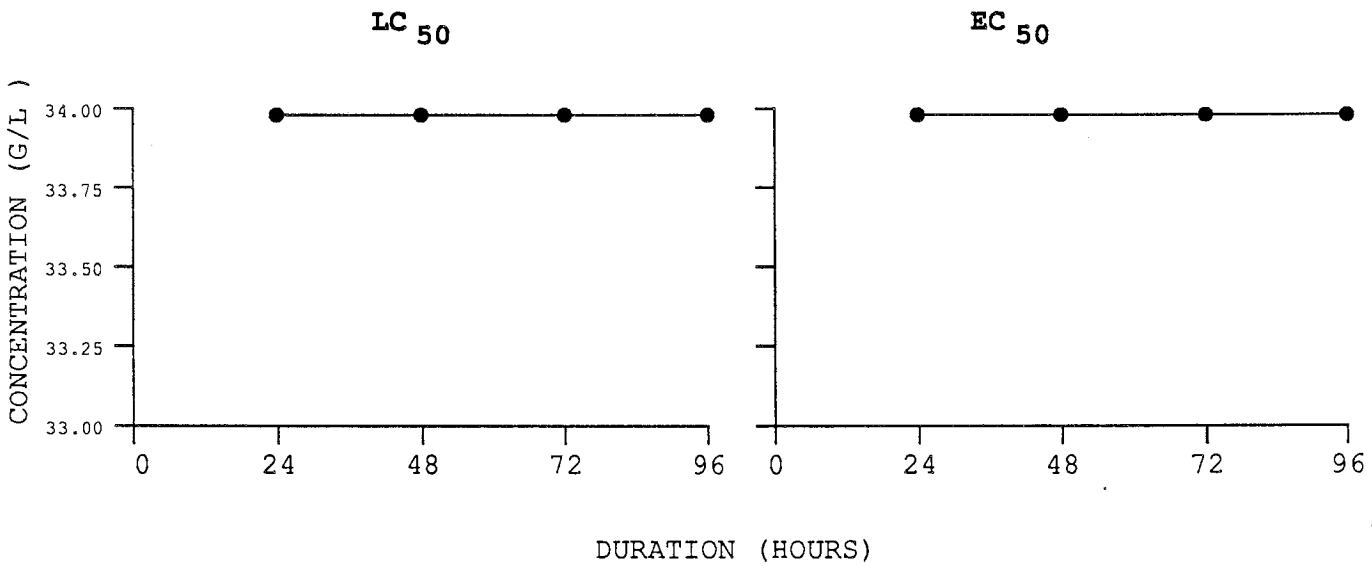
REMARKS

Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. Behavioral data were not recorded. Control tank concentrations were < 0.001 g/l.

Methyl Sulfoxide

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	10	10	10	10	10	10	* * * * *	* * * * *
24				10	10		*	*
48				10	10		*	(G/L)
72				10	10		*	
96				10	10		*	96 HR LC50: 34.0
							*	
							*	
							*	CONF. LIM:
							*	(NOT REL.)
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	10	10	10	10	10	10	* * * * *	* * * * *
24				10	10		*	*
48				10	10		*	(G/L)
72				10	10		*	
96				10	10		*	96 HR EC50: 34.0
							*	
							*	
							*	CONF. LIM:
							*	(NOT REL.)
							*	
							*	
							*	
							*	
							*	



CHEMICAL: 2-Aminoethanol

TEST DATE: 10/14/86

CAS NUMBER: 141435

MF: C2H7NO

MWT: 61.08

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 34.7 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.6 (0.42)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.16)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 44.3 (0.24)	PH	: 7.9 (0.04)
ALKALINITY (MG/L CaCO ₃)	: 44.6 (1.25)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1220	1880	2890	4440	6830
10/14/86	<2.0	680	973	2430	3490	5860
10/15/86	<2.0	477	903	2270	3260	4770
10/16/86	<2.0	690	1240	2310	4190	7820
10/17/86	<2.0	312	992	1760	2600	4100
10/18/86						
AVERAGE:	<2.00	540	1027	2193	3385	5638
COR AVE:	<1.99	537	1023	2183	3371	5613
PERCENT RECOVERY		100.43 (11.5)	N=9			

FISH SIZES

MEAN LENGTH (mm)	: 18.3	MEAN WEIGHT (G)	: 0.090
SD LENGTH (mm)	: 1.809	SD WEIGHT (G)	: 0.0247
		LOADING (G/L/D)	: 0.0500

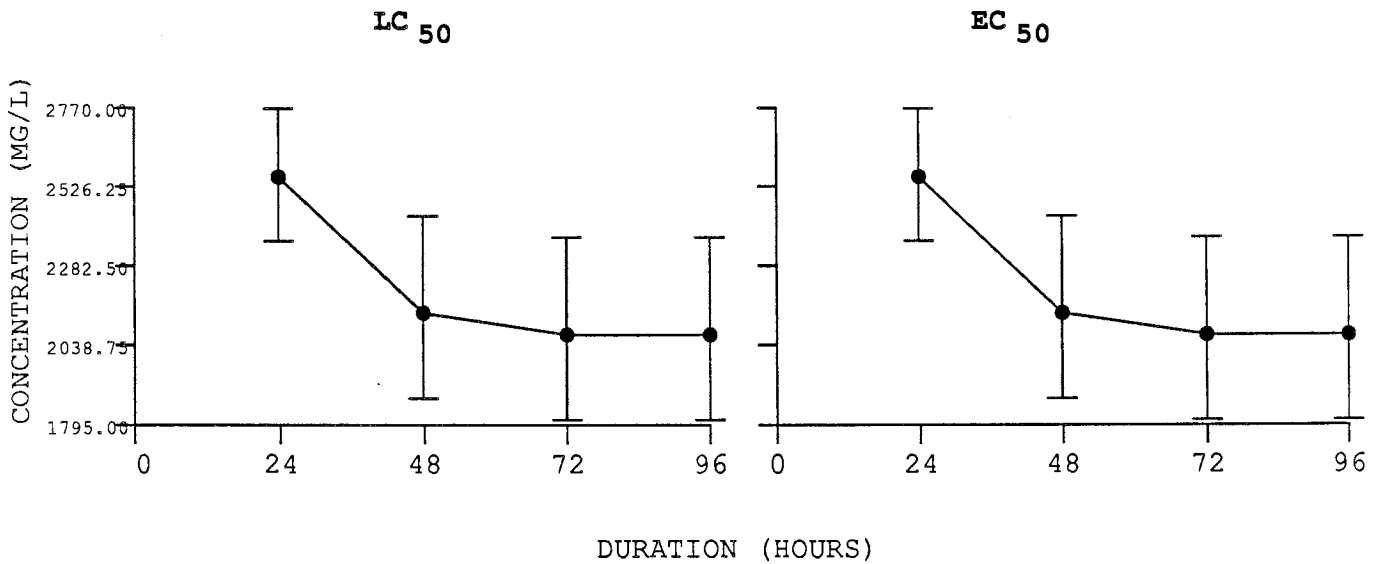
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, and swam near the tank surface. Equilibrium loss was not observed prior to death. Samples were not taken at 96 hr for determination of toxicant concentrations. The pH of the stock solution was adjusted to that of lake water using HCl. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

2-Aminoethanol

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				2	20	20	*	*
48				8	20	20	*	(MG/L)
72				9	20	20	*	*
96				9	20	20	*	96 HR LC50: 2070
							*	*
							*	CONF. LIM:
							*	(1810-2370)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				2	20	20	*	*
48				8	20	20	*	(MG/L)
72				9	20	20	*	*
96				9	20	20	*	96 HR EC50: 2070
							*	*
							*	CONF. LIM:
							*	(1810-2370)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: 1,1-Dimethylhydrazine

TEST DATE: 02/29/88

CAS NUMBER: 57147

MF: C2H8N2

MWT: 60.10

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 88.5 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.5 (0.56)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.4 (0.38)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 46.4 (0.21)	PH	: 8.0 (0.05)
ALKALINITY (MG/L CaCO3)	: 42.8 (3.18)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.13	4.82	7.41	11.4	17.6
02/29/88	<0.1	2.57	4.03	5.94	9.01	14.0
03/01/88	<0.1	3.41	4.64	8.91	13.1	19.1
03/02/88	<0.1	4.20	5.98	8.86	12.4	19.9
03/03/88	<0.1	3.83	5.70	8.41	13.1	19.3
03/04/88	<0.1	2.96	3.73	6.16	8.61	13.1
AVERAGE:	<0.10	3.39	4.82	7.66	11.2	17.1
COR AVE:	<0.10	3.40	4.83	7.67	11.3	17.1
PERCENT RECOVERY	99.8	(7.77)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 17.5	MEAN WEIGHT (G)	: 0.070
SD LENGTH (mm)	: 0.827	SD WEIGHT (G)	: 0.0129
		LOADING (G/L/D)	: 0.0389

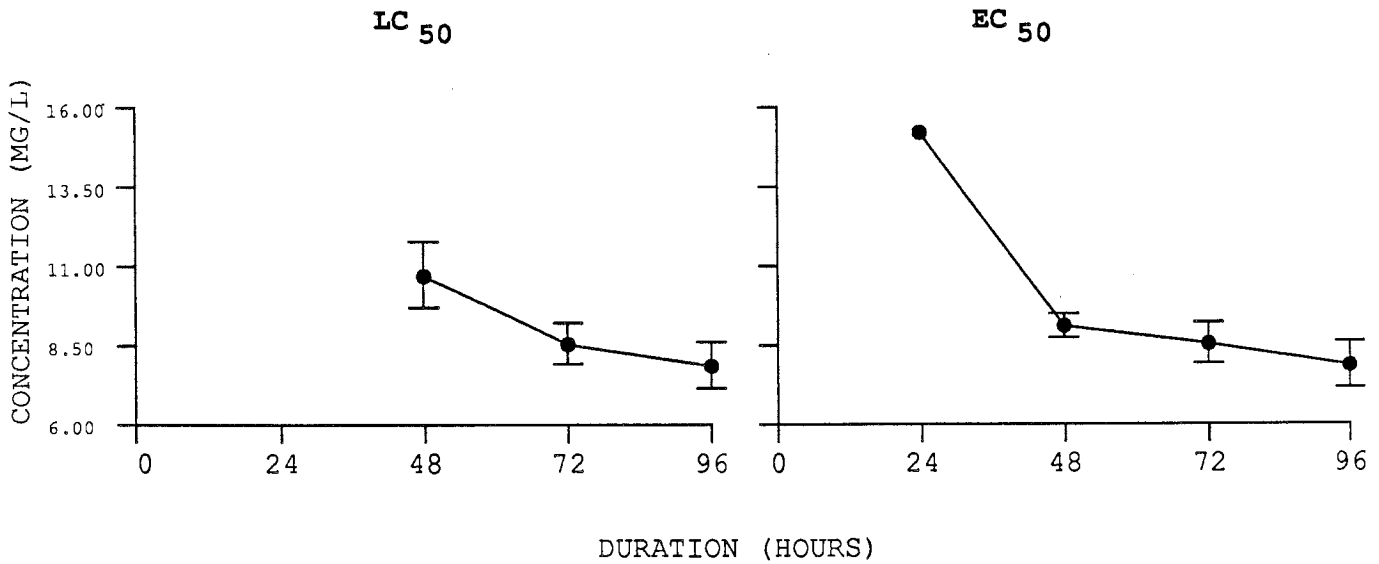
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli and had convulsions. They were also lightly colored and lost equilibrium prior to death. The stock solution turned a very light brown color over the course of the test.

1,1-Dimethylhydrazine

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24							* (MG/L) *
48			1	12	20		* 96 HR LC50: 7.85 *
72			4	20	20		* CONF. LIM: *
96			8	20	20		* (7.16-8.62) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24						14	* (MG/L) *
48			1	20	20		* 96 HR EC50: 7.85 *
72			4	20	20		* CONF. LIM: *
96			8	20	20		* (7.16-8.62) *
							* * * * *



CHEMICAL: Ethylenediamine

TEST DATE: 03/09/87

CAS NUMBER: 107153

MF: C2H8N2

MWT: 60.10

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 4830 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.2 (0.26)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.6 (0.22)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 43.5 (0.00)	PH	: 7.7 (0.04)
ALKALINITY (MG/L CaCO3)	: 43.4 (1.49)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	171	263	404	621	955
03/09/87	<2.0	158	246	368	578	946
03/10/87	<6.0	187	268	394	607	944
03/11/87	<6.1	173	257	392	603	940
03/12/87	<3.1	179	278	400	600	944
03/13/87	<4.0	187	266	398	610	946
AVERAGE:	<4.24	177	263	390	600	944
COR AVE:	<4.00	167	248	368	566	891
PERCENT RECOVERY	106	(5.8) N=6				

FISH SIZES

MEAN LENGTH (mm) : 21.0
SD LENGTH (mm) : 2.828

MEAN WEIGHT (G) : 0.130
SD WEIGHT (G) : 0.0406
LOADING (G/L/D) : 0.0578

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli and had increased respiration. Equilibrium loss was observed prior to death. The stock solution was adjusted to that of lake water using HCl. Hardness measurements for the treatment tanks were low due to the interaction of the test chemical with the titrant; therefore, only the hardness value for the control tank is reported.

Ethylenediamine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				3	14	
48	1		6	20	20	
72	1	10	10	20	20	
96	4	13	18	20	20	

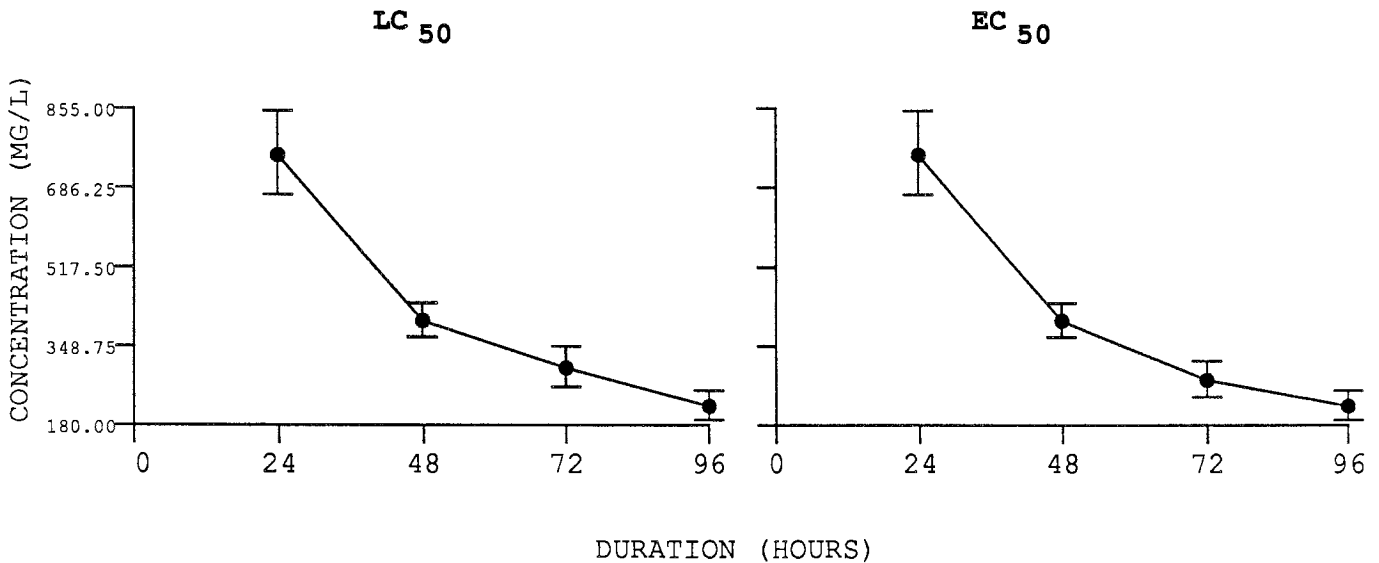
RESULTS

 (MG/L)
 96 HR LC50: 220
 CONF. LIM:
 (191- 254)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				3	14	
48	1		6	20	20	
72	1	11	13	20	20	
96	4	13	18	20	20	

 (MG/L)
 96 HR EC50: 220
 CONF. LIM:
 (191- 254)



CHEMICAL: 1,3-Dichloropropene

TEST DATE: 07/11/88

CAS NUMBER: 542756

MF: C3H4Cl2

MWT: 110.97

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 95%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 45.6 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.7 (0.81)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.4 (0.44)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 46.2 (0.10)	PH	: 7.7 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 38.4 (0.17)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	168	259	398	612	942
07/11/88	<10	113	174	264	419	620
07/12/88	<10	101	157	237	394	594
07/13/88	<10	94.0	148	224	403	578
07/14/88	<10	87.0	117	228	360	621
07/15/88	<10	108	156	268	444	667
AVERAGE: < 10		101	150	244	404	616
COR AVE: <10.2		103	153	249	412	629
PERCENT RECOVERY	98.0	(3.0) N=5				

FISH SIZES

MEAN LENGTH (mm):	16.0	MEAN WEIGHT (G):	0.050
SD LENGTH (mm):	2.743	SD WEIGHT (G):	0.0306
		LOADING (G/L/D):	0.0278

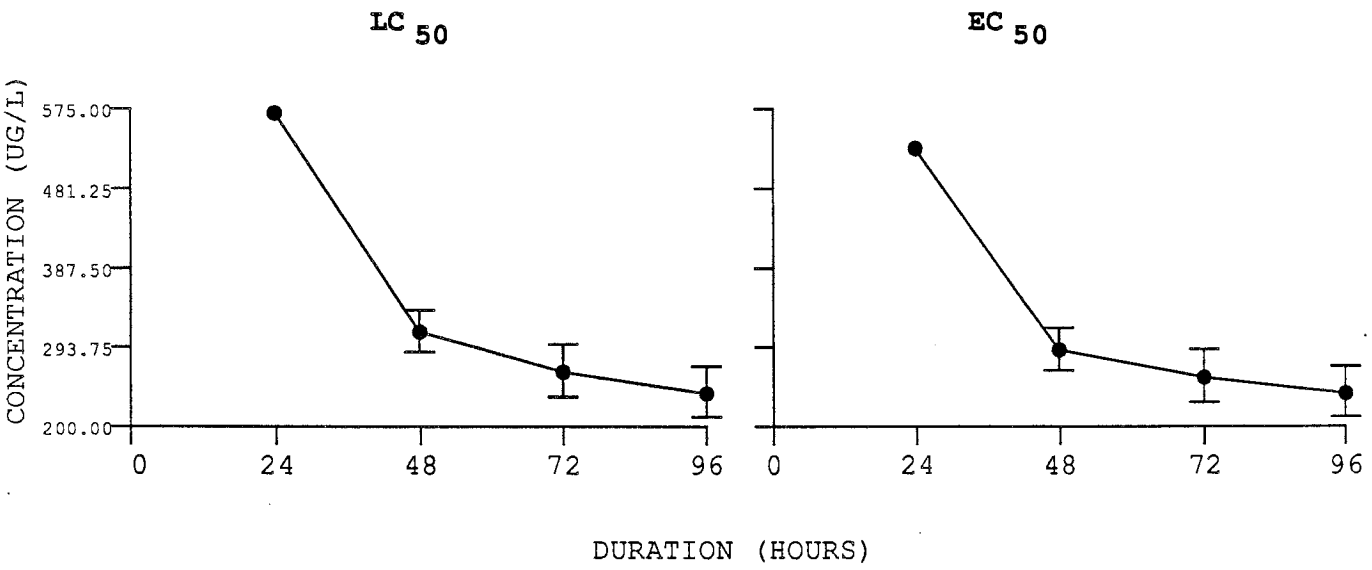
REMARKS

Affected fish lost schooling behavior, were hypoactive and had edema. Equilibrium loss was not observed prior to death. An intermediate cell was used to further dilute the stock solution. Measured concentrations were lower than nominal concentrations due to volatility. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

1,3-Dichloropropene

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						13	*	*
48				2	19	20	*	(UG/L)
72		2	6	20	20		*	
96		2	10	20	20		*	96 HR LC50: 239
							*	
							*	
							*	CONF. LIM:
							*	(211- 271)
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						17	*	*
48			4	20	20		*	(UG/L)
72		2	7	20	20		*	
96		2	10	20	20		*	96 HR EC50: 239
							*	
							*	
							*	CONF. LIM:
							*	(211- 271)
							*	
							*	
							*	
							*	
							*	



CHEMICAL: Acrolein (Test 2)

TEST DATE: 03/03/86

CAS NUMBER: 107028

MF: C3H4O

MWT: 56.06

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 140 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 42-46 D

TEST CONDITIONS

TEMPERATURE (C)	: 17.4 (0.21)	TANK VOLUME (L)	: 37.8
DISSOLVED OXYGEN (MG/L)	: 9.3 (0.35)	ADDITIONS (V/D)	: 7.6
HARDNESS (MG/L CaCO ₃)	: 45.2 (0.00)	PH	: 7.4 (0.06)
ALKALINITY (MG/L CaCO ₃)	: 42.9 (0.48)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E						
NOMINAL:	0	18.8	37.5	75.0	150	300						
03/03/86	<1.0	7.96	11.1	22.1	66.5	217						
03/04/86	<1.0	5.05	7.37	21.7	58.9	93.9						
03/05/86	<1.0	3.05	6.72	33.5	89.2	187						
03/06/86	<1.0	4.16	4.90	21.8	55.2	108						
03/07/86												
AVERAGE:	<1.00	<1.00	5.51	4.61	8.91	6.14	27.8	21.8	77.8	57.1	202	101
COR AVE:	<1.03	<1.03	5.66	4.74	9.17	6.31	28.6	22.4	80.1	58.7	208	104
PERCENT RECOVERY	97.2	(1.0)	N=4									

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

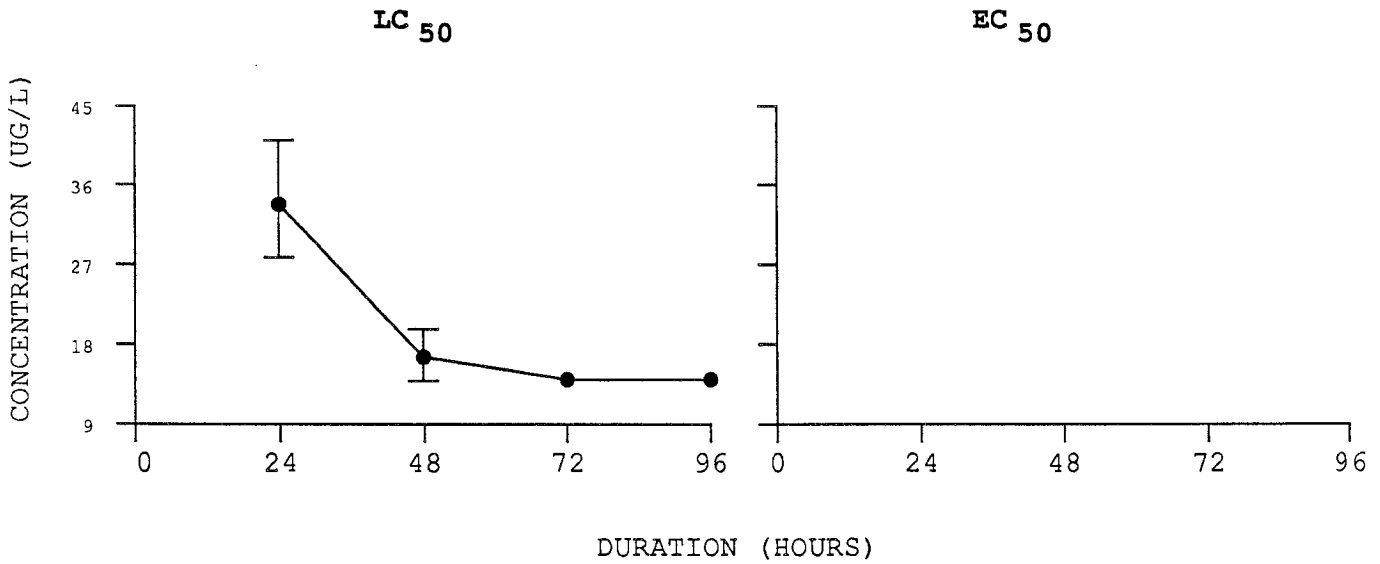
REMARKS

A couple of affected fish in the "C" tanks lost equilibrium prior to death. No effect data were recorded. Individual lengths and weights of the test fish were not recorded; however, the measured mean weight was 0.42 g. Samples were not taken at 96 hr for determination of toxicant concentrations. The tank volume ranged from 36.0-39.6 L. Measured concentrations were lower than nominal concentrations due to volatility.

Acrolein (Test 2)

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24			4	20	20		* (UG/L) *
48			17	20	20		* 96 HR LC50: 14.0 *
72			20	20	20		* CONF. LIM: *
96			20	20	20		* (NOT REL.) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24							* (UG/L) *
48							* 96 HR EC50: NOT DET. *
72							* CONF. LIM: *
96							* () *
							* * * * *



CHEMICAL: 1,2,3-Trichloropropane

TEST DATE: 04/04/88

CAS NUMBER: 96184

MF: C3H5Cl3

MWT: 147.43

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 533 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 31-32 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.6 (0.12)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.9 (0.20)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.1 (0.48)	PH	: 8.0 (0.03)
ALKALINITY (MG/L CaCO3)	: 40.1 (0.48)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	19.1	29.4	45.2	69.6	107
04/04/88	<0.5	12.6	17.8	27.3	41.9	67.4
04/05/88	<0.5	16.7	23.6	34.4	50.4	85.8
04/06/88	<0.5	16.5	22.7	34.0	49.6	84.0
04/07/88	<0.5	16.7	23.6	34.4	52.7	91.4
04/08/88	<0.5	15.2	21.3	30.9	47.4	82.8
AVERAGE:	<0.50	15.5	21.8	32.2	48.4	82.3
COR AVE:	<0.53	16.4	23.0	33.9	51.0	86.7
PERCENT RECOVERY	94.9	(3.2)		N=5		

FISH SIZES

MEAN LENGTH (mm)	: 17.9	MEAN WEIGHT (G)	: 0.077
SD LENGTH (mm)	: 1.294	SD WEIGHT (G)	: 0.0220
		LOADING (G/L/D)	: 0.0428

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, were darkly colored and lost equilibrium prior to death.

1,2,3-Trichloropropane

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					20	
48					20	
72					20	
96					20	

RESULTS

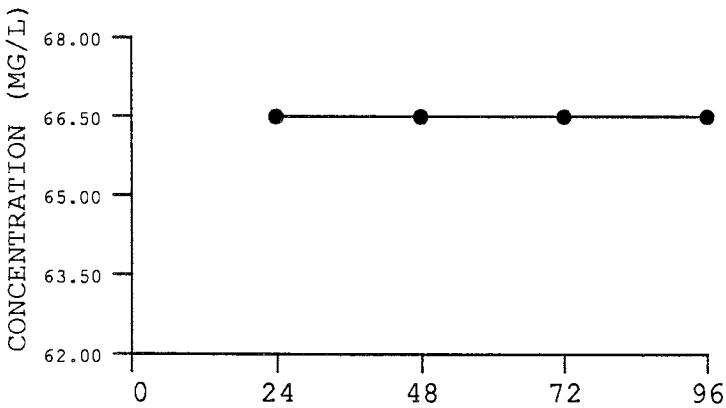
* * * * *
 * * * * *
 * (MG/L) *
 * * * * *
 * 96 HR LC50: 66.5 *
 * * * * *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *
 * * * * *

***** EFFECT *****

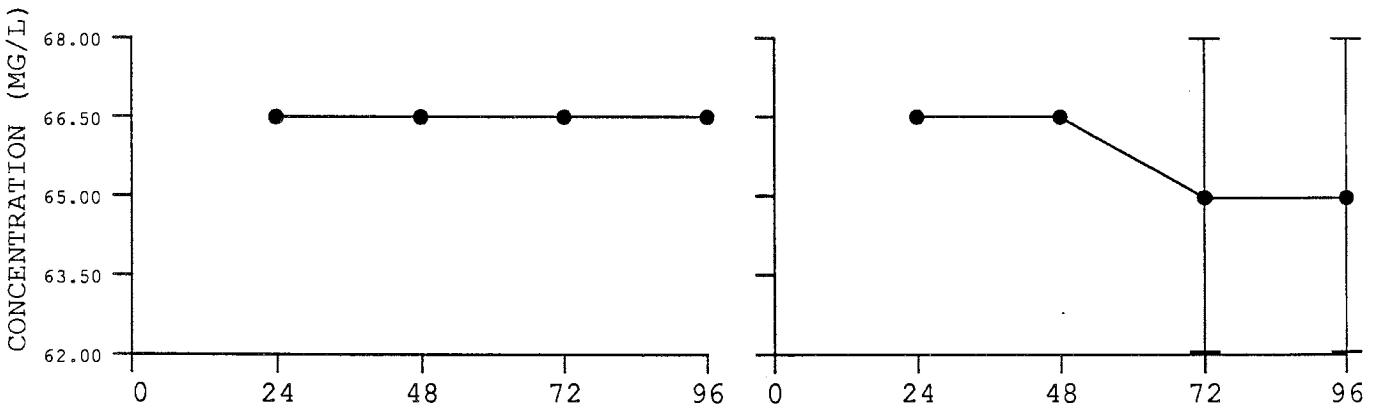
HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					20	
48					20	
72				1	20	
96				1	20	

* * * * *
 * * * * *
 * (MG/L) *
 * * * * *
 * 96 HR EC50: 65.0 *
 * * * * *
 * CONF. LIM: *
 * (62.0-68.0) *
 * * * * *
 * * * * *

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: Propionitrile

TEST DATE: 06/27/88

CAS NUMBER: 107120

MF: C3H5N

MWT: 55.08

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 6120 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (0.63)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.3 (0.22)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 47.0 (0.44)	PH	: 7.6 (0.21)
ALKALINITY (MG/L CaCO3)	: 40.1 (1.04)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	455	700	1080	1660	2550
06/27/88	<5.0	406	667	834	1010	1990
06/28/88	<5.0	345	539	822	1060	2090
06/29/88	<5.0	361	602	914	1120	2200
06/30/88	<5.0	377	626	931	1140	2290
07/01/88	<5.0	384	614	923	1160	2350
AVERAGE:	<5.00	375	610	885	1098	2184
COR AVE:	<5.01	375	611	887	1100	2188
PERCENT RECOVERY	99.8	(0.7)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 20.8	MEAN WEIGHT (G)	: 0.092
SD LENGTH (mm)	: 1.673	SD WEIGHT (G)	: 0.0244
		LOADING (G/L/D)	: 0.1278

REMARKS

Affected fish lost schooling behavior, were darkly colored and lost equilibrium prior to death.

Propionitrile

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				1	20	
48				1	20	
72				1	20	
96				1	20	

RESULTS

* * * * *
 * (MG/L) *
 * 96 HR LC50: 1520 *
 * * * * *
 * CONF. LIM: *
 * (1450-1580) *
 * * * * *

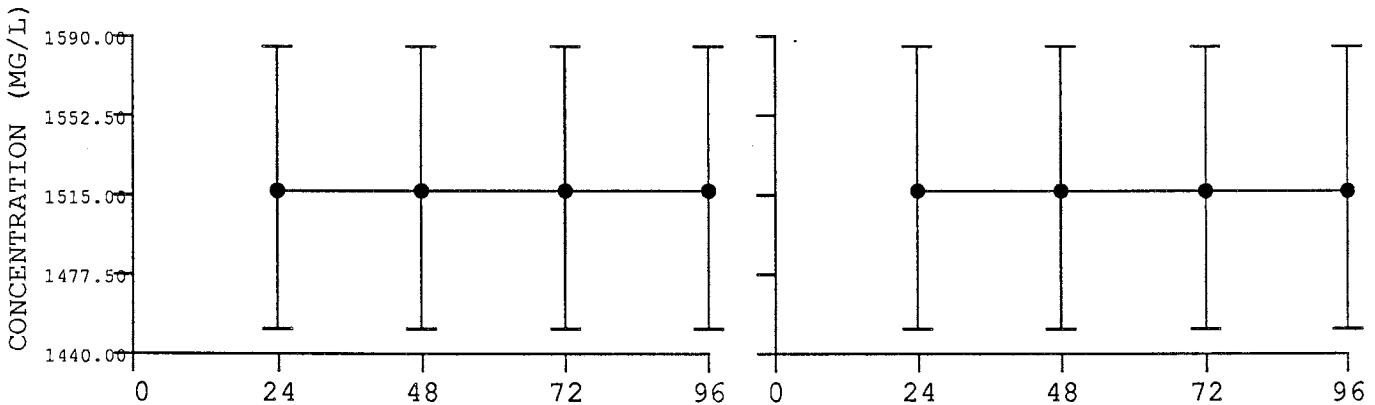
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				1	20	
48				1	20	
72				1	20	
96				1	20	

* * * * *
 * (MG/L) *
 * 96 HR EC50: 1520 *
 * * * * *
 * CONF. LIM: *
 * (1450-1580) *
 * * * * *

LC 50

EC 50



DURATION (HOURS)

CHEMICAL: Acrylamide

TEST DATE: 06/29/87

CAS NUMBER: 79061

MF: C3H5NO

MWT: 71.08

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 10.0 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.1 (0.60)	TANK VOLUME (L)	: 1.5
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.28)	ADDITIONS (V/D)	: 15.4
HARDNESS (MG/L CaCO3)	: 50.8 (0.87)	PH	: 7.1 (0.05)
ALKALINITY (MG/L CaCO3)	: 43.3 (1.32)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E		
NOMINAL:	0	20	39	78	156	312		
06/29/87	<2.2	25.2	24.3	38.4	42.8	75.9 77.3	126 137	227 216
06/30/87	<2.2	22.3		42.4		83.2	154	277
07/01/87	<2.2	26.2	25.3	43.7	46.0	85.8 87.3	156 154	272 273
07/02/87	<2.2		19.8		36.4	72.8		130
07/03/87	<2.2	20.3	20.9	37.0	37.5	73.9 74.5	139 138	
AVERAGE:	<2.20	<2.20	23.5 22.6	40.4 40.7	79.7 78.0		144 140	259 245
COR AVE:	<2.20	<2.20	23.5 22.6	40.4 40.7	79.8 78.1		144 140	259 245
PERCENT RECOVERY		99.9	(2.8)	N=5				

FISH SIZES

MEAN LENGTH (mm) : 18.1
SD LENGTH (mm) : 2.514

MEAN WEIGHT (G) : 0.089
SD WEIGHT (G) : 0.0325
LOADING (G/L/D) : 0.0385

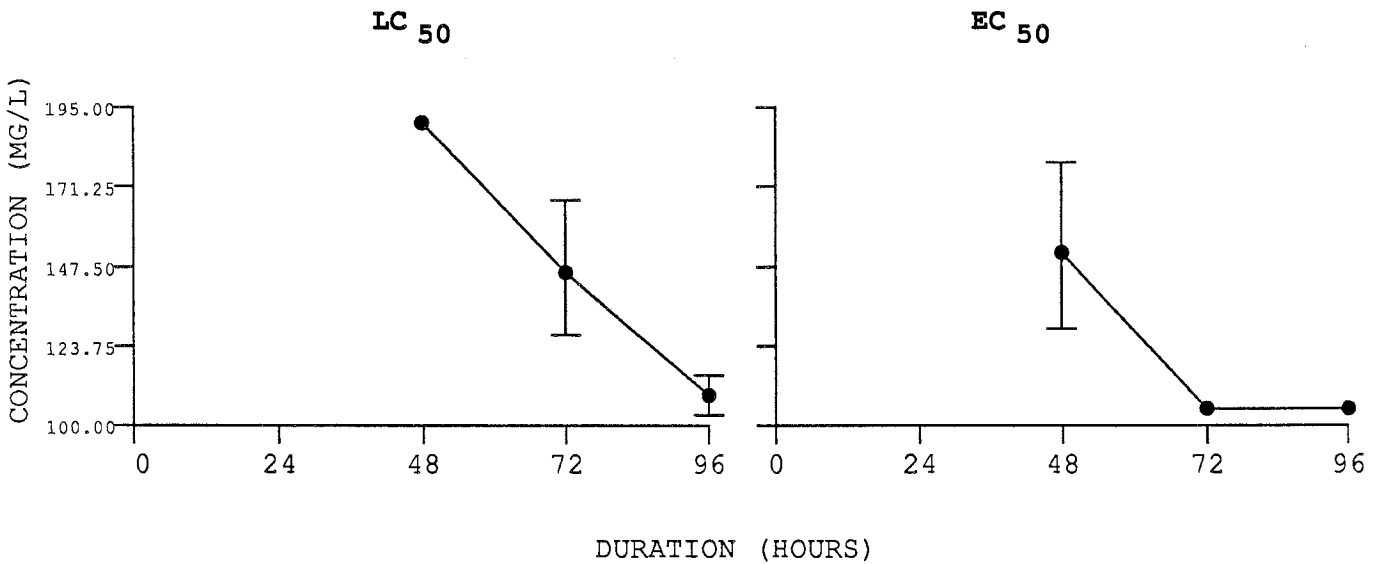
REMARKS

Affected fish lost schooling behavior, swam at the water's surface and lost equilibrium prior to death.

Acrylamide

***** MORTALITIES *****											***** RESULTS *****										
HOUR	CON	A	B	C	D	E															
INITIAL	10	10	10	10	10	10	* * * * *														
24		1				2	* * * * *														
48		1				10	* (MG/L) *														
72		1			5	4	* 96 HR LC50: 109 *														
96		1			9	10	* CONF. LIM: *														
							* (103- 115) *														
							* * * * *														

***** EFFECT *****											***** RESULTS *****										
HOUR	CON	A	B	C	D	E															
INITIAL	10	10	10	10	10	10	* * * * *														
24		1				2	* * * * *														
48		1		2	1	1	* (MG/L) *														
72		1				10	* 96 HR EC50: 105 *														
96		1				10	* CONF. LIM: *														
							* (NOT REL.) *														
							* * * * *														



CHEMICAL: Allyl Alcohol

TEST DATE: 05/18/87

CAS NUMBER: 107186

MF: C3H6O

MWT: 58.08

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 7.3 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 28 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.6 (0.47)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.7 (0.26)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 46.4 (0.63)	PH	: 7.5 (0.16)
ALKALINITY (MG/L CaCO ₃)	: 44.4 (1.31)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.26	0.40	0.61	0.94	1.45
05/18/87						
05/19/87	<0.1	0.26	0.38	0.62	0.96	1.39
05/20/87	<0.1		0.34	0.63	1.00	1.60
05/21/87	<0.1	0.30	0.37	0.68	1.04	1.42
05/22/87	<0.1	0.23	0.38	0.65	1.02	1.57
AVERAGE:	<0.10	0.26	0.37	0.65	1.00	1.50
COR AVE:	<0.10	0.25	0.35	0.62	0.97	1.44
PERCENT RECOVERY	104	(12.6)	N=10			

FISH SIZES

MEAN LENGTH (mm)	: 18.6	MEAN WEIGHT (G)	: 0.098
SD LENGTH (mm)	: 2.927	SD WEIGHT (G)	: 0.0435
		LOADING (G/L/D)	: 0.0544

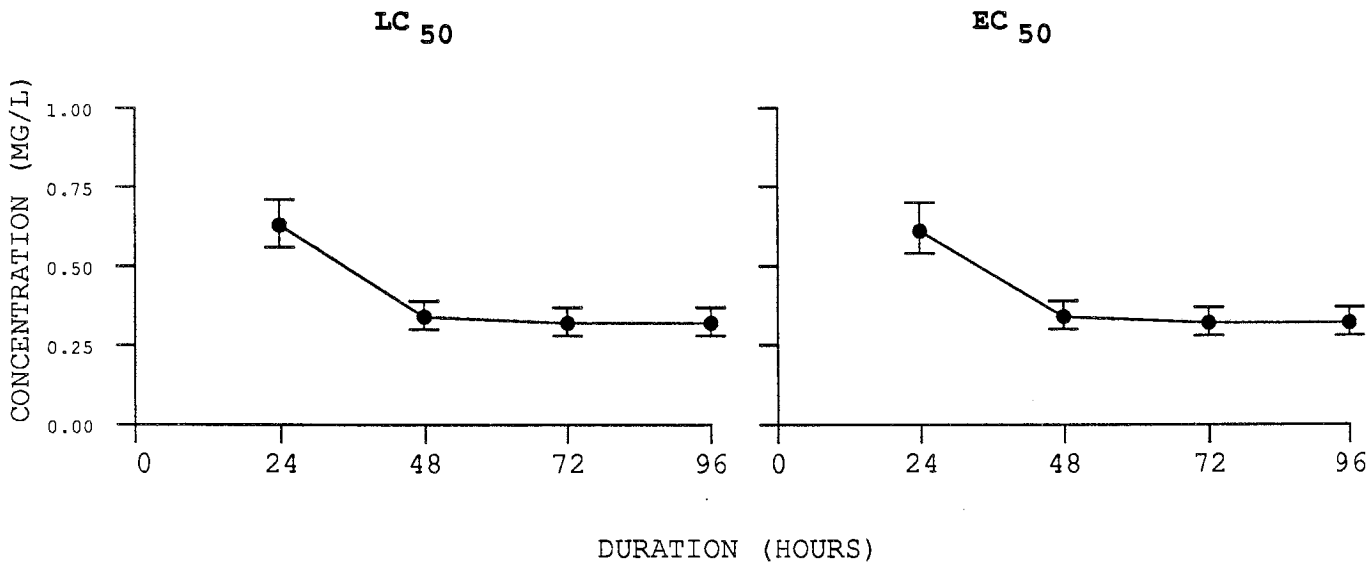
REMARKS

Affected fish lost schooling behavior, were underreactive to external stimuli and darkly colored. Equilibrium loss was observed prior to death. The 0-hr data were omitted due to an analytical instrument failure. The missing value from tank A at 48 hr was below the detectable limits of the instrument.

Allyl Alcohol

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	1	1	8	20	20	20	* (MG/L) *
48	3	12	20	20	20	20	* 96 HR LC50: 0.32 *
72	4	13	20	20	20	20	* CONF. LIM: *
96	4	13	20	20	20	20	* (0.28-0.37) *
							* * * * *

***** EFFECT *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	1	1	9	20	20	20	* (MG/L) *
48	3	12	20	20	20	20	* 96 HR EC50: 0.32 *
72	4	13	20	20	20	20	* CONF. LIM: *
96	4	13	20	20	20	20	* (0.28-0.37) *
							* * * * *



CHEMICAL: Acetone Oxime

TEST DATE: 03/13/89

CAS NUMBER: 127060

MF: C3H7NO

MWT: 73.10

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 3950 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.56)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.1 (0.26)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 48.5 (0.78)	PH	: 7.2 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 41.0 (0.42)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	151	232	357	549	844
03/13/89	<12	132	215	323	519	776
03/14/89	<12	163	245	333	558	882
03/15/89	<12	165	282	399	643	859
03/16/89	<12	157	244	318	499	814
03/17/89	<12	144	225	314	509	843
AVERAGE: < 12		152	242	337	546	835
COR AVE: <12.4		158	251	350	566	866
PERCENT RECOVERY	96.4	(5.7) N=5				

FISH SIZES

MEAN LENGTH (mm)	: 17.3	MEAN WEIGHT (G)	: 0.072
SD LENGTH (mm)	: 1.750	SD WEIGHT (G)	: 0.0226
		LOADING (G/L/D)	: 0.1000

REMARKS

Affected fish were hypoactive, exhibited hemorrhaging and lost equilibrium prior to death. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

Acetone Oxime

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	
24						
48					2	
72				1	18	
96				10	20	

RESULTS

 (MG/L)
 96 HR LC50: 558
 CONF. LIM:
 (504- 618)

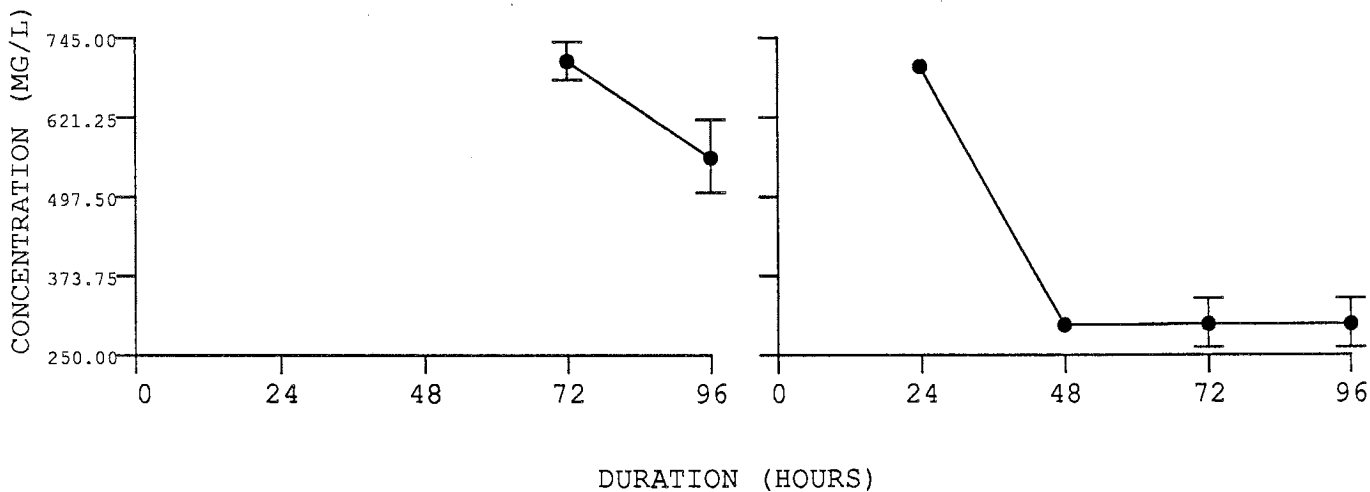
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	
24						
48			20	20	20	
72		10	10	20	20	
96		10	10	20	20	

 (MG/L)
 96 HR EC50: 298
 CONF. LIM:
 (262- 338)

LC 50

EC 50



CHEMICAL: Urethane

TEST DATE: 05/03/88

CAS NUMBER: 51796

MF: C3H7NO2

MWT: 89.09

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 106 g/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31-32 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.28)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.19)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.9 (0.25)	PH	: 7.8 (0.05)
ALKALINITY (MG/L CaCO3)	: 40.0 (0.16)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.78	2.75	4.22	6.50	10.0
05/03/88		1.74	2.61	4.06	6.37	10.0
05/04/88		2.39	3.43	5.04	7.74	11.7
05/05/88		1.94	2.92	4.32	6.39	9.92
05/06/88		2.06	2.90	4.35	6.76	10.5
05/07/88		2.32	2.98	4.28	6.62	10.4
AVERAGE: <		2.09	2.97	4.41	6.78	10.5
COR AVE: <0.00		2.09	2.97	4.41	6.78	10.5
PERCENT RECOVERY	100	(1.6)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 17.8	MEAN WEIGHT (G)	: 0.073
SD LENGTH (mm)	: 1.361	SD WEIGHT (G)	: 0.0203
		LOADING (G/L/D)	: 0.0406

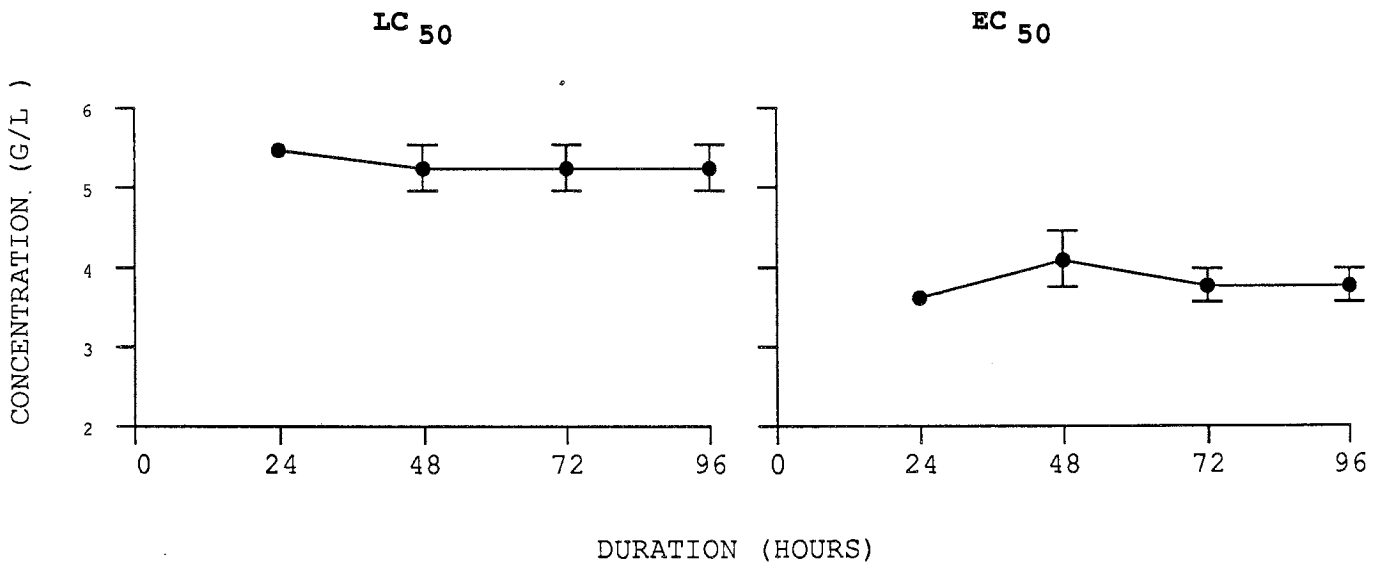
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli and were darkly colored. Equilibrium loss was not observed prior to death. The detection limit for the control tank was <0.004 g/l.

Urethane

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				20	20		*	*
48				2	20	20	*	(G/L)
72				2	20	20	*	
96				2	20	20	*	96 HR LC50: 5.24
							*	
							*	
							*	CONF. LIM:
							*	(4.96-5.54)
							*	
							*	
							*	
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				20	20	20	*	*
48				14	20	20	*	(G/L)
72				18	20	20	*	
96				18	20	20	*	96 HR EC50: 3.77
							*	
							*	
							*	CONF. LIM:
							*	(3.57-3.99)
							*	
							*	
							*	
							*	
							*	
							*	
							*	
							*	



CHEMICAL: Dimethoxymethane

TEST DATE: 08/29/88

CAS NUMBER: 109875

MF: C3H8O2

MWT: 76.10

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 41.0 g/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 & 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.7 (0.37)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.3 (0.23)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 45.6 (0.25)	PH	: 7.3 (0.11)
ALKALINITY (MG/L CaCO ₃)	: 38.0 (0.10)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.18	4.90	7.54	11.6	17.9
08/29/88	<0.1	2.13	3.30	3.34	6.16	12.4
08/30/88	<0.1	1.80	2.71	3.92	5.94	12.6
08/31/88	<0.1	1.92	2.84	4.07	4.85	11.2
09/01/88	<0.1	2.17	2.50	4.68	5.54	9.42
09/02/88	<0.1	2.46	1.06	4.05	5.85	13.2
AVERAGE:	<0.10	2.10	2.48	4.01	5.67	11.8
COR AVE:	<0.10	2.11	2.50	4.04	5.71	11.8
PERCENT RECOVERY	99.3	(0.9)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 19.6
SD LENGTH (mm) : 2.540

MEAN WEIGHT (G) : 0.102
SD WEIGHT (G) : 0.0422
LOADING (G/L/D) : 0.1417

REMARKS

Affected fish lost schooling behavior, were hypoactive and overreactive to external stimuli and were darkly colored. Equilibrium loss was observed prior to death. At 96 hr, the toxicant concentration in the "B" tank was low because the delivery tip had plugged and the chemical volatilized. Measured concentrations were lower than nominal concentrations due to volatility.

CHEMICAL: Trimethyl Phosphate

TEST DATE: 05/08/89

CAS NUMBER: 512561

MF: C3H9O4P

MWT: 140.08

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 66.2 g/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (0.32)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.21)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 45.8 (0.24)	PH	: 7.7 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 36.4 (0.57)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.54	3.90	6.00	9.23	14.2
05/08/89	<.04	2.21	3.22	5.10	7.97	12.5
05/09/89	<.04	2.95	4.45	6.78	10.3	15.3
05/10/89	<.04	3.09	4.38	6.38	9.48	14.2
05/11/89	<.04	3.84	4.97	6.87	9.82	14.5
05/12/89	<.04	4.30	5.27	8.69	10.4	16.0
AVERAGE:	<0.04	3.28	4.46	6.76	9.59	14.5
COR AVE:	<0.04	3.20	4.35	6.60	9.36	14.1
PERCENT RECOVERY		102.5 (5.0)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 17.5
SD LENGTH (mm) : 1.670

MEAN WEIGHT (G) : 0.073
SD WEIGHT (G) : 0.0228
LOADING (G/L/D) : 0.1014

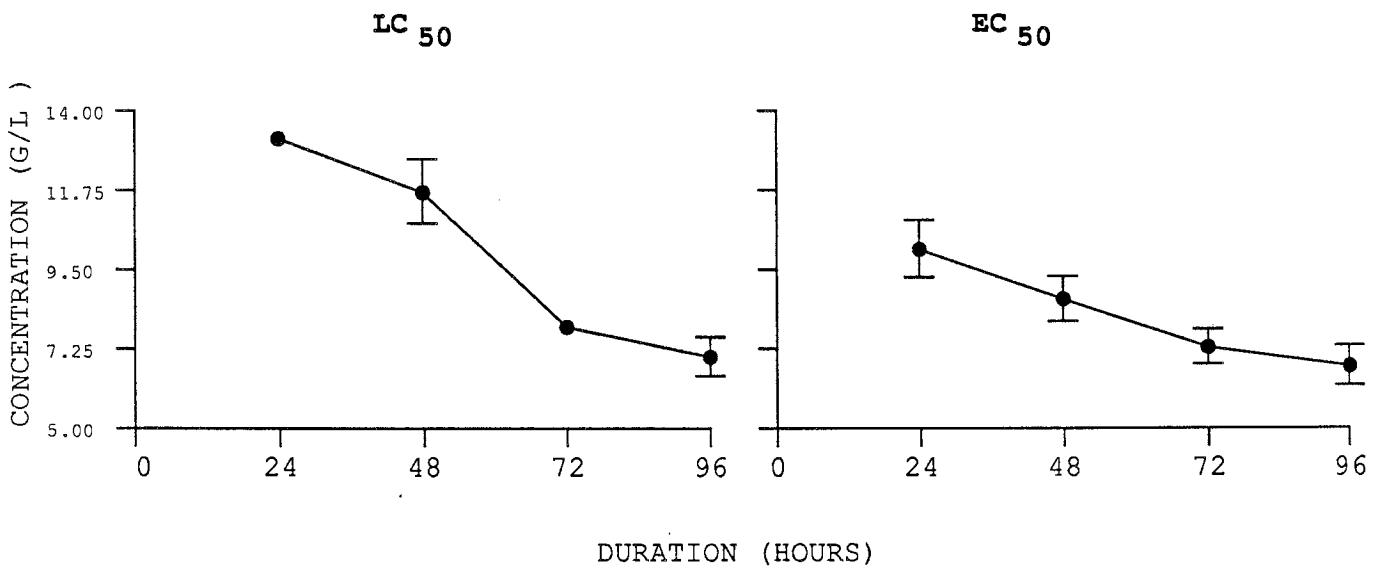
REMARKS

The pH of the stock solution was adjusted to that of lake water using NaOH. Affected fish swam sporadically, were hypoactive and overreactive to external stimuli, had convulsions and were darkly colored. Equilibrium loss was observed prior to death.

Trimethyl Phosphate

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						12	*	*
48					3	16	*	(G/L)
72					20	20	*	
96			6		20	20	*	96 HR LC50: 7.01
							*	
							*	
							*	CONF. LIM:
							*	(6.48-7.58)
							*	
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24					7	20	*	*
48					15	20	*	(G/L)
72			4		20	20	*	
96			8		20	20	*	96 HR EC50: 6.74
							*	
							*	
							*	CONF. LIM:
							*	(6.20-7.33)
							*	
							*	
							*	
							*	
							*	
							*	



CHEMICAL: Allyl Isothiocyanate

TEST DATE: 12/19/88

CAS NUMBER: 57067

MF: C4H5NS

MWT: 99.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 17.6 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 33 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.20)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.12)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: ()	PH	: 7.8 (0.03)
ALKALINITY (MG/L CaCO3)	: ()		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	24	37	57	88	135
12/19/88	<5.0	26	31	43	67	103
12/20/88	<5.0	26	35	52	70	107
12/21/88	<5.0	18	21	29	50	79
12/22/88	<5.0	15	22	27	42	75
12/23/88	<5.0	36	46	58	100	150
AVERAGE:	<5.00	24	31	42	66	103
COR AVE:	<4.92	23.8	30.5	41.1	64.7	101
PERCENT RECOVERY		101.7 (5.4)	N=8			

FISH SIZES

MEAN LENGTH (mm)	: 19.3	MEAN WEIGHT (G)	: 0.107
SD LENGTH (mm)	: 1.943	SD WEIGHT (G)	: 0.0358
		LOADING (G/L/D)	: 0.0594

REMARKS

Affected fish lost schooling behavior and were darkly colored. Equilibrium loss was not observed prior to death. Alkalinity and hardness measurements were not taken.

Allyl Isothiocyanate

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48					9	
72					16	
96					16	

RESULTS

```

* * * * *
*
* (UG/L)
*
* 96 HR LC50: 85.6
*
*
* CONF. LIM:
* (NOT REL.)
*
*
*
* * * * *
    
```

***** EFFECT *****

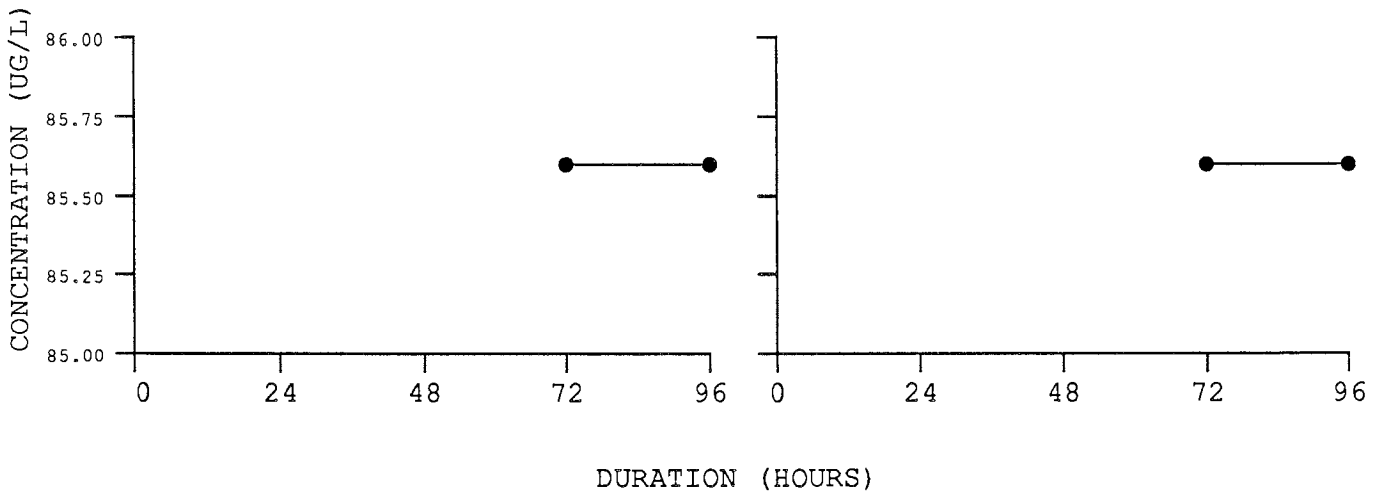
HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48					9	
72					16	
96					16	

```

* * * * *
*
* (UG/L)
*
* 96 HR EC50: 85.6
*
*
* CONF. LIM:
* (NOT REL.)
*
*
*
* * * * *
    
```

LC 50

EC 50



CHEMICAL: 1,4-Dioxane (Test 1)

TEST DATE: 04/27/87

CAS NUMBER: 123911

MF: C4H8O2

MWT: 88.11

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Undiluted

ORGANISM: Fathead Minnow

AGE: 27-33 D

TEST CONDITIONS

TEMPERATURE (C)	: 22.1 (0.38)	TANK VOLUME (L)	: 1.5
DISSOLVED OXYGEN (MG/L)	: 8.1 (0.35)	ADDITIONS (V/D)	: 15.4
HARDNESS (MG/L CaCO ₃)	: 50.2 (1.05)	PH	: 7.3 (0.06)
ALKALINITY (MG/L CaCO ₃)	: 42.0 (0.00)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.78	1.56	3.12	6.25	12.5
04/27/87	<.05 <.05	0.32 0.23	1.02 0.97	2.37 2.43	6.53 6.14	12.4 13.2
04/28/87	<.05	0.44	1.09	2.44	5.94	13.1
04/29/87	<.05 <.05	0.32 0.31	0.95 0.94	2.37 2.31	5.96 6.42	13.3 12.9
04/30/87	<.05	0.52	1.18	2.67	6.19	11.6
05/01/87	<.05 <.05	0.46 0.50	1.05 1.14	2.44 2.35	10.5 10.0	13.9 14.9
AVERAGE:	<0.05 <0.05	0.39 0.39	1.03 1.06	2.40 2.44	7.23 7.19	13.2 13.2
COR AVE:	<0.05 <0.05	0.37 0.37	0.99 1.02	2.31 2.34	6.95 6.90	12.7 12.6
PERCENT RECOVERY	104.1 (10.0)	N=5				

FISH SIZES

MEAN LENGTH (mm) : 18.2
SD LENGTH (mm) : 2.860

MEAN WEIGHT (G) : 0.092
SD WEIGHT (G) : 0.0465
LOADING (G/L/D) : 0.0398

REMARKS

Affected fish lost equilibrium prior to death.

1,4-Dioxane (Test 1)

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					3	2
48					6	6
72					6	7
96					8	9

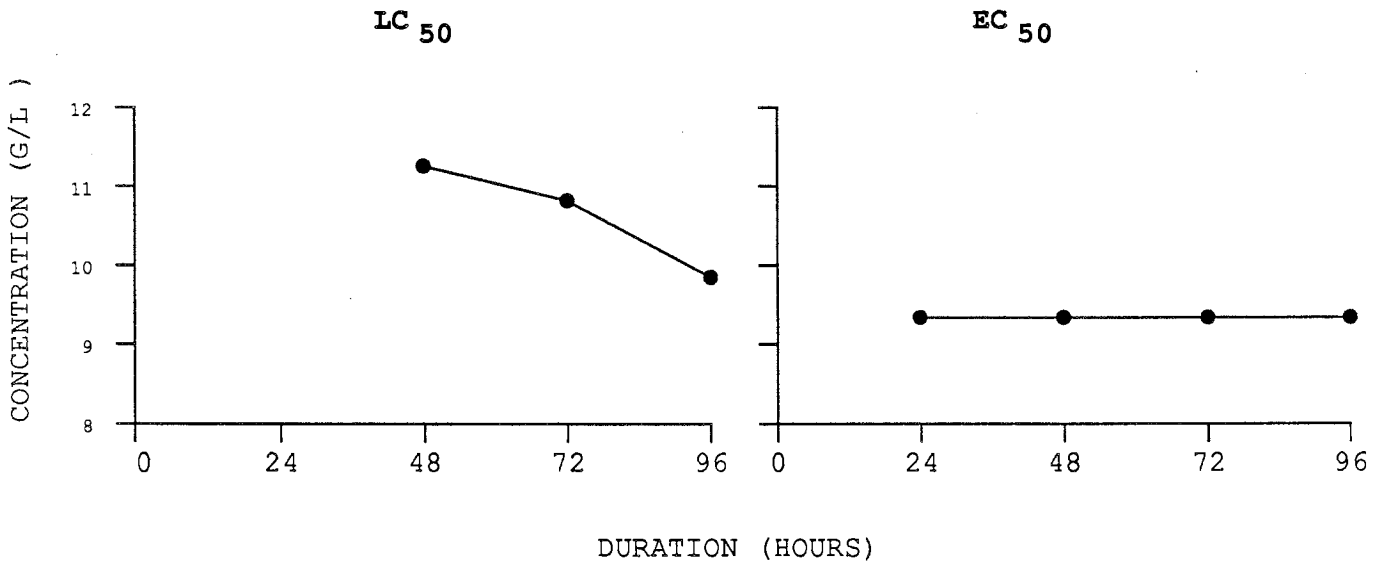
RESULTS

* * * * *
 (G/L)
 96 HR LC50: 9.85
 * * * * *
 CONF. LIM:
 (NOT REL.)
 * * * * *

***** EFFECT *****

INITIAL	10	10	10	10	10	10	10	10	10	10	10
24									10	10	
48									10	10	
72									10	10	
96									10	10	

* * * * *
 (G/L)
 96 HR EC50: 9.34
 * * * * *
 CONF. LIM:
 (NOT REL.)
 * * * * *



CHEMICAL: 1,4-Dioxane (Test 2)

TEST DATE: 04/18/88

CAS NUMBER: 123911

MF: C4H8O2

MWT: 88.11

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Undiluted

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.9 (0.61)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.4 (0.22)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.5 (0.33)	PH	: 8.0 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 39.5 (0.41)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.96	3.02	4.65	7.15	11.0
04/18/88	<0.1	2.46	3.45	5.25	7.54	11.8
04/19/88	<0.1	2.86	3.92	6.12	8.60	12.9
04/20/88	<0.1	3.18	4.06	5.70	8.14	10.6
04/21/88	<0.1	3.67	4.39	6.00	7.84	11.5
04/22/88	<0.1	3.80	4.50	6.18	8.17	11.4
AVERAGE:	<0.10	3.19	4.06	5.85	8.06	11.6
COR AVE:	<0.10	3.14	4.00	5.76	7.93	11.5
PERCENT RECOVERY		101.6 (3.6)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 19.0	MEAN WEIGHT (G)	: 0.087
SD LENGTH (mm)	: 1.317	SD WEIGHT (G)	: 0.0134
		LOADING (G/L/D)	: 0.0483

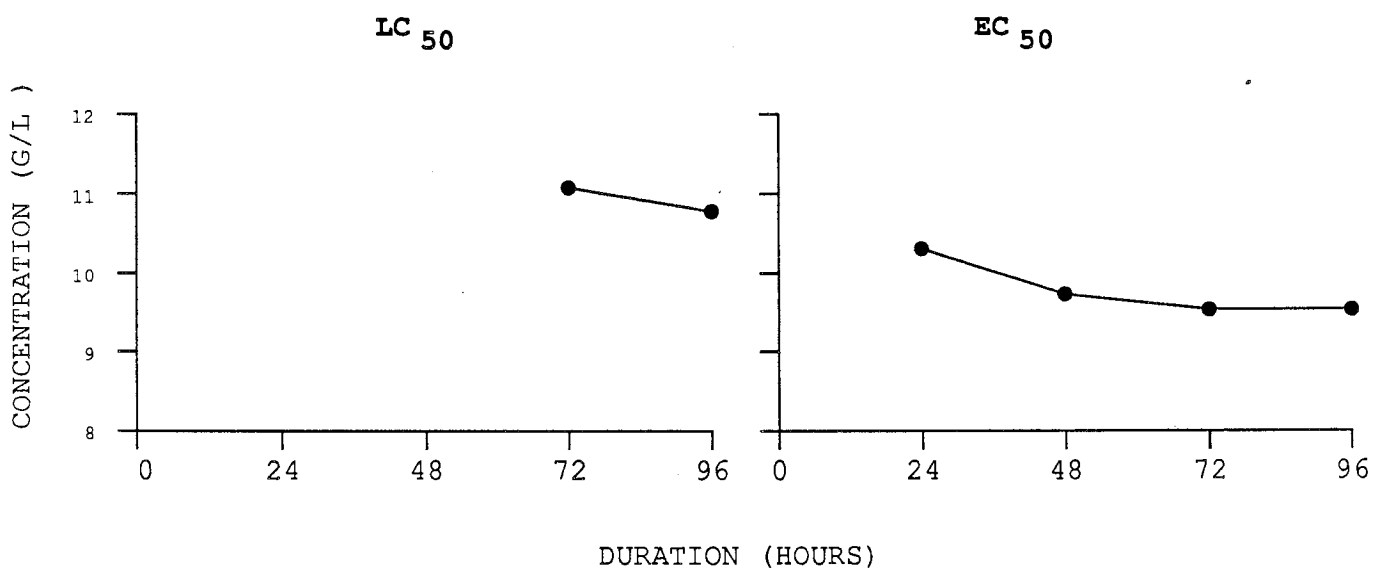
REMARKS

Affected fish lost schooling behavior, swam near the tank surface, were hyperactive and overreactive to external stimuli. The fish also had increased respiration. Equilibrium loss was not observed prior to death. The test tanks appeared cloudy which may have been due to the tygon tubing from the stock bottle being in direct contact with the chemical. The chemical was pumped from a cylinder into a carboy that contained a nitrogen head.

1,4-Dioxane (Test 2)

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						7	*	*
48						9	*	(G/L)
72						11	*	*
96						12	*	96 HR LC50: 10.8
							*	*
							*	CONF. LIM:
							*	(NOT REL.)
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						14	*	*
48						18	*	(G/L)
72						20	*	*
96						20	*	96 HR EC50: 9.55
							*	*
							*	CONF. LIM:
							*	(NOT REL.)
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: 2-Hydroxyethyl Ether

TEST DATE: 02/09/87

CAS NUMBER: 111466

MF: C4H10O3

MWT: 106.12

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 84800 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.9 (0.23)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.36)	ADDITIONS (V/D)	: 40.3
HARDNESS (MG/L CaCO3)	: 43.1 (0.75)	PH	: 7.7 (0.01)
ALKALINITY (MG/L CaCO3)	: 40.3 (0.65)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	17.0	33.9	50.9	67.8	84.8
02/09/87		19.3	33.2	44.9	66.7	85.0
02/10/87		17.4	34.8	45.1	65.4	83.0
02/11/87		16.3	32.0	43.5	65.1	80.8
02/12/87		19.5	34.0	49.6	69.5	87.8
02/13/87		17.6	34.4	45.5	68.0	89.0
AVERAGE: <		18.0	33.7	45.7	66.9	85.1
COR AVE: <0.00		17.9	33.5	45.5	66.7	84.8
PERCENT RECOVERY	100.4 (2.9)					
						N=5

FISH SIZES

MEAN LENGTH (mm)	: 19.1	MEAN WEIGHT (G)	: 0.102
SD LENGTH (mm)	: 0.994	SD WEIGHT (G)	: 0.0157
		LOADING (G/L/D)	: 0.1012

REMARKS

The detection limit for 2-hydroxyethyl ether in the control tanks was <0.004 g/l. Affected fish were darkly colored and lost equilibrium prior to death. Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution.

2-Hydroxyethyl Ether

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					10	
48					10	
72					10	
96					10	

RESULTS

```

* * * * *
*
*           (G/L )
*
*   96 HR LC50: 75.2
*
*
*   CONF. LIM:
*   (NOT REL.)
*
*
* * * * *
    
```

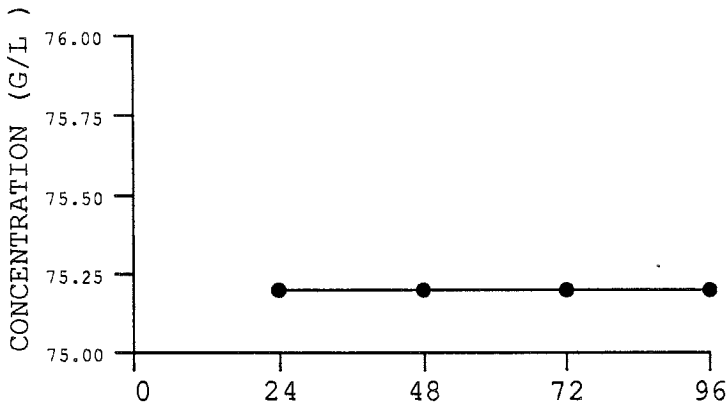
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					10	
48					10	
72					10	
96					10	

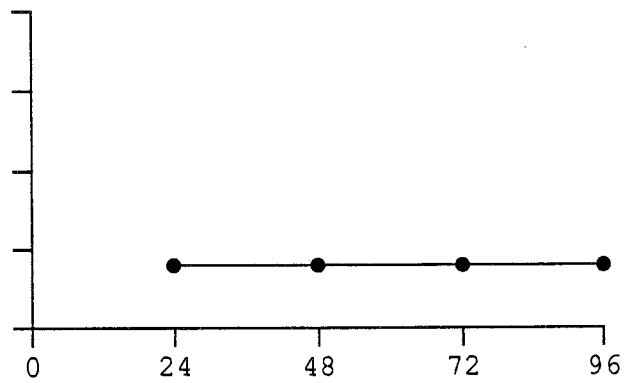
```

* * * * *
*
*           (G/L )
*
*   96 HR EC50: 75.2
*
*
*   CONF. LIM:
*   (NOT REL.)
*
*
* * * * *
    
```

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: (+-)-sec-Butylamine

TEST DATE: 11/03/86

CAS NUMBER: 13952846

MF: C4H11N

MWT: 73.14

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2250 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.2 (0.36)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.34)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 43.2 (0.57)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO3)	: 42.8 (1.85)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	80.6	124	191	294	453
11/03/86	<1.0	91.0	130	211	305	491
11/04/86	<7.0	87.0	154	207	331	523
11/05/86	<7.0	87.1	142	240	346	541
11/06/86	<7.0	89.3	152	260	340	560
11/07/86	<7.0	128	196	241	334	504
AVERAGE:	<5.80	96.5	155	232	331	524
COR AVE:	<5.97	99.4	159	239	341	539
PERCENT RECOVERY		97.1	(7.8)	N=7		

FISH SIZES

MEAN LENGTH (mm) : 22.0
SD LENGTH (mm) : 2.000

MEAN WEIGHT (G) : 0.159
SD WEIGHT (G) : 0.0495
LOADING (G/L/D) : 0.0883

REMARKS

Affected fish lost schooling behavior, were hyperactive, swam near the tank surface and had increased respiration. Equilibrium loss was not observed prior to death. The pH of the stock solution was adjusted to that of lake water using HCl.

(+)-sec-Butylamine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48				2	8	
72			1	7	20	
96		1	3	18	20	

RESULTS

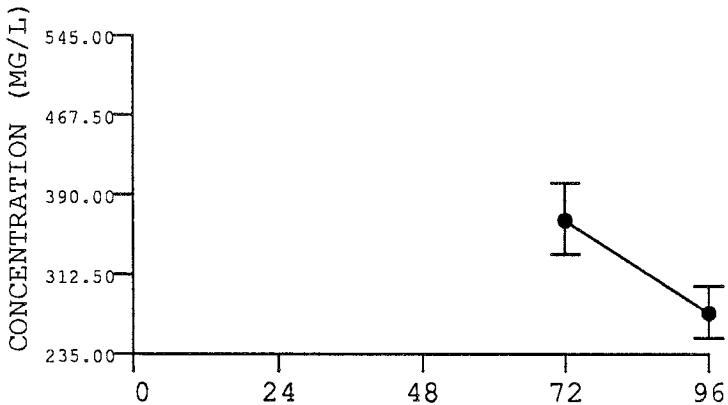
 (MG/L)
 96 HR LC50: 275
 CONF. LIM:
 (250- 301)

***** EFFECT *****

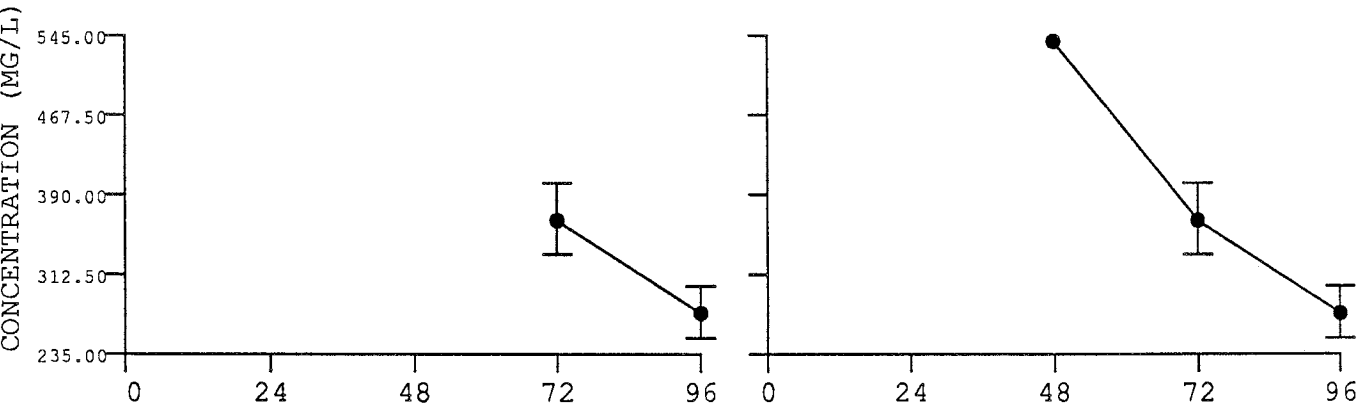
HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48				2	10	
72			1	7	20	
96		1	3	18	20	

 (MG/L)
 96 HR EC50: 275
 CONF. LIM:
 (250- 301)

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: Diethanolamine

TEST DATE: 04/27/87

CAS NUMBER: 111422

MF: C4H11NO2

MWT: 105.14

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 36.2 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 26.0 (0.23)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.24)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 44.3 (0.24)	PH	: 7.8 (0.09)
ALKALINITY (MG/L CaCO3)	: 44.2 (0.85)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.85	4.39	6.75	10.4	16.0
04/27/87	<15	2.32	3.84	6.03	8.90	13.1
04/28/87	<15	2.72	4.60	6.94	9.96	14.6
04/29/87	<15	2.52	3.69	6.14	10.4	15.3
04/30/87	<15	2.73	4.24		9.92	15.6
05/01/87	<15	2.80	4.26	6.60	10.4	15.3
AVERAGE: < 15		2.62	4.13	6.43	9.92	14.8
COR AVE: <14.1		2.47	3.89	6.05	9.34	13.9
PERCENT RECOVERY	106.2 (3.9)		N=10			

FISH SIZES

MEAN LENGTH (mm)	: 19.9	MEAN WEIGHT (G)	: 0.120
SD LENGTH (mm)	: 1.651	SD WEIGHT (G)	: 0.0376
		LOADING (G/L/D)	: 0.1667

REMARKS

Affected fish lost schooling behavior, were hypoactive and had increased respiration. They also had rigid musculature and edema. Equilibrium loss was observed prior to death. The pH of the stock solution was adjusted to that of lake water using HCl.

Diethanolamine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			4	16	20	
48		1	9	17	20	
72	1	2	14	20	20	
96	3	3	19	20	20	

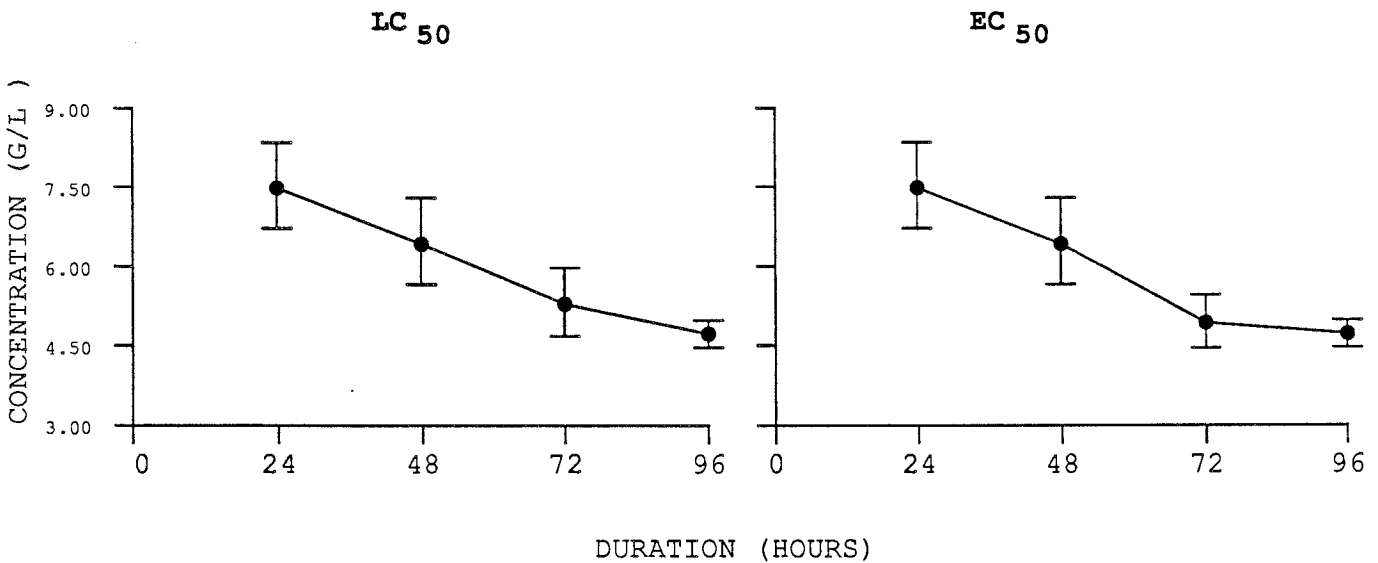
RESULTS

 (G/L)
 96 HR LC50: 4.71
 CONF. LIM:
 (4.46-4.98)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			4	16	20	
48		1	9	17	20	
72	1	2	17	20	20	
96	3	3	19	20	20	

 (G/L)
 96 HR EC50: 4.71
 CONF. LIM:
 (4.46-4.98)



CHEMICAL: Ethyl Acrylate

TEST DATE: 11/14/88

CAS NUMBER: 140885

MF: C5H8O2

MWT: 100.12

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 88.9 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.3 (0.58)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.23)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 46.9 (0.48)	PH	: 7.5 (0.01)
ALKALINITY (MG/L CaCO3)	: 39.7 (0.53)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.77	1.18	1.81	2.78	4.27
11/14/88	<0.2	0.74	1.14	1.32	2.24	3.34
11/15/88	<0.2	0.63	1.02	1.53	2.07	3.50
11/16/88	<0.2	0.92	1.18	1.66	2.05	3.76
11/17/88	<0.2	0.54	0.86	1.23	1.78	3.13
11/18/88	<0.2	0.62	0.92	1.18	1.66	2.80
AVERAGE:	<0.20	0.69	1.02	1.38	1.96	3.31
COR AVE:	<0.20	0.69	1.02	1.38	1.96	3.31
PERCENT RECOVERY	100	(6.34)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.7	MEAN WEIGHT (G)	: 0.095
SD LENGTH (mm)	: 2.003	SD WEIGHT (G)	: 0.0347
		LOADING (G/L/D)	: 0.0528

REMARKS

Affected fish lost schooling behavior and were darkly colored. Equilibrium loss was not observed prior to death.

Ethyl Acrylate

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48					10	
72					19	
96				2	19	

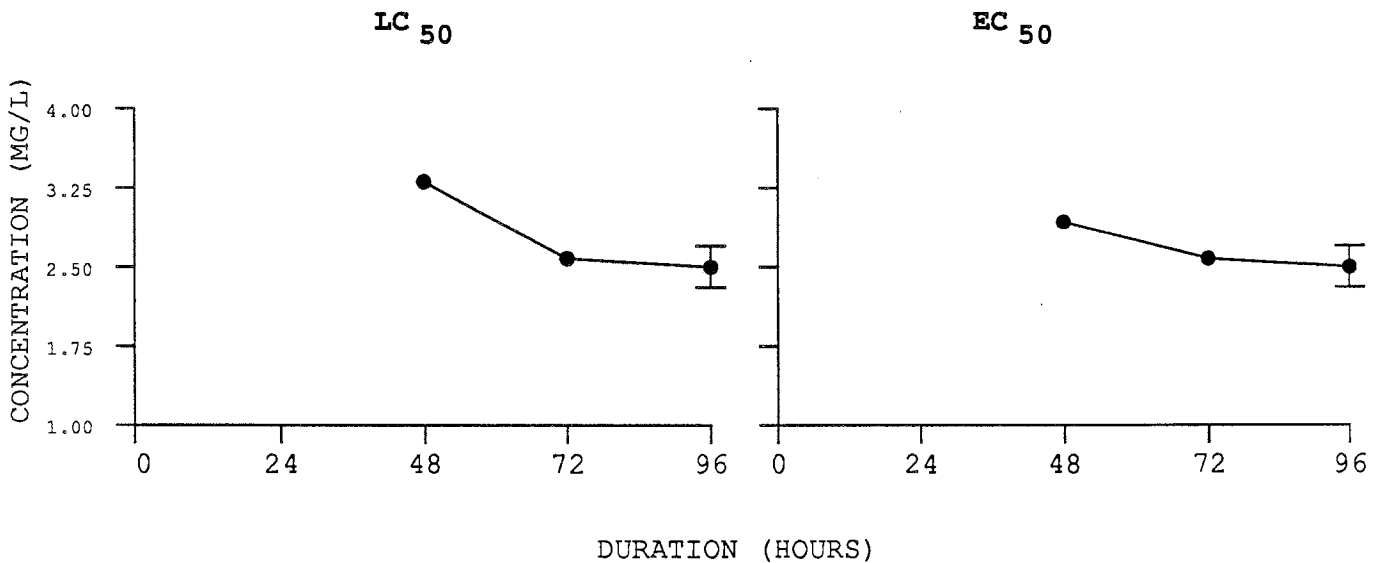
RESULTS

 (MG/L)
 96 HR LC50: 2.50
 CONF. LIM:
 (2.31-2.70)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48					13	
72					19	
96				2	19	

 (MG/L)
 96 HR EC50: 2.50
 CONF. LIM:
 (2.31-2.70)



CHEMICAL: Methyl Methacrylate

TEST DATE: 02/06/89

CAS NUMBER: 80626

MF: C5H8O2

MWT: 100.12

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 3490 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (0.26)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.50)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 46.0 (0.10)	PH	: 7.5 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 38.0 (0.84)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	116	179	275	423	651
02/06/89	<1.0	101	137	207	311	493
02/07/89	<1.0	95.4	136	203	303	483
02/08/89	<1.0	97.4	134	196	287	436
02/09/89	<1.0	94.6	133	199	314	533
02/10/89	<1.0	84.4	125	194	331	557
AVERAGE:	<1.00	94.6	133	200	309	500
COR AVE:	<0.99	94.0	132	199	307	497
PERCENT RECOVERY	100.6	(0.8)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 15.4	MEAN WEIGHT (G)	: 0.054
SD LENGTH (mm)	: 2.114	SD WEIGHT (G)	: 0.0243
		LOADING (G/L/D)	: 0.0300

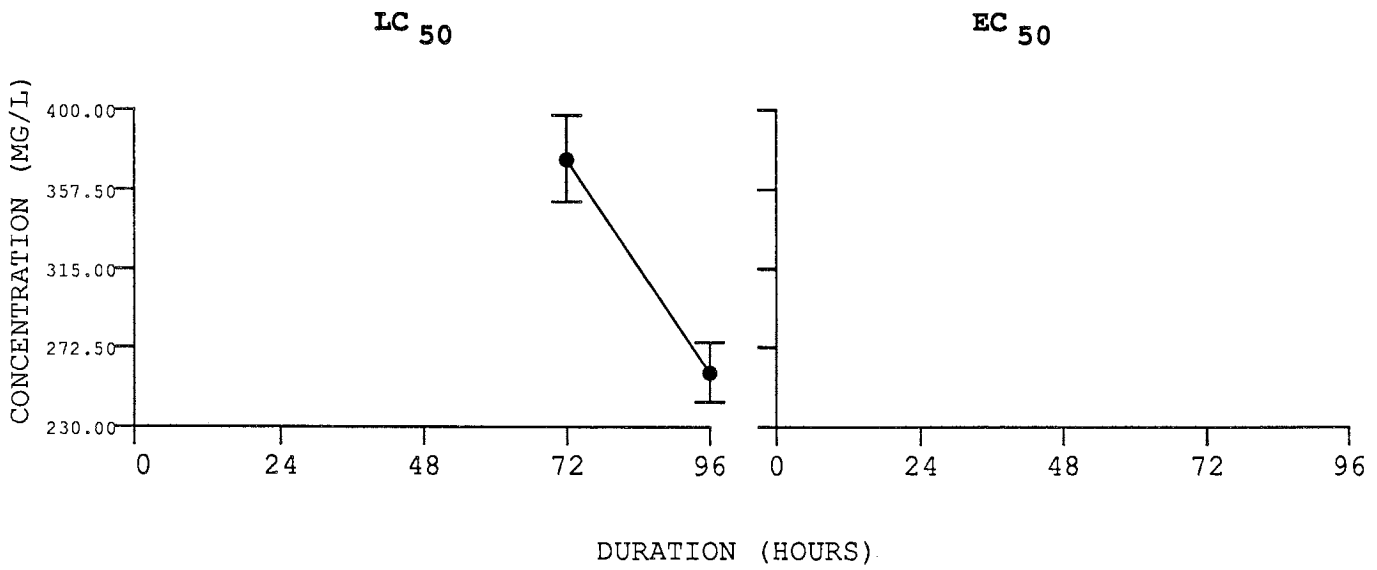
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, swam near the tank surface and were darkly colored. Equilibrium loss was observed prior to death. Effect data could not be used in the calculations because all fish in the treatment tanks were affected throughout the test.

Methyl Methacrylate

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24							*	*
48						9	*	(MG/L)
72				2	20		*	*
96				18	20		*	96 HR LC50: 259
							*	*
							*	CONF. LIM:
							*	(243- 275)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24	20	20	20	20	20	20	*	*
48	20	20	20	20	20	20	*	(MG/L)
72	20	20	20	20	20	20	*	*
96	20	20	20	20	20	20	*	96 HR EC50: <94.0
							*	*
							*	CONF. LIM:
							*	(NOT REL.)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: L-Arabinose

TEST DATE: 12/08/87

CAS NUMBER: 87729

MF: C5H10O5

MWT: 150.13

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 54 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 22.8 (0.17)	TANK VOLUME (L)	: 1.5
DISSOLVED OXYGEN (MG/L)	: 6.0 (0.94)	ADDITIONS (V/D)	: 2
HARDNESS (MG/L CaCO3)	: ()	PH	: 7.3 (0.05)
ALKALINITY (MG/L CaCO3)	: ()		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.38	6.75	13.5	27.0	54.0
12/07/87	<.04	3.32	7.24	16.2	25.2	53.1
12/08/87	<.04	3.15	5.95	13.1	23.2	41.1
12/09/87	<.04	1.90	5.51	17.0	40.5	51.6
12/10/87	<.04	3.67	8.61	18.4	32.1	
12/11/87	<.04	2.56	7.81	17.5	25.4	
AVERAGE:	<0.04	2.92	7.02	16.4	29.3	48.6
COR AVE:	<0.04	2.92	7.02	16.4	29.3	48.6
PERCENT RECOVERY		100.07 (9.05)	N=7			

FISH SIZES

MEAN LENGTH (mm) : 18.6	MEAN WEIGHT (G) : 0.083
SD LENGTH (mm) : 1.140	SD WEIGHT (G) : 0.0191
	LOADING (G/L/D) : 0.1385

REMARKS

Due to the large quantity of chemical needed to complete a flow-through test, a measured static test was conducted using 2-L battery jars and a reduced amount of chemical. Behavioral data were not recorded. Alkalinity and hardness measurements were not taken.

L-Arabinose

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	5	5	5	5	5	5
24						5
48						5
72						5
96						5

RESULTS

 (G/L)
 96 HR LC50: 37.7
 CONF. LIM:
 (NOT REL.)

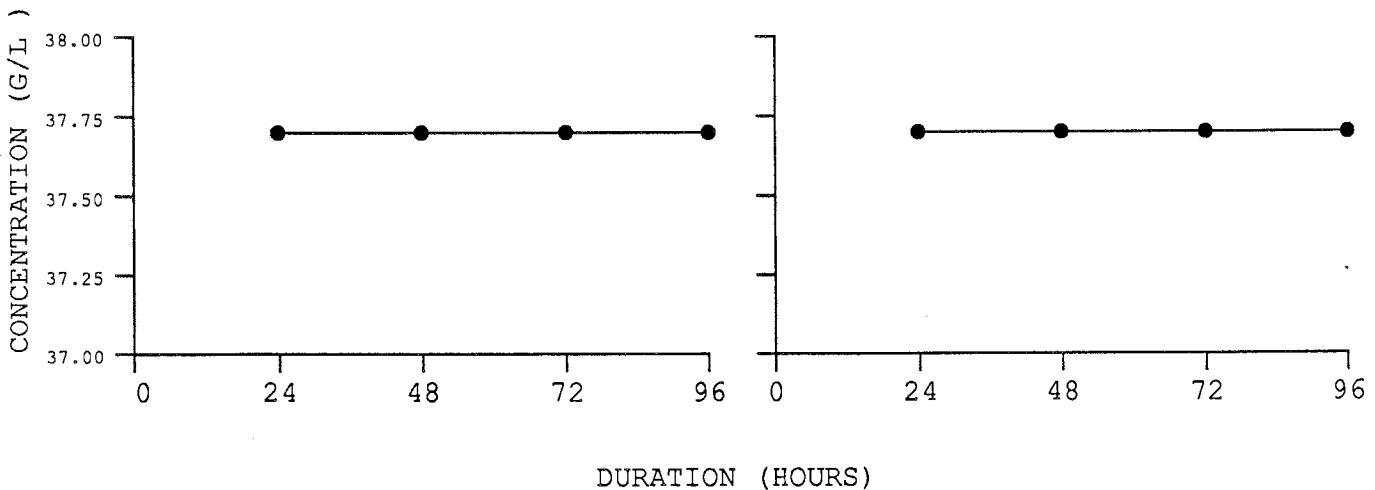
***** EFFECT *****

INITIAL	5	5	5	5	5	5
24						5
48						5
72						5
96						5

 (G/L)
 96 HR EC50: 37.7
 CONF. LIM:
 (NOT REL.)

LC 50

EC 50



CHEMICAL: Pentachlorophenol (Test 6)

TEST DATE: 05/20/82

CAS NUMBER: 87865

MF: C6HCl5O

MWT: 266.34

CHEMICAL SOURCE: Dow Chemical Co.

PURITY: 88%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 21.9 (0.10)	TANK VOLUME (L)	: 0.6
DISSOLVED OXYGEN (MG/L)	: 8.0 (0.15)	ADDITIONS (V/D)	: 36
HARDNESS (MG/L CaCO ₃)	: 42.7 (0.00)	PH	: 6.6 (0.00)
ALKALINITY (MG/L CaCO ₃)	: ()		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	16.2	32.5	65	130	260
05/20/82						
05/21/82	<0.3	12.4	27.6	52.7	112	212
05/22/82						
05/23/82						
05/24/82						
AVERAGE:	<0.30	12.4	27.6	52.7	112	212
COR AVE:	<0.31	12.9	28.8	54.9	117	221
PERCENT RECOVERY	96.0	(0.0)	N=1			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

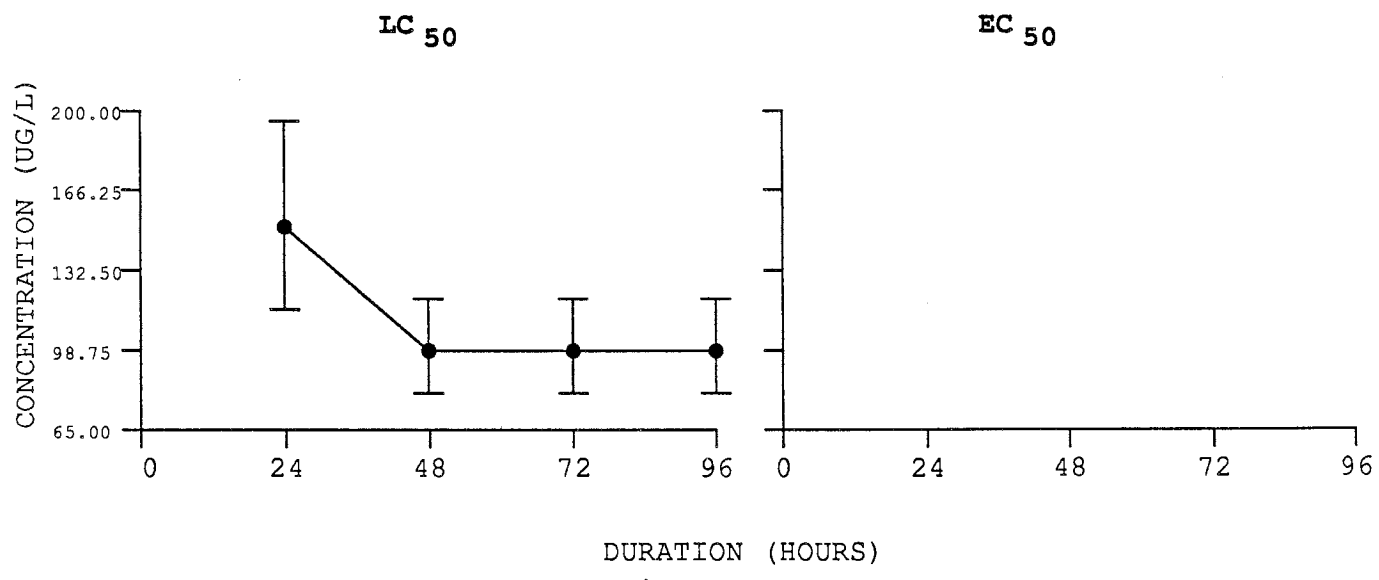
REMARKS

The pH of the test water was approximately 6.6. Individual lengths and weights of the test fish were not recorded. No effect or behavioral data were recorded. The diluter stock solutions were prepared from superstock solutions containing the chemical, NaOH and distilled water. Alkalinity values were omitted from this test due to erroneous titrations.

Pentachlorophenol (Test 6)

***** MORTALITIES *****													RESULTS																											
HOUR	CON		A		B		C		D		E																													
INITIAL	5	5	5	5	5	5	5	5	5	5	5	5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
24									1	1	5	4	*														*													
48									4	3	5	5	*	(UG/L)													*													
72									4	3	5	5	*	96 HR LC50: 98.6													*													
96									4	3	5	5	*	CONF. LIM:													*													
													*	(80.6- 121)													*													
													*														*													
													*														*													
													*														*													
													*														*													
													*														*													

***** EFFECT *****																											
INITIAL	5		5		5		5		5		5																
24													*														*
48													*	(UG/L)													*
72													*	96 HR EC50: NOT DET.													*
96													*	CONF. LIM:													*
													*	()													*
													*														*
													*														*
													*														*
													*														*



CHEMICAL: Pentachlorophenol (Test 7)

TEST DATE: 05/20/82

CAS NUMBER: 87865

MF: C6HCl5O

MWT: 266.34

CHEMICAL SOURCE: Dow Chemical Co.

PURITY: 88%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 21.7 (0.12)	TANK VOLUME (L)	: 0.6
DISSOLVED OXYGEN (MG/L)	: 8.0 (0.05)	ADDITIONS (V/D)	: 36
HARDNESS (MG/L CaCO ₃)	: 42.7 (0.00)	PH	: 7.5 (0.00)
ALKALINITY (MG/L CaCO ₃)	: ()		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	33	66	133	265	530
05/20/82						
05/21/82	<0.3	14.4	37.5	89.0	201	453
05/22/82						
05/23/82						
05/24/82						
AVERAGE:	<0.30	14.4	37.5	89.0	201	453
COR AVE:	<0.31	14.7	38.3	90.8	205	462
PERCENT RECOVERY	98.0	(0.0)	N=1			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

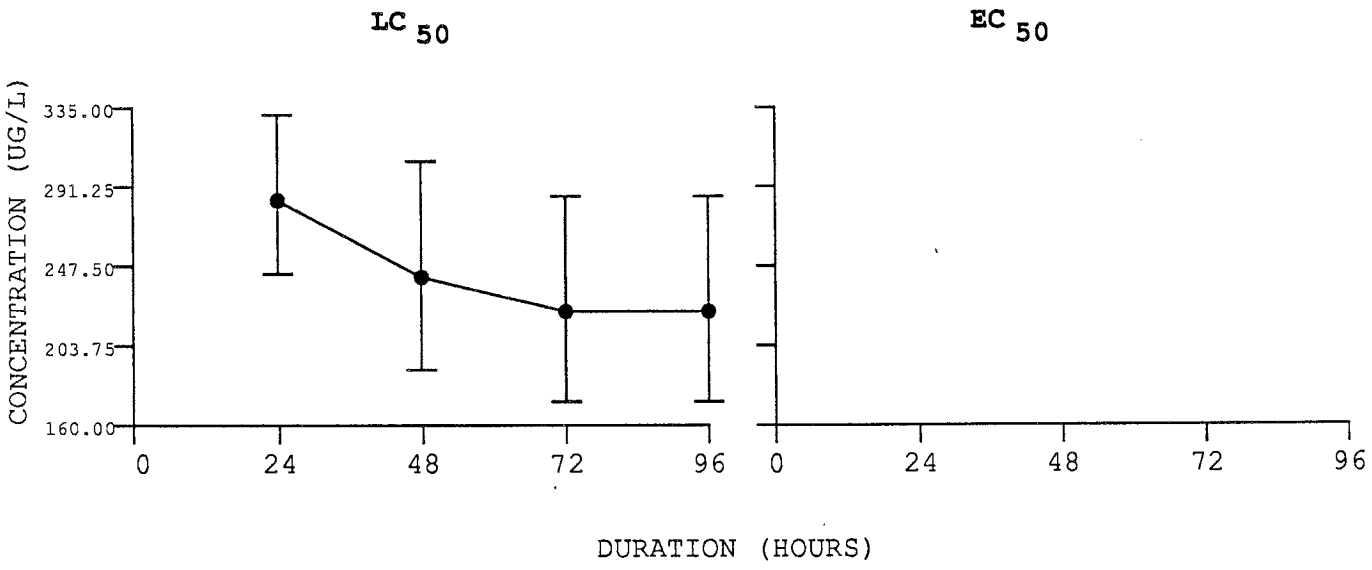
REMARKS

The pH of the test water was approximately 7.5. Individual lengths and weights of the test fish were not recorded. No effect or behavioral data were recorded. The diluter stock solutions were prepared from superstock solutions containing the chemical, NaOH and distilled water. Alkalinity values were omitted from this test due to erroneous titrations.

Pentachlorophenol (Test 7)

***** MORTALITIES *****												***** RESULTS *****											
HR	CON	A	B	C	D	E																	
INITIAL	5	5	5	5	5	5	5	5	5	5	5	* * * * *											
24									1	5	5	* (UG/L) *											
48								2	1	5	5	* 96 HR LC50: 222 *											
72								2	2	5	5	* CONF. LIM: *											
96								2	2	5	5	* (173- 286) *											

***** EFFECT *****												***** ***** *****											
HR	CON	A	B	C	D	E																	
INITIAL	5	5	5	5	5	5	5	5	5	5	5	* * * * *											
24												* (UG/L) *											
48												* 96 HR EC50: NOT DET. *											
72												* CONF. LIM: *											
96												* () *											



CHEMICAL: Pentachlorophenol (Test 8)

TEST DATE: 06/11/82

CAS NUMBER: 87865

MF: C6HCl5O

MWT: 266.34

CHEMICAL SOURCE: Dow Chemical Co.

PURITY: 88%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 22.1 (0.00)	TANK VOLUME (L)	: 0.6
DISSOLVED OXYGEN (MG/L)	: 8.1 (0.13)	ADDITIONS (V/D)	: 36
HARDNESS (MG/L CaCO3)	: 44.6 (0.00)	PH	: 7.8 (0.00)
ALKALINITY (MG/L CaCO3)	: 41.6 (0.00)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
06/11/82	<0.3	60	148	341	720	1479
06/12/82						
06/13/82						
06/14/82						
06/15/82						
AVERAGE:	<0.30	60	148	341	720	1479
COR AVE:	<0.30	60.0	148	341	720	1479
PERCENT RECOVERY	100	(0.0)	N=1			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

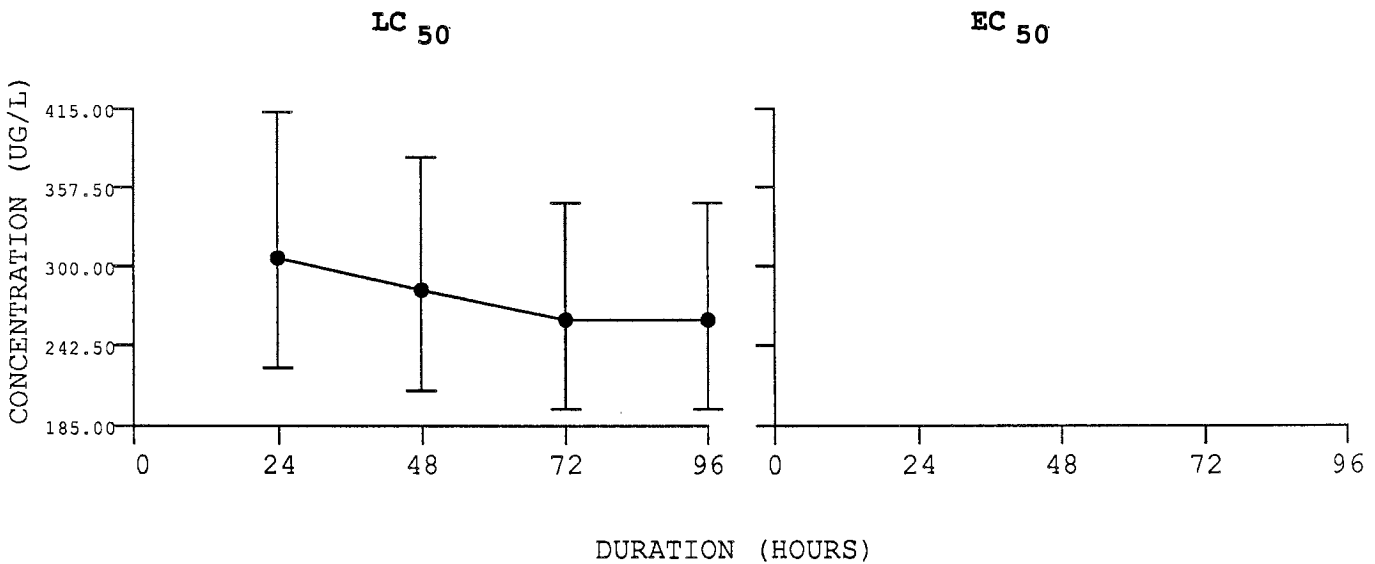
REMARKS

The pH of the test water was 7.8. Nominal concentrations were not recorded. Individual lengths and weights of the test fish were not recorded. No effect or behavioral data were recorded. The diluter stock solutions were prepared from superstock solutions containing the chemical, NaOH and distilled water.

Pentachlorophenol (Test 8)

***** MORTALITIES *****												***** RESULTS *****												
HOUR	CON		A		B		C		D		E													
INITIAL	5	5	5	5	5	5	5	5	5	5	5	5	* * * * *											
24					1	1	4	5	5	5	5	5	* * * * *											
48					1	2	4	5	5	5	5	5	* (UG/L) *											
72					1	3	4	5	5	5	5	5	* * * * *											
96					1	3	4	5	5	5	5	5	* 96 HR LC50: 261 *											
												* * * * *												
												* CONF. LIM: *												
												* (197- 346) *												
												* * * * *												

***** EFFECT *****												***** *****												
INITIAL	5		5		5		5		5		5													
INITIAL	5	5	5	5	5	5	5	5	5	5	5	5	* * * * *											
24													* * * * *											
48													* (UG/L) *											
72													* * * * *											
96													* 96 HR EC50: NOT DET. *											
												* * * * *												
												* CONF. LIM: *												
												* () *												
												* * * * *												



CHEMICAL: Pentachlorophenol (Test 9)

TEST DATE: 06/11/82

CAS NUMBER: 87865

MF: C6HC15O

MWT: 266.34

CHEMICAL SOURCE: Dow Chemical Co.

PURITY: 88%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 22.3 (0.00)	TANK VOLUME (L)	: 0.6
DISSOLVED OXYGEN (MG/L)	: 8.0 (0.19)	ADDITIONS (V/D)	: 36
HARDNESS (MG/L CaCO ₃)	: 42.7 (0.00)	PH	: 8.7 (0.00)
ALKALINITY (MG/L CaCO ₃)	: 52.5 (0.00)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
06/11/82	<0.3	248	453	765	1492	2932
06/12/82						
06/13/82						
06/14/82						
06/15/82						
AVERAGE:	<0.30	248	453	765	1492	2932
COR AVE:	<0.30	251	458	773	1507	2962
PERCENT RECOVERY	99.0	(0.0)	N=1			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

REMARKS

The pH of the test water was 8.7. Nominal concentrations were not recorded. Individual lengths and weights of the test fish were not recorded. No effect or behavioral data were recorded. The diluter stock solutions were prepared from superstock solutions containing the chemical, NaOH and distilled water.

CHEMICAL: 1,2,4-Trichlorobenzene

TEST DATE: 10/28/85

CAS NUMBER: 120821

MF: C6H3Cl3

MWT: 181.45

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Emulsified

ORGANISM: Fathead Minnow

AGE: 38-43 D

TEST CONDITIONS

TEMPERATURE (C)	: 16.6 (0.00)	TANK VOLUME (L)	: 41
DISSOLVED OXYGEN (MG/L)	: 9.5 (0.61)	ADDITIONS (V/D)	: 7.6
HARDNESS (MG/L CaCO3)	: 44.0 (0.87)	PH	: 7.2 (0.14)
ALKALINITY (MG/L CaCO3)	: 41.5 (0.35)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E					
NOMINAL:	0	312	625	1250	2500	5000					
10/28/85											
10/29/85	<20	249	411	535	1470	4140					
10/30/85	<20	292	589	946	1830	4480					
10/31/85	<20	342	604	746	1860	5210					
11/01/85	<20	500	762	1240	3360	6620					
AVERAGE:	< 20 < 20	396	296	676	508	1093	641	2595	1665	5550	4675
COR AVE:	<18.8 <18.8	372	278	635	477	1027	602	2439	1565	5216	4394
PERCENT RECOVERY	106.4 (7.4)	N=4									

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

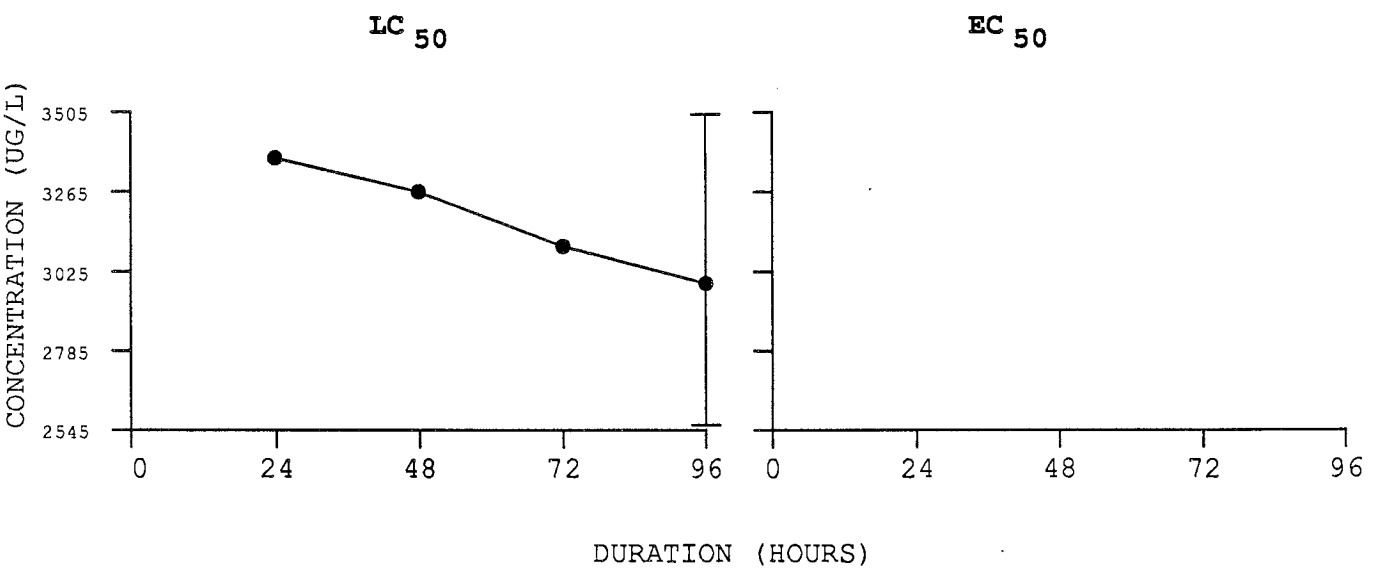
REMARKS

Affected fish lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.154 g. Samples were not taken at 0 hr for determination of toxicant concentrations. The tank volume ranged from 40-42 L.

1,2,4-Trichlorobenzene

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	19	19		* * * * *
24					16		* * * * *
48					17		* (UG/L) *
72					19		* * * * *
96				2	19		* 96 HR LC50: 2990 *
							* * * * *
							* CONF. LIM: *
							* (2560-3500) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	19	19		* * * * *
24							* * * * *
48							* (UG/L) *
72							* * * * *
96							* 96 HR EC50: NOT DET. *
							* * * * *
							* CONF. LIM: *
							* () *
							* * * * *



CHEMICAL: 2,4,6-Trichlorophenol (Test 3)

TEST DATE: 06/09/86

CAS NUMBER: 88062

MF: C6H3Cl3O

MWT: 197.45

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 3980 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 38-47 D

TEST CONDITIONS

TEMPERATURE (C)	: 16.7 (0.00)	TANK VOLUME (L)	: 41
DISSOLVED OXYGEN (MG/L)	: 7.7 (0.25)	ADDITIONS (V/D)	: 7.0
HARDNESS (MG/L CaCO3)	: 46.2 (0.00)	PH	: 7.6 (0.07)
ALKALINITY (MG/L CaCO3)	: 43.6 (1.46)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E						
NOMINAL:	0	0.94	1.88	3.75	7.50	15.0						
06/09/86	<0.1	0.86	1.55	3.32	6.86	13.9						
06/10/86	<0.1	1.00	1.80	3.34	7.17	13.7						
06/11/86	<0.1	0.83	1.62	3.21	6.79	13.4						
06/12/86	<0.1	1.01	1.80	3.43	6.70	13.9						
06/13/86	<0.1	0.75	1.40	3.41	6.73	12.6						
AVERAGE:	<0.10	<0.10	0.81	1.00	1.52	1.80	3.31	3.38	6.79	6.93	13.3	13.8
COR AVE:	<0.10	<0.10	0.83	1.03	1.56	1.84	3.38	3.46	6.94	7.08	13.6	14.1
PERCENT RECOVERY		97.9	(4.90)	N=5								

FISH SIZES

MEAN LENGTH (mm) : 0.0
SD LENGTH (mm) : 0.000

MEAN WEIGHT (G) : 0.000
SD WEIGHT (G) : 0.0000
LOADING (G/L/D) : 0.0000

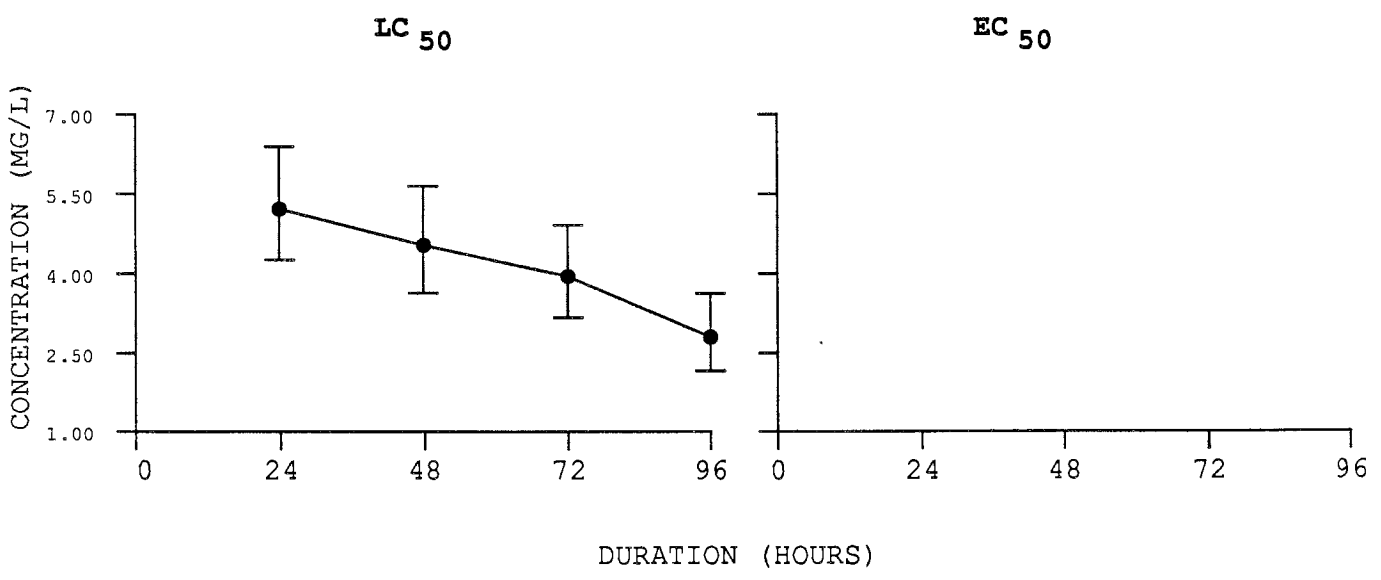
REMARKS

Affected fish swam at the water's surface in a spiral motion, were hyperactive and had edema. They also lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.22 g.

2,4,6-Trichlorophenol (Test 3)

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				5	13	20	*	*
48		1	7	14	20		*	(MG/L)
72		2	8	16	20		*	*
96	1	6	12	17	20		*	96 HR LC50: 2.80
							*	*
							*	CONF. LIM:
							*	(2.16-3.63)
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24							*	*
48							*	(MG/L)
72							*	*
96							*	96 HR EC50: NOT DET.
							*	*
							*	CONF. LIM:
							*	()
							*	*
							*	*
							*	*
							*	*



CHEMICAL: 2,4,6-Triiodophenol

TEST DATE: 10/06/86

CAS NUMBER: 609234

MF: C6H3I3O

MWT: 471.80

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 7.0 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.6 (0.57)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.24)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 49.7 (0.54)	PH	: 7.6 (0.05)
ALKALINITY (MG/L CaCO ₃)	: 49.6 (1.25)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.53	0.82	1.27	1.96	3.01
10/06/86						
10/07/86	<.07	.467	.780	1.27	2.04	2.95
10/08/86	<.07	.487	.879	1.49	2.21	3.15
10/09/86	<.07	.383	.678	1.28	1.94	2.97
10/10/86	<.07	.538	.809	1.37	2.17	3.07
AVERAGE:	<0.07	0.47	0.79	1.35	2.09	3.04
COR AVE:	<0.07	0.48	0.80	1.38	2.13	3.10
PERCENT RECOVERY		97.9	(4.9)	N=7		

FISH SIZES

MEAN LENGTH (mm):	20.6	MEAN WEIGHT (G)	: 0.138
SD LENGTH (mm)	: 2.137	SD WEIGHT (G)	: 0.0451
		LOADING (G/L/D)	: 0.1917

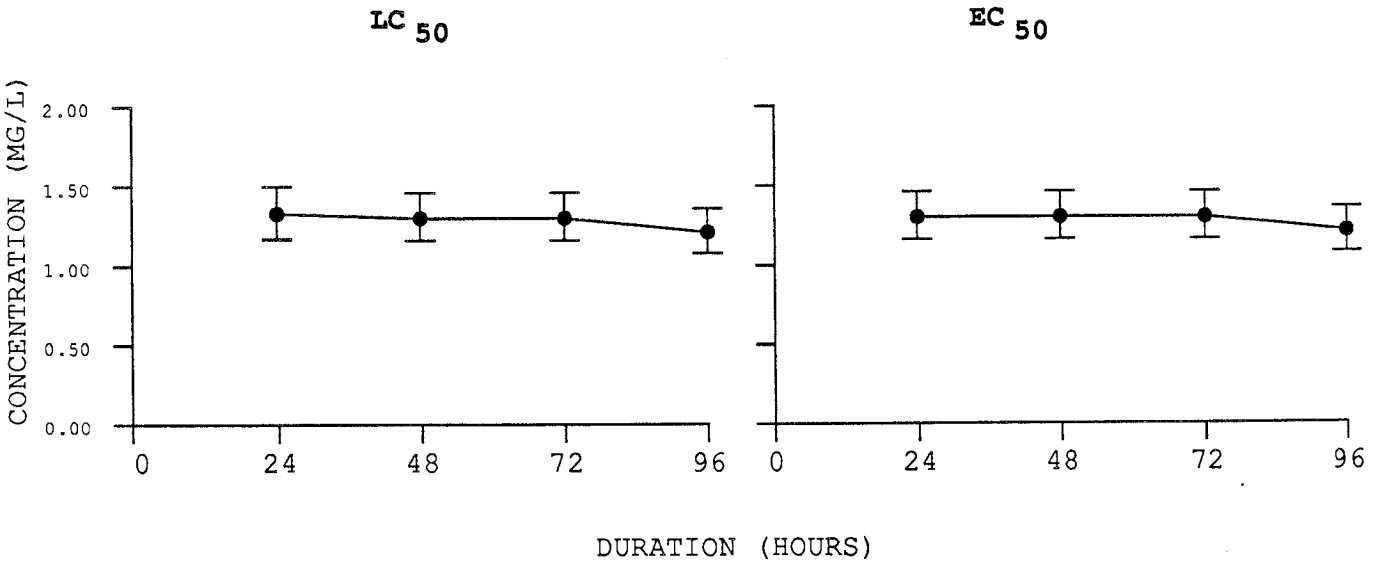
REMARKS

Affected fish lost schooling behavior, were overreactive to external stimuli, had increased respiration and convulsions. Equilibrium loss was observed prior to death. The 0-hr measurements were unreasonably low and not used due to a diluter malfunction and sampling of the tanks before they had reached equilibrium. Due to sensitivity of the chemical to light, the diluter was covered throughout the test. NaOH was added, increasing the amount of chemical in solution. HCl was then added to the solution, readjusting the pH to that of lake water.

2,4,6-Triiodophenol

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24			13	17	20		*	*
48			13	18	20		*	(MG/L)
72			13	18	20		*	*
96	1		15	18	20		*	96 HR LC50: 1.21
							*	*
							*	CONF. LIM:
							*	(1.08-1.36)
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24			13	18	20		*	*
48			13	18	20		*	(MG/L)
72			13	18	20		*	*
96	1		15	18	20		*	96 HR EC50: 1.21
							*	*
							*	CONF. LIM:
							*	(1.08-1.36)
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: 2,4-Dinitrophenol (Test 8)

TEST DATE: 12/16/85

CAS NUMBER: 51285

MF: C6H4N2O5

MWT: 184.11

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 85%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 2940 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 47-50 D

TEST CONDITIONS

TEMPERATURE (C)	: 17.3 (0.00)	TANK VOLUME (L)	: 41
DISSOLVED OXYGEN (MG/L)	: 8.3 (1.59)	ADDITIONS (V/D)	: 7.3
HARDNESS (MG/L CaCO ₃)	: 44.5 (0.29)	PH	: 7.6 (0.16)
ALKALINITY (MG/L CaCO ₃)	: 45.9 (2.74)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.12	6.25	12.5	25.0	50.0
12/16/85	<0.5	3.29	5.51	12.5	23.8	46.2
12/17/85	<0.5	3.67	6.16	12.3	25.2	48.8
12/18/85	<0.5	3.48	5.98	12.9	23.3	48.3
12/19/85	<0.5	3.64	5.99	13.0	25.1	49.0
12/20/85						
AVERAGE:	<0.50	3.38	5.75	12.7	23.5	47.3
COR AVE:	<0.49	3.29	5.59	12.4	22.9	46.0
PERCENT RECOVERY	102.8	(2.51)	N=4			

FISH SIZES

MEAN LENGTH (mm) : 0.0
SD LENGTH (mm) : 0.000

MEAN WEIGHT (G) : 0.000
SD WEIGHT (G) : 0.0000
LOADING (G/L/D) : 0.0000

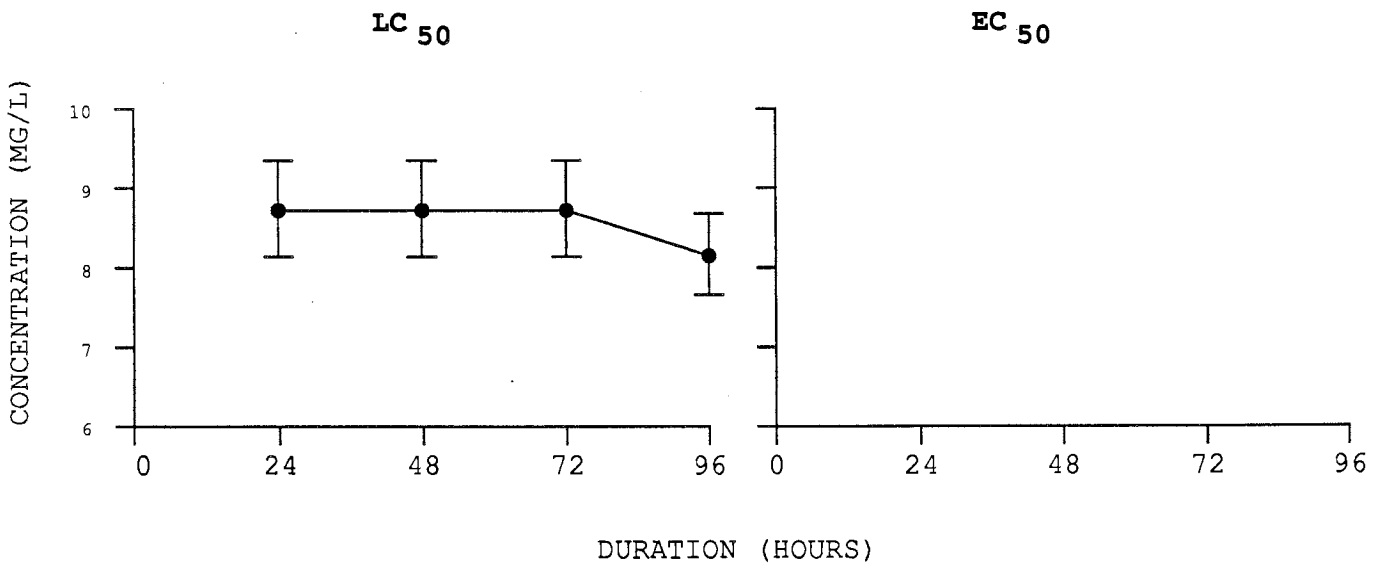
REMARKS

Behavioral observations were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.18 g. NaOH was mixed with the chemical to increase its solubility rate in water. The resulting stock solution was titrated back to pH 7.9 with 5M HCl before being pumped to the diluter. Samples were not taken at 96 hr for determination of toxicant concentrations. The tank volume ranged from 40-42 L. The reduced purity was caused by waters of hydration.

2,4-Dinitrophenol (Test 8)

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24			19	20	20		* * * * *
48			19	20	20		(MG/L)
72			19	20	20		
96		1	20	20	20		96 HR LC50: 8.15
							CONF. LIM:
							(7.66-8.68)
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24							* * * * *
48							(MG/L)
72							
96							96 HR EC50: NOT DET.
							CONF. LIM:
							()
							* * * * *



CHEMICAL: 2,4-Dinitrophenol (Test 9)

TEST DATE: 08/15/88

CAS NUMBER: 51285

MF: C6H4N2O5

MWT: 184.11

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 85%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 362 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.4 (0.71)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.38)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.7 (0.43)	PH	: 7.5 (0.02)
ALKALINITY (MG/L CaCO3)	: 38.7 (0.17)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.18	4.90	7.54	11.6	17.8
08/15/88	<0.2	3.35	4.42	6.75	10.0	15.2
08/16/88	<0.2	3.86	5.24		11.4	17.1
08/17/88	<0.2	3.91	5.44	7.97	11.9	17.6
08/18/88	<0.2	3.97	5.34	7.62	11.3	17.9
08/19/88	<0.2	3.80	5.26	7.88	11.9	17.6
AVERAGE:	<0.20	3.78	5.14	7.56	11.3	17.1
COR AVE:	<0.20	3.70	5.03	7.39	11.1	16.7
PERCENT RECOVERY		102.2 (3.3)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 13.4	MEAN WEIGHT (G)	: 0.029
SD LENGTH (mm)	: 1.635	SD WEIGHT (G)	: 0.0141
		LOADING (G/L/D)	: 0.0161

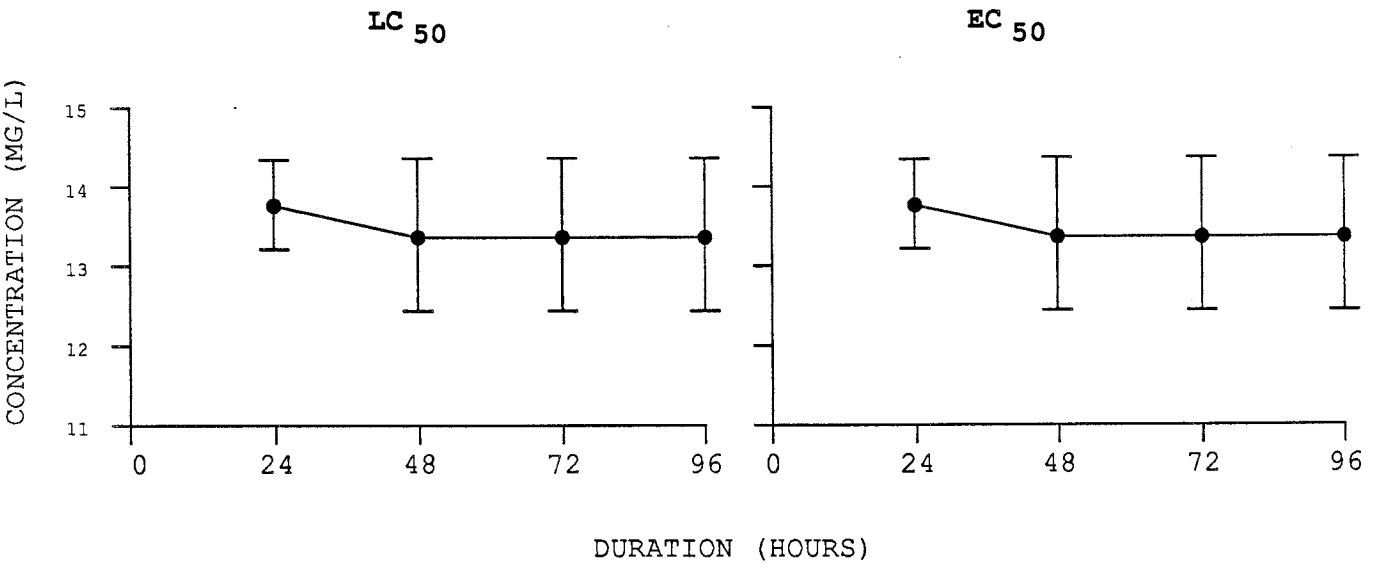
REMARKS

Affected fish lost schooling behavior, were overreactive to external stimuli and had increased respiration. Equilibrium loss was observed prior to death. The reduced purity was caused by waters of hydration. Two acute tests were run with this chemical simultaneously for the purpose of comparing two different strains of fathead minnows. Fathead minnows from the Newtown, Ohio lab (U.S. EPA) were used with 2,4-dinitrophenol (test 9) and fish from the ERL-D lab were used with 2,4-dinitrophenol (test 10). NaOH was added to the stock, increasing the solubility rate of the chemical.

2,4-Dinitrophenol (Test 9)

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24					1	18	*	*
48					2	19	*	(MG/L)
72					2	19	*	*
96					2	19	*	96 HR LC50: 13.3
							*	*
							*	CONF. LIM:
							*	(12.4-14.3)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24					1	18	*	*
48					2	19	*	(MG/L)
72					2	19	*	*
96					2	19	*	96 HR EC50: 13.3
							*	*
							*	CONF. LIM:
							*	(12.4-14.3)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: 2,4-Dinitrophenol (Test 10)

TEST DATE: 08/15/88

CAS NUMBER: 51285

MF: C6H4N2O5

MWT: 184.11

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 85%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 368 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.8 (0.69)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.2 (0.16)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.7 (0.25)	PH	: 7.5 (0.03)
ALKALINITY (MG/L CaCO3)	: 38.7 (0.24)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.02	4.65	7.15	11.0	17.0
08/15/88	<0.2	3.23	4.28	6.44	9.15	14.5
08/16/88	<0.2	3.98	5.39	7.71	11.1	17.2
08/17/88	<0.2	4.44	5.04	7.54	11.3	17.5
08/18/88	<0.2	3.89	5.46	8.13	12.0	17.7
08/19/88	<0.2	4.15	5.39	8.04	11.8	18.7
AVERAGE:	<0.20	3.94	5.11	7.57	11.1	17.1
COR AVE:	<0.20	3.85	5.00	7.41	10.8	16.8
PERCENT RECOVERY		102.2 (3.3)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 17.1
SD LENGTH (mm) : 3.313

MEAN WEIGHT (G) : 0.073
SD WEIGHT (G) : 0.0457
LOADING (G/L/D) : 0.0406

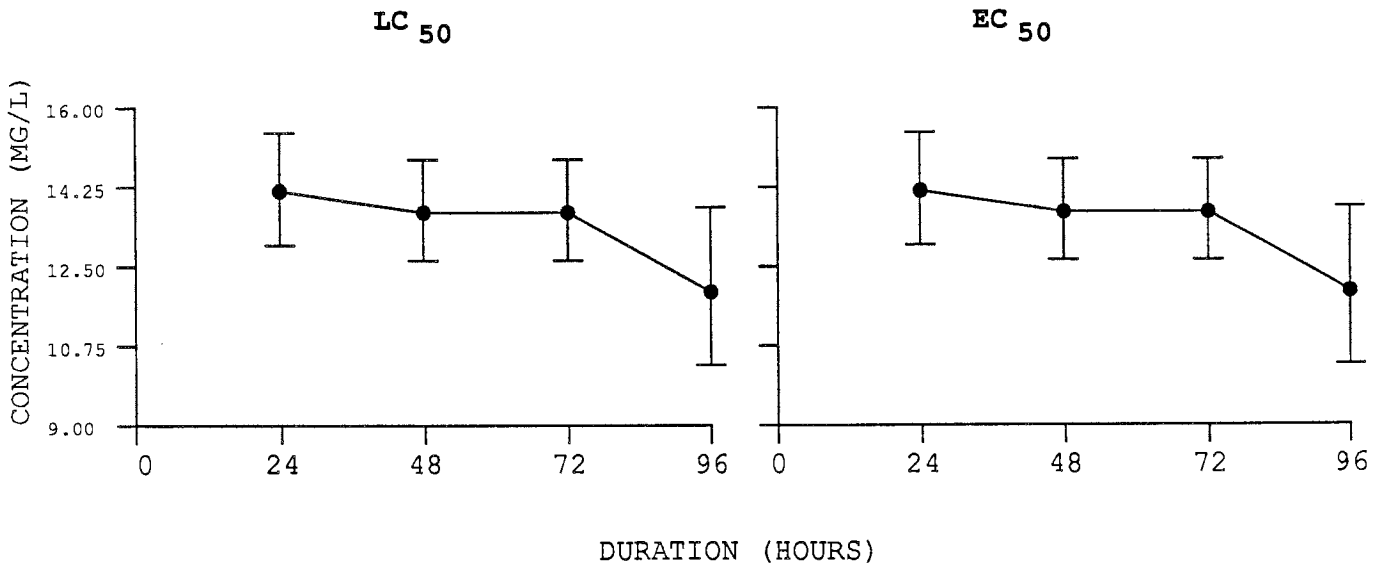
REMARKS

Affected fish lost schooling behavior, were overreactive to external stimuli and had increased respiration. Equilibrium loss was observed prior to death. The reduced purity was caused by waters of hydration. Two acute tests were run with this chemical simultaneously for the purpose of comparing two different strains of fathead minnows. Fathead minnows from the Newtown, Ohio lab (U.S. EPA) were used with 2,4-dinitrophenol (test 9) and fish from the ERL-D lab were used with 2,4-dinitrophenol (test 10). NaOH was added to the stock, increasing the solubility rate of the chemical.

2,4-Dinitrophenol (Test 10)

***** MORTALITIES *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	15		* * * * *
48				3	16		(MG/L)
72				3	16		* * * * *
96				8	17		96 HR LC50: 11.9
							CONF. LIM: (10.3-13.8)
							* * * * *

***** EFFECT *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	15		* * * * *
48				3	16		(MG/L)
72				3	16		* * * * *
96				8	17		96 HR EC50: 11.9
							CONF. LIM: (10.3-13.8)
							* * * * *



CHEMICAL: 2,6-Dinitrophenol

TEST DATE: 05/06/87

CAS NUMBER: 573568

MF: C6H4N2O5

MWT: 184.10

CHEMICAL SOURCE: Lancaster Synthesis Ltd.

PURITY: 80%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 230 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.58)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.88)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.9 (0.30)	PH	: 7.7 (0.11)
ALKALINITY (MG/L CaCO3)	: 44.9 (1.04)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	8.45	13.0	20.0	30.8	47.4
05/06/87	0.4	8.7	12.7	20.0	29.1	45.0
05/07/87	0.4	8.5	12.7	20.2	29.8	46.8
05/08/87	0.4	9.0	12.6	20.0	31.0	47.9
05/09/87		12.8	15.4	21.6	35.7	52.2
05/10/87		17.3	18.0	25.7	40.0	58.1
AVERAGE:	0.40	11.3	14.3	21.5	33.1	50.0
COR AVE:	0.41	11.4	14.5	21.8	33.6	50.7
PERCENT RECOVERY	98.7	(2.0) N=6				

FISH SIZES

MEAN LENGTH (mm) : 20.8
SD LENGTH (mm) : 1.542

MEAN WEIGHT (G) : 0.129
SD WEIGHT (G) : 0.0344
LOADING (G/L/D) : 0.0717

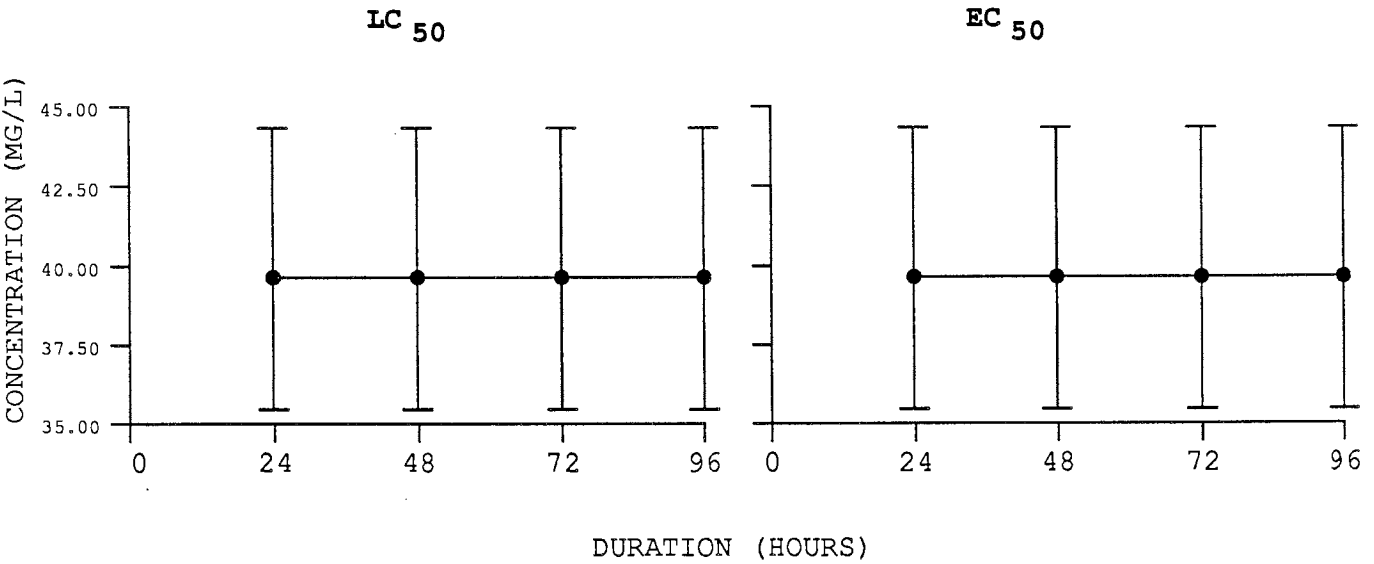
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli and lost equilibrium prior to death. NaOH was added to the stock solution to increase the solubility rate of the chemical. The pH of the stock solution was then readjusted to that of lake water using HCl. The reduced purity was caused by waters of hydration. The 96-hr toxicant measurements were high due to a diluter malfunction.

2,6-Dinitrophenol

***** MORTALITIES *****							RESULTS												
HOURL	CON	A	B	C	D	E													
INITIAL	20	20	20	20	20		*	*	*	*	*	*	*	*	*	*	*	*	*
24				4	18		*												*
48				4	18		*		(MG/L)										*
72				4	18		*												*
96				4	18		*		96 HR LC50: 39.7										*
							*												*
							*		CONF. LIM:										*
							*		(35.5-44.4)										*
							*												*
							*												*
							*	*	*	*	*	*	*	*	*	*	*	*	*

***** EFFECT *****																			
INITIAL	CON	A	B	C	D	E													
INITIAL	20	20	20	20	20		*	*	*	*	*	*	*	*	*	*	*	*	*
24				4	18		*												*
48				4	18		*		(MG/L)										*
72				4	18		*												*
96				4	18		*		96 HR EC50: 39.7										*
							*												*
							*		CONF. LIM:										*
							*		(35.5-44.4)										*
							*												*
							*												*
							*	*	*	*	*	*	*	*	*	*	*	*	*



CHEMICAL: Chlorobenzene

TEST DATE: 02/02/87

CAS NUMBER: 108907

MF: C6H5Cl

MWT: 112.56

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 269 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.7 (0.56)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.2 (0.49)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 43.8 (0.65)	PH	: 7.5 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 43.4 (0.75)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	21.4	33.0	50.7	78.0	120
02/02/87	<.10	4.25	6.75	8.99	11.7	22.8
02/03/87	<.10	5.00	7.79	10.8	15.9	43.9
02/04/87		5.48	8.58	11.9	21.7	49.8
02/05/87	<.10	5.20	9.78	12.6	21.0	38.2
02/06/87		5.60	11.7	14.2	25.1	44.5
AVERAGE:	<0.10	5.11	8.92	11.7	19.1	39.8
COR AVE:	<0.10	5.06	8.83	11.6	18.9	39.4
PERCENT RECOVERY		101.0 (2.1)	N=6			

FISH SIZES

MEAN LENGTH (mm)	: 17.8	MEAN WEIGHT (G)	: 0.083
SD LENGTH (mm)	: 1.209	SD WEIGHT (G)	: 0.0137
		LOADING (G/L/D)	: 0.1153

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had convulsions. They also had rigid musculature, were darkly colored, had spinal column deformities and lost equilibrium prior to death. Measured concentrations were lower than nominal concentrations due to volatility. The chemical produced an unusual mortality pattern in the test organisms, however, it is consistent with results obtained from other tests using halogenated benzenes.

Chlorobenzene

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			1			19
48		2	1	1		19
72		10	1	1		19
96		15	3	4		19

RESULTS

 (MG/L)
 96 HR LC50: 16.9
 CONF. LIM:
 (13.8-20.6)

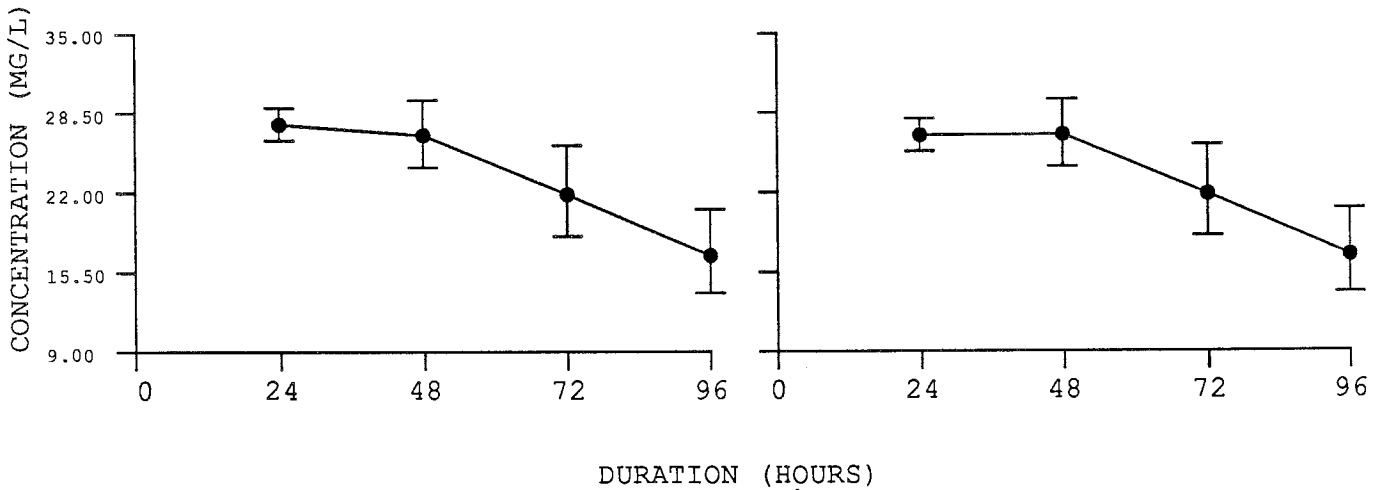
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			1			20
48		2	1	1		19
72		10	1	1		19
96		15	3	4		19

 (MG/L)
 96 HR EC50: 16.9
 CONF. LIM:
 (13.8-20.6)

LC 50

EC 50



CHEMICAL: 4-Chlorophenol

TEST DATE: 04/13/87

CAS NUMBER: 106489

MF: C6H5ClO

MWT: 128.56

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 47 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 27 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.5 (0.31)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.40)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 44.8 (0.54)	PH	: 7.8 (0.05)
ALKALINITY (MG/L CaCO ₃)	: 44.0 (0.41)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.68	2.58	3.97	6.11	9.40
04/13/87	<0.1	1.66	2.55	3.85	5.95	9.18
04/14/87	<0.1	1.90	2.69	4.06	5.93	9.06
04/15/87	<0.1	1.77	2.57	3.94	5.69	8.80
04/16/87	<0.1	1.81	2.66	4.09	6.02	9.54
04/17/87	<0.1	1.84	2.64	3.93	5.87	9.13
AVERAGE:	<0.10	1.80	2.62	3.97	5.89	9.14
COR AVE:	<0.10	1.83	2.67	4.05	6.00	9.31
PERCENT RECOVERY	98.2	(2.2) N=9				

FISH SIZES

MEAN LENGTH (mm)	: 19.6	MEAN WEIGHT (G)	: 0.113
SD LENGTH (mm)	: 1.273	SD WEIGHT (G)	: 0.0251
		LOADING (G/L/D)	: 0.0628

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had increased respiration. They also had rigid musculature and convulsions, were darkly colored and had spinal column deformities. Equilibrium loss was not observed prior to death. The pH of the stock solution was adjusted to that of lake water using NaOH.

4-Chlorophenol

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				2	13	
48				2	14	
72				1	6	18
96				2	9	19

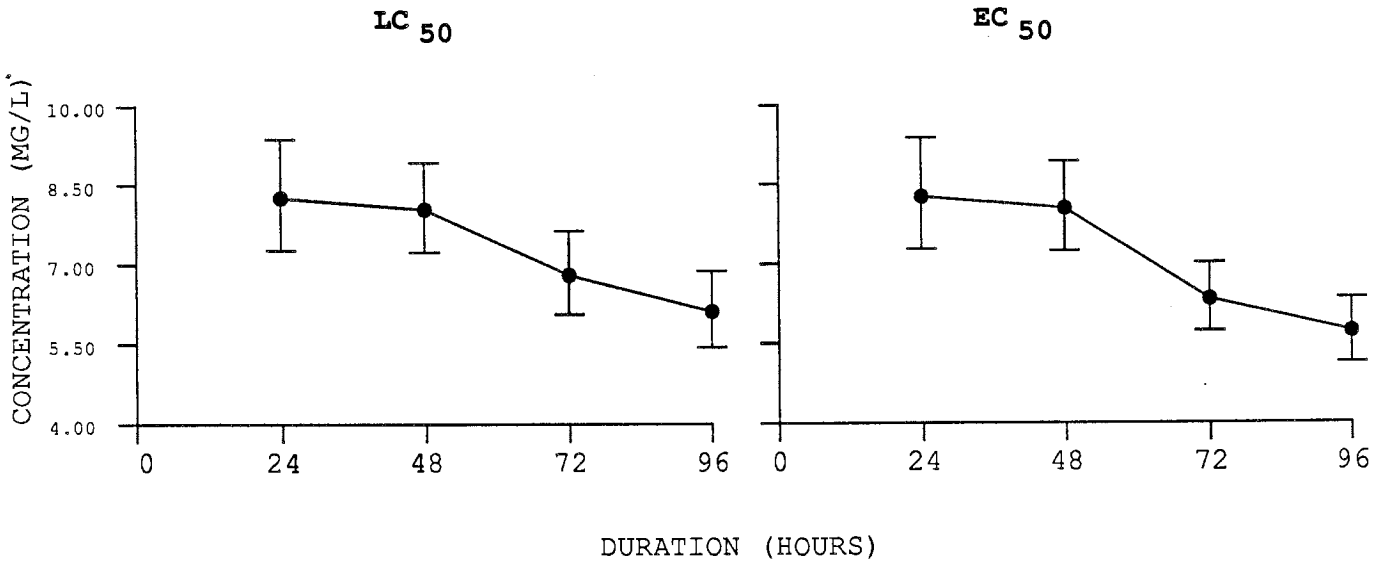
RESULTS

 (MG/L)
 96 HR LC50: 6.11
 CONF. LIM:
 (5.43-6.87)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				2	13	
48				2	14	
72				2	6	20
96				2	11	20

 (MG/L)
 96 HR EC50: 5.71
 CONF. LIM:
 (5.13-6.36)



CHEMICAL: Benzene (Test 1)

TEST DATE: 03/02/87

CAS NUMBER: 71432

MF: C6H6

MWT: 78.11

CHEMICAL SOURCE: J.T. Baker Chemical Co.

PURITY: 99.9+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 394 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	:	22.3 (0.33)	TANK VOLUME (L)	:	1.5
DISSOLVED OXYGEN (MG/L)	:	7.3 (0.46)	ADDITIONS (V/D)	:	15.4
HARDNESS (MG/L CaCO3)	:	50.7 (0.00)	PH	:	7.0 (0.01)
ALKALINITY (MG/L CaCO3)	:	42.5 (1.00)			

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	25	50	100	200	400
03/02/87	<0.5 <0.5	2.90 4.30	5.60 5.20	15.5 14.4	24.0 22.7	44.7 42.7
03/03/87	<0.5	5.00	10.7	21.8	35.0	74.4
03/04/87	<0.5 <0.5	2.90 4.80	6.10 6.70	20.3 18.3	34.6 30.6	70.7 69.7
03/05/87	<0.5	4.80	5.70	18.7	34.5	
03/06/87	<0.5 <0.5	2.00 3.30	3.00 3.70	17.3 17.2	35.9 34.6	
AVERAGE:	<0.50 <0.50	3.20 4.30	6.35 5.33	18.7 17.2	32.4 30.6	63.3 56.2
COR AVE:	<0.51 <0.51	3.26 4.38	6.47 5.42	19.1 17.5	33.0 31.2	64.4 57.2
PERCENT RECOVERY	98.2	(7.3)	N=10			

FISH SIZES

MEAN LENGTH (mm)	:	17.2	MEAN WEIGHT (G)	:	0.074
SD LENGTH (mm)	:	1.751	SD WEIGHT (G)	:	0.0206
			LOADING (G/L/D)	:	0.0320

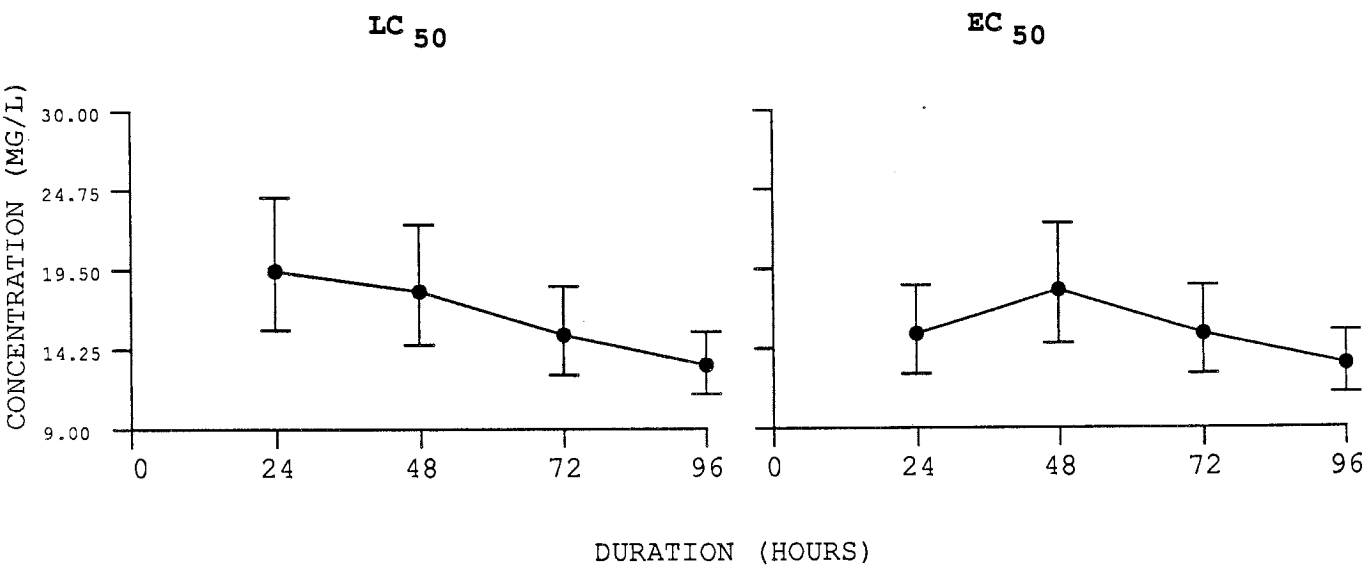
REMARKS

Affected fish lost schooling behavior, swam in a corkscrew motion, were underreactive to external stimuli, had increased respiration and convulsions. They were also darkly colored and were hemorrhaging. Equilibrium loss was observed prior to death. Measured concentrations were lower than nominal concentrations due to volatility.

Benzene (Test 1)

***** MORTALITIES *****											***** RESULTS *****											
HOUR	CON	A	B	C	D	E																
INITIAL	10	10	10	10	10	10	10	10	10	10	10	* * * * *										
24				6	7	5	6	10	10			* * * * *										
48				7	7	5	7	10	10			* (MG/L) * * * * *										
72				7	8	7	9	10	10			* * * * *										
96				8	9	8	10	10	10			* 96 HR LC50: 12.6 * * * * *										
												* * * * *										
												* CONF. LIM: * * * * *										
												* (10.7-14.7) * * * * *										
												* * * * *										

***** EFFECT *****											***** *****												
INITIAL	10	10	10	10	10	10	10	10	10	10	10	* * * * *											
24							7	8	10	6	10	10	* * * * *										
48							7	7	5	7	10	10	* (MG/L) * * * * *										
72							7	8	7	9	10	10	* * * * *										
96							8	9	8	10	10	10	* 96 HR EC50: 12.6 * * * * *										
												* * * * *											
												* CONF. LIM: * * * * *											
												* (10.7-14.7) * * * * *											
												* * * * *											



CHEMICAL: Benzene (Test 2)

TEST DATE: 05/30/88

CAS NUMBER: 71432

MF: C6H6

MWT: 78.11

CHEMICAL SOURCE: Burdick and Jackson Laboratories, Inc.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 888 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 31-32 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.7 (0.70)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.4 (0.41)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.3 (0.50)	PH	: 7.9 (0.06)
ALKALINITY (MG/L CaCO3)	: 39.7 (0.35)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	29.4	45.2	69.6	107	164
05/30/88	<.25	14.8	22.3	33.7	60.8	124
05/31/88	<.25	9.46	15.1	21.8	41.0	83.1
06/01/88	<.25	10.9	16.1	25.8	48.7	84.8
06/02/88	<.25	9.06	13.8	23.5	40.6	67.9
06/03/88	<.25	9.37	13.2	22.5	39.0	66.3
AVERAGE:	<0.25	10.7	16.1	25.5	46.0	85.2
COR AVE:	<0.25	10.7	16.0	25.4	45.8	84.9
PERCENT RECOVERY	100.4	(0.0)	N=2			

FISH SIZES

MEAN LENGTH (mm) : 19.1
SD LENGTH (mm) : 1.373

MEAN WEIGHT (G) : 0.092
SD WEIGHT (G) : 0.0224
LOADING (G/L/D) : 0.0511

REMARKS

Affected fish lost schooling behavior, swam near the tank surface, were overreactive to external stimuli, had increased respiration and were lightly colored. Equilibrium loss was observed prior to death. Measured concentrations were lower than nominal concentrations due to volatility.

Benzene (Test 2)

***** MORTALITIES *****

CON	A	B	C	D	E
INITIAL 20	20	20	20	20	20
24				5	20
48			7	5	20
72			16	9	20
96			20	13	20

RESULTS

 (MG/L)
 96 HR LC50: 24.6
 CONF. LIM:
 (21.4-28.1)

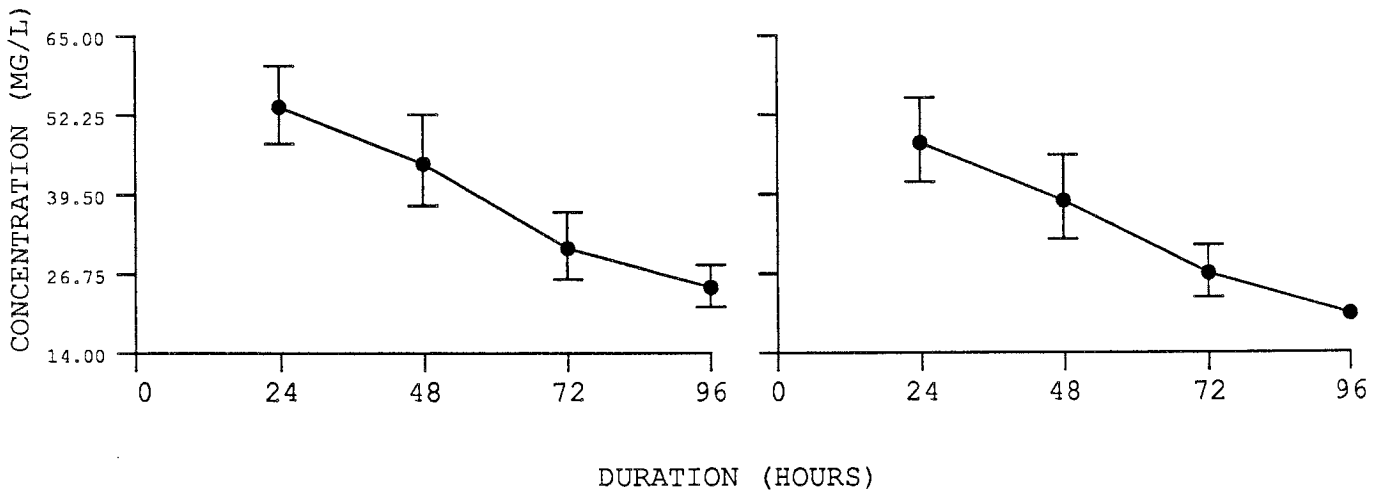
***** EFFECT *****

INITIAL 20	20	20	20	20	20
24			1	8	20
48			7	10	20
72			17	13	20
96			20	20	20

 (MG/L)
 96 HR EC50: 20.2
 CONF. LIM:
 (NOT REL.)

LC 50

EC 50



CHEMICAL: p-Nitroaniline

TEST DATE: 10/27/86

CAS NUMBER: 100016

MF: C6H6N2O2

MWT: 138.13

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 299 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

***** TEST CONDITIONS *****

TEMPERATURE (C)	: 24.9 (0.42)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.3 (0.42)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 48.3 (0.87)	PH	: 7.5 (0.04)
ALKALINITY (MG/L CaCO3)	: 43.5 (1.35)		

***** TOXICANT CONCENTRATIONS (MG/L) *****

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	47.3	72.8	112	172	265
10/27/86	<3.0	51.4	77.7	121	176	260
10/28/86	<3.0	50.4	77.1	116	169	
10/29/86	<3.0	55.7	91.7	140	204	280
10/30/86	<3.0	55.5	87.6	132	196	277
10/31/86	<3.0	46.3	79.9	132	199	271
AVERAGE:	<3.00	51.9	82.8	128	189	272
COR AVE:	<3.00	51.9	82.9	128	189	272
PERCENT RECOVERY	99.9	(3.0)	N=8			

***** FISH SIZES *****

MEAN LENGTH (mm)	: 20.3	MEAN WEIGHT (G)	: 0.107
SD LENGTH (mm)	: 2.468	SD WEIGHT (G)	: 0.0375
		LOADING (G/L/D)	: 0.1486

***** REMARKS *****

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, had increased respiration and convulsions. They also had rigid musculature and spinal column deformities along with hemorrhaging and dark coloration. Equilibrium loss was observed prior to death. The pH of the stock solution was adjusted to that of lake water using HCl. The 24-hr sample from the E tank was not recorded because the data system malfunctioned and an accurate report was not retrieved.

p-Nitroaniline

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		2	4	20	20	
48		2	4	20	20	
72	1	2	8	20	20	
96	1	2	9	20	20	

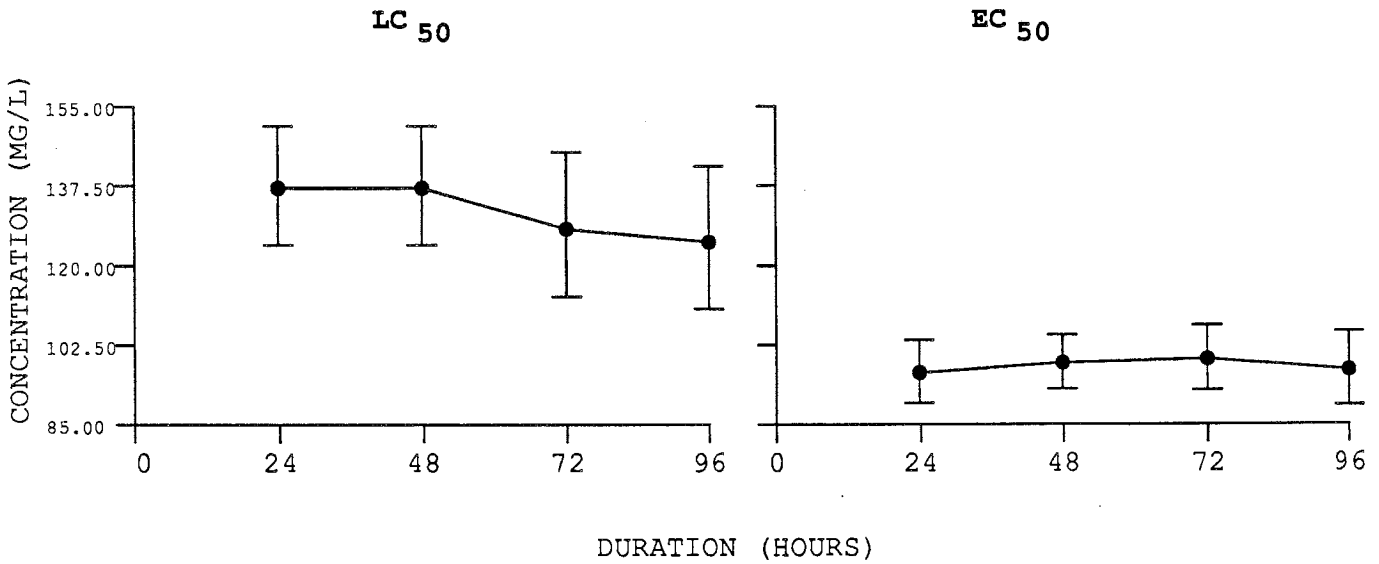
RESULTS

 (MG/L)
 96 HR LC50: 125
 CONF. LIM:
 (110- 142)

***** EFFECT *****

INITIAL	20	20	20	20	20
24		3	20	20	20
48		2	20	20	20
72	1	2	20	20	20
96	1	3	20	20	20

 (MG/L)
 96 HR EC50: 96.9
 CONF. LIM:
 (89.1- 105)



CHEMICAL: Phenol (Test 4)

TEST DATE: 09/28/87

CAS NUMBER: 108952

MF: C6H6O

MWT: 94.11

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 225 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.7 (0.23)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.20)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 43.8 (2.32)	PH	: 7.7 (0.04)
ALKALINITY (MG/L CaCO3)	: 40.5 (0.25)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	8.26	12.7	19.6	30.2	46.5
09/28/87	<0.2	6.85	11.9	18.6	27.6	45.6
09/29/87	<0.5	8.43	13.1	19.3	27.8	43.1
09/30/87	<0.5	7.91	12.4	19.2	29.5	47.9
10/01/87	<0.5	9.19	12.8	18.9	28.2	45.0
10/02/87	<.01	8.48	12.1	18.7	27.2	42.7
AVERAGE:	<0.34	8.17	12.5	18.9	28.1	44.9
COR AVE:	<0.35	8.42	12.8	19.5	28.9	46.2
PERCENT RECOVERY	97.0	(4.9)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.1	MEAN WEIGHT (G)	: 0.095
SD LENGTH (mm)	: 2.641	SD WEIGHT (G)	: 0.0490
		LOADING (G/L/D)	: 0.0528

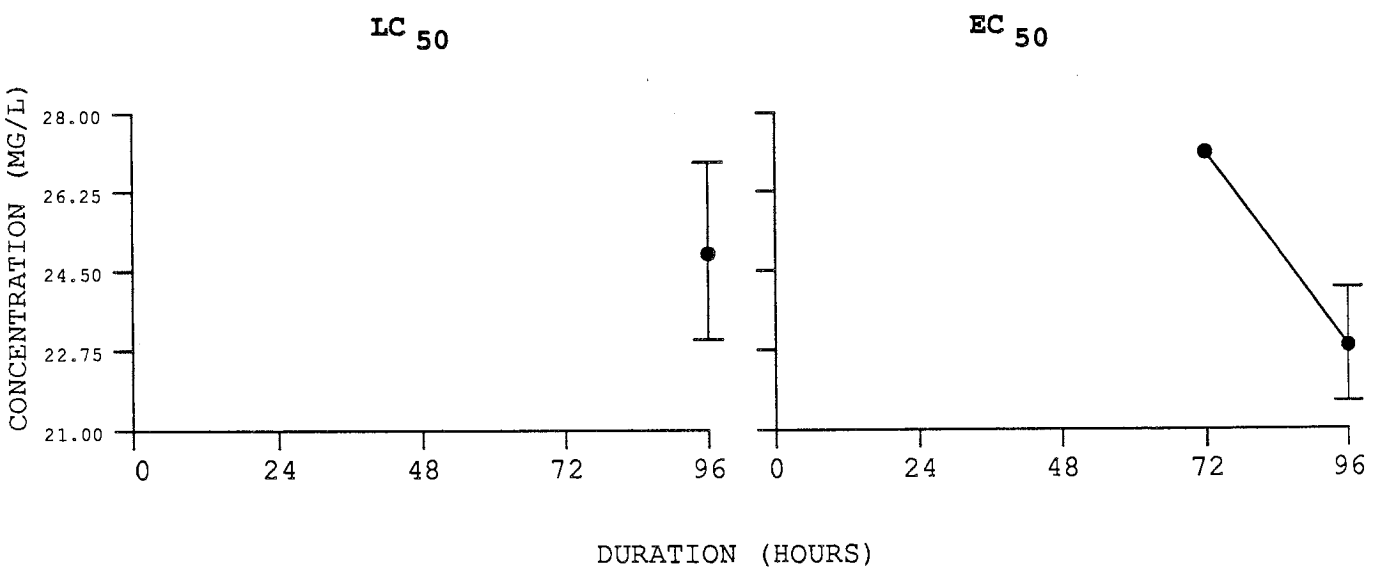
REMARKS

Affected fish lost schooling behavior, were hyperactive and had increased respiration. They were also darkly colored. Equilibrium loss was not observed prior to death.

Phenol (Test 4)

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24					1	2	*	*
48					2	3	*	(MG/L)
72					12	7	*	*
96				2	17	13	*	96 HR LC50: 24.8
							*	*
							*	CONF. LIM:
							*	(23.0-26.9)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24					1	2	*	*
48					2	6	*	(MG/L)
72					14	10	*	*
96				2	20	20	*	96 HR EC50: 22.8
							*	*
							*	CONF. LIM:
							*	(21.6-24.1)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: Catechol

TEST DATE: 12/14/87

CAS NUMBER: 120809

MF: C6H6O2

MWT: 110.11

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 135 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.6 (0.19)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.63)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 46.0 (0.10)	PH	: 7.7 (0.18)
ALKALINITY (MG/L CaCO3)	: 40.2 (0.24)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	8.00	10.0	12.5	15.6	19.5
12/14/87	<0.5	8.10	10.5	12.0	14.8	18.2
12/15/87	<0.5	8.35	9.58	11.4	13.0	15.6
12/16/87	<0.5	7.77	8.24	10.1	12.8	17.3
12/17/87	<0.5	8.11	9.19	10.3	13.6	17.8
12/18/87	<0.5	6.73	6.96	9.71	12.9	17.8
AVERAGE:	<0.50	7.81	8.89	10.7	13.4	17.3
COR AVE:	<0.51	7.89	8.98	10.8	13.6	17.5
PERCENT RECOVERY	99.0	(2.25)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 18.9
SD LENGTH (mm) : 1.694

MEAN WEIGHT (G) : 0.097
SD WEIGHT (G) : 0.0317
LOADING (G/L/D) : 0.0539

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, had increased respiration and were darkly colored. Equilibrium loss was observed prior to death. Due to sensitivity of the chemical to light, the diluter was covered throughout the test.

Catechol

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			1	5	11	
48	2	7	9	18	19	
72	4	9	16	20	20	
96	4	9	16	20	20	

RESULTS

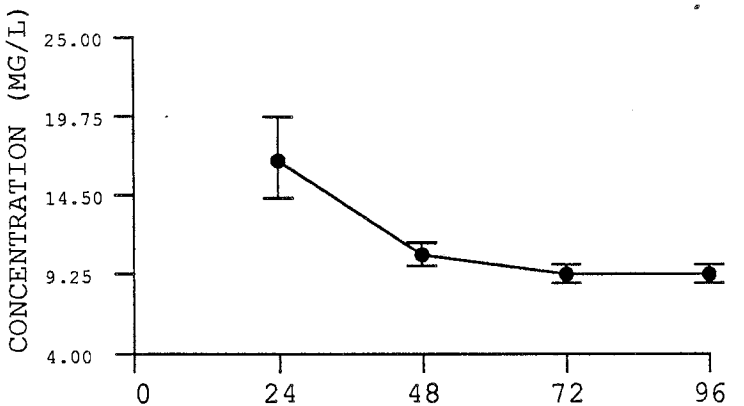
 (MG/L)
 96 HR LC50: 9.22
 CONF. LIM:
 (8.62-9.87)

***** EFFECT *****

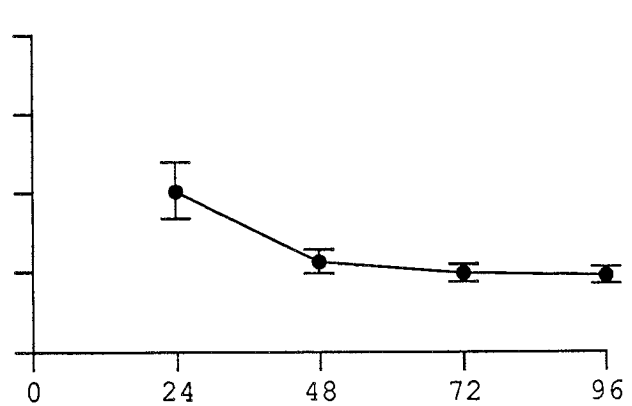
HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			2	8	15	
48	3	8	12	19	20	
72	4	9	17	20	20	
96	4	10	18	20	20	

 (MG/L)
 96 HR EC50: 9.00
 CONF. LIM:
 (8.47-9.56)

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: Aniline (Test 2)

TEST DATE: 01/27/86

CAS NUMBER: 62533

MF: C6H7N

MWT: 93.13

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99.5+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Emulsified

ORGANISM: Fathead Minnow

AGE: 42-46 D

TEST CONDITIONS

TEMPERATURE (C)	: 17.2 (0.00)	TANK VOLUME (L)	: 37.8
DISSOLVED OXYGEN (MG/L)	: 9.1 (0.47)	ADDITIONS (V/D)	: 7.6
HARDNESS (MG/L CaCO3)	: 44.1 (0.25)	PH	: 7.4 (0.05)
ALKALINITY (MG/L CaCO3)	: 64.4 (31.2)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	15.6	31.2	62.5	125	250
01/27/86	<0.5	18.3	28.8	55.3	116	242
01/28/86	<0.5	18.5	26.7	50.8	108	232
01/29/86	<0.5	18.6	26.8	48.0	102	212
01/30/86	<0.5	16.1	24.4	45.3	94.6	190
01/31/86						
AVERAGE:	<0.50	18.5	27.8	51.7	109	227
COR AVE:	<0.48	17.9	26.9	50.0	106	220
PERCENT RECOVERY	103.2	(7.8)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

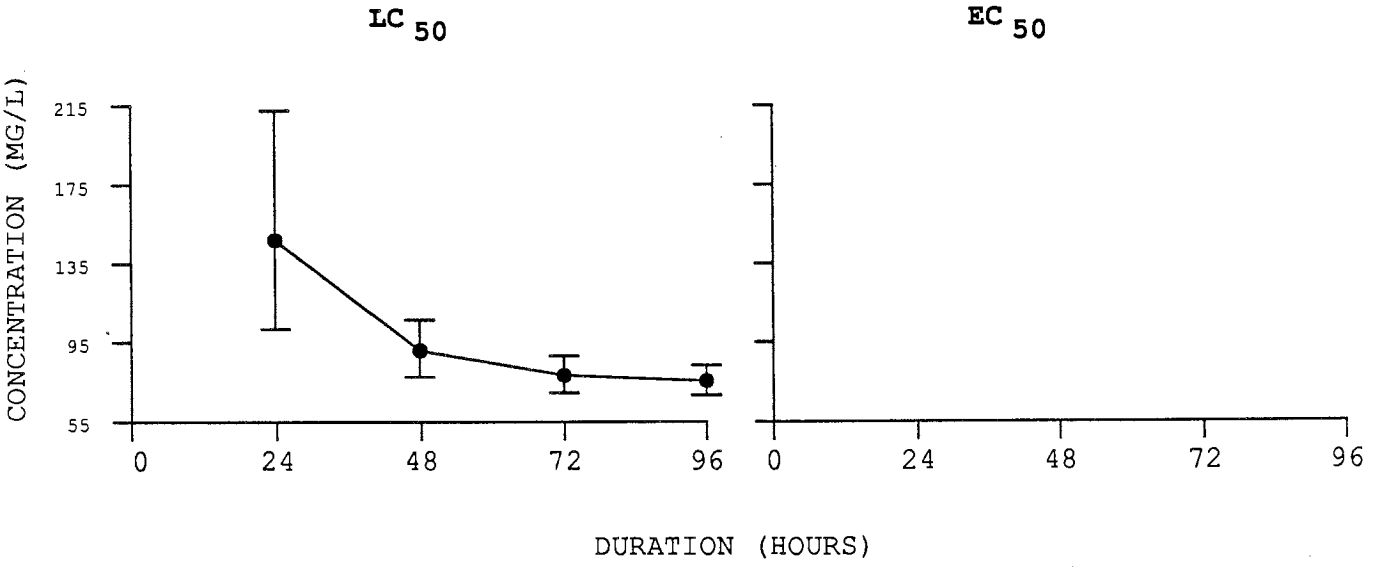
REMARKS

Affected fish lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.27 g. Samples were not taken at 96 hr for determination of toxicant concentrations. The tank volume ranged from 36.0-39.6 L. Increased alkalinity values were due to a reaction between the titrant and toxicant.

Aniline (Test 2)

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				7	13		*	*
48				13	20		*	(MG/L)
72				17	20		*	
96				18	20		*	96 HR LC50: 75.5
							*	
							*	
							*	CONF. LIM:
							*	(68.4-83.4)
							*	
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24							*	*
48							*	(MG/L)
72							*	
96							*	96 HR EC50: NOT DET.
							*	
							*	
							*	CONF. LIM:
							*	()
							*	
							*	
							*	
							*	
							*	
							*	



CHEMICAL: Aniline (Test 3)

TEST DATE: 10/12/87

CAS NUMBER: 62533

MF: C6H7N

MWT: 93.13

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1670 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.8 (0.52)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.25)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.7 (0.15)	PH	: 7.5 (0.05)
ALKALINITY (MG/L CaCO3)	: 70.9 (34.0)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	59.5	91.6	141	217	334
10/12/87	<0.5	58.5	83.9	129	192	298
10/13/87	<0.5	66.3	95.4	141	211	331
10/14/87	<0.5	64.8	92.7	143	215	337
10/15/87	<0.5	65.2	92.3	139	208	328
10/16/87	<0.5	65.5	94.7	142	210	340
AVERAGE:	<0.50	64.1	91.8	139	207	327
COR AVE:	<0.48	62.0	88.9	134	201	316
PERCENT RECOVERY		103.3 (3.5)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.5	MEAN WEIGHT (G)	: 0.074
SD LENGTH (mm)	: 1.849	SD WEIGHT (G)	: 0.0276
		LOADING (G/L/D)	: 0.0411

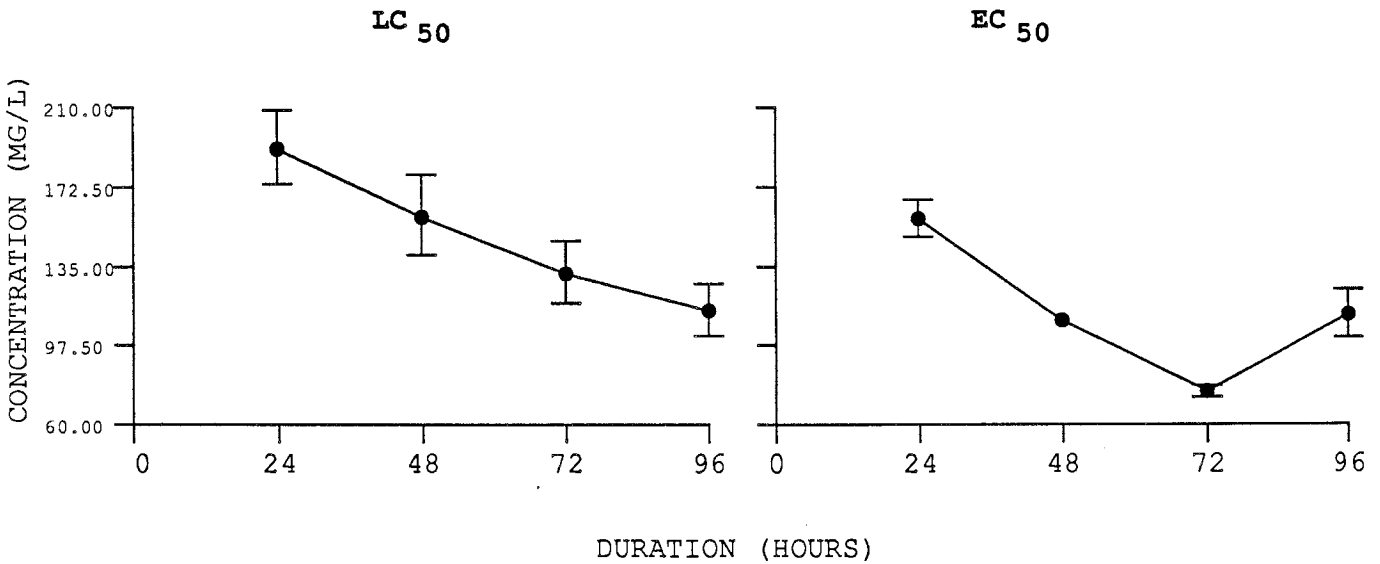
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, had increased respiration and were darkly colored. Equilibrium loss was not observed prior to death. Increased alkalinity values were due to a reaction between the titrant and toxicant.

Aniline (Test 3)

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				13	20		*	*
48			7	15	20		*	(MG/L)
72		2	10	19	20		*	
96		4	14	20	20		*	96 HR LC50: 114
							*	
							*	CONF. LIM:
							*	(102- 127)
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24			2	20	20		*	*
48			20	20	20		*	(MG/L)
72		19	20	20	20		*	
96		4	15	20	20		*	96 HR EC50: 112
							*	
							*	CONF. LIM:
							*	(101- 124)
							*	
							*	
							*	
							*	
							*	



CHEMICAL: 3-Picoline

TEST DATE: 11/24/86

CAS NUMBER: 108996

MF: C6H7N

MWT: 93.13

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2350 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.1 (0.18)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.16)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 43.5 (0.91)	PH	: 7.8 (0.04)
ALKALINITY (MG/L CaCO ₃)	: 44.0 (0.71)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	41.5	63.8	98.2	151	233
11/24/86	<3.0	46.0	65.2	94.4	143	218
11/25/86	<3.0	44.1	64.3	97.4	144	223
11/26/86	<3.0	44.0	63.1	95.2	143	227
11/27/86	<3.0	44.1	64.8	94.6	143	214
11/28/86	<3.0	47.6	65.7	94.7	140	219
AVERAGE:	<3.00	45.2	64.6	95.3	143	220
COR AVE:	<2.95	44.4	63.6	93.8	140	217
PERCENT RECOVERY	101.6 (2.9)	N=5				

FISH SIZES

MEAN LENGTH (mm) : 18.1
SD LENGTH (mm) : 2.231

MEAN WEIGHT (G) : 0.077
SD WEIGHT (G) : 0.0270
LOADING (G/L/D) : 0.0428

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and were darkly colored. They also had rigid musculature and lost equilibrium prior to death. The pH of the stock solution was adjusted to that of lake water using HCl.

3-Picoline

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48						
72				2	20	
96			1	8	20	

RESULTS

* * * * *
 *
 * (MG/L)
 *
 * 96 HR LC50: 144
 *
 *
 * CONF. LIM:
 * (131- 160)
 *
 *
 *
 * * * * *

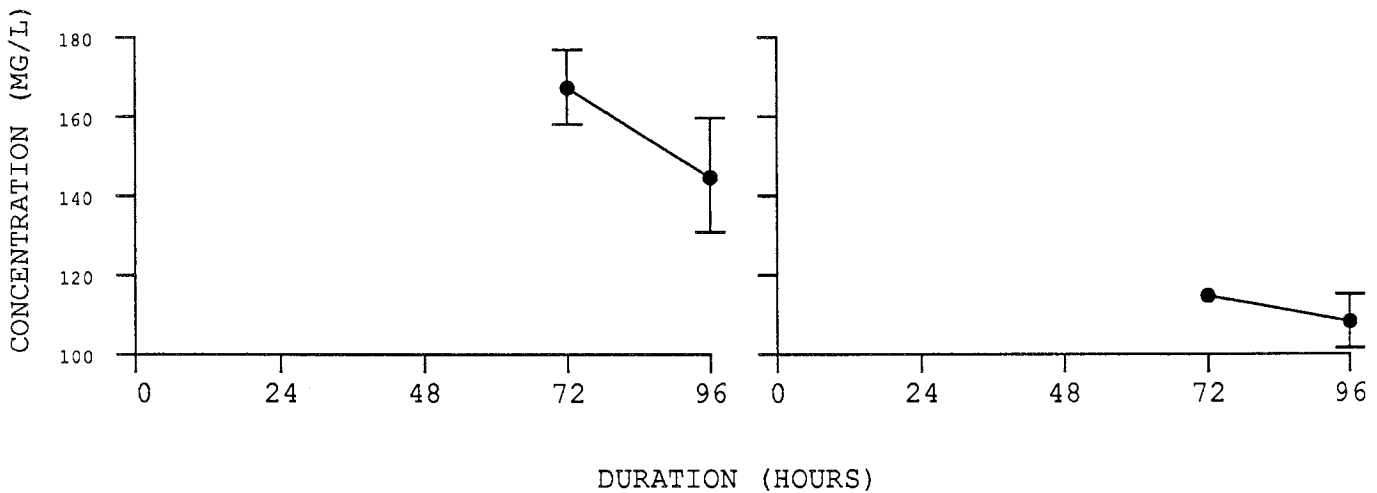
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48				1	2	
72				20	20	
96			3	20	20	

* * * * *
 *
 * (MG/L)
 *
 * 96 HR EC50: 108
 *
 *
 * CONF. LIM:
 * (101- 115)
 *
 *
 *
 * * * * *

LC 50

EC 50



CHEMICAL: Cyclohexanone Oxime

TEST DATE: 12/14/87

CAS NUMBER: 100641

MF: C6H11NO

MWT: 113.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2020 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.6 (0.27)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.3 (0.34)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.8 (0.29)	PH	: 7.9 (0.01)
ALKALINITY (MG/L CaCO ₃)	: 40.3 (1.16)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	72.8	112	172	265	408
12/14/87	<3.0	78.6	103	150	228	364
12/15/87	<5.0	67.8	98.8	149	232	368
12/16/87	<5.0	64.7	93.3	148	235	376
12/17/87	<5.0	77.2	112	164	249	389
12/18/87						
AVERAGE:	<4.50	72.1	102	153	236	374
COR AVE:	<4.41	70.7	100	150	231	367
PERCENT RECOVERY		101.98 (3.59)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 18.9	MEAN WEIGHT (G)	: 0.097
SD LENGTH (mm)	: 1.694	SD WEIGHT (G)	: 0.0317
		LOADING (G/L/D)	: 0.0539

REMARKS

Affected fish were hypoactive and underreactive to external stimuli, were darkly colored and hemorrhaging. Equilibrium loss was observed prior to death.

Cyclohexanone Oxime

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24						1
48						17
72					9	20
96				1	14	20

RESULTS

 (MG/L)
 96 HR LC50: 208
 CONF. LIM:
 (189- 230)

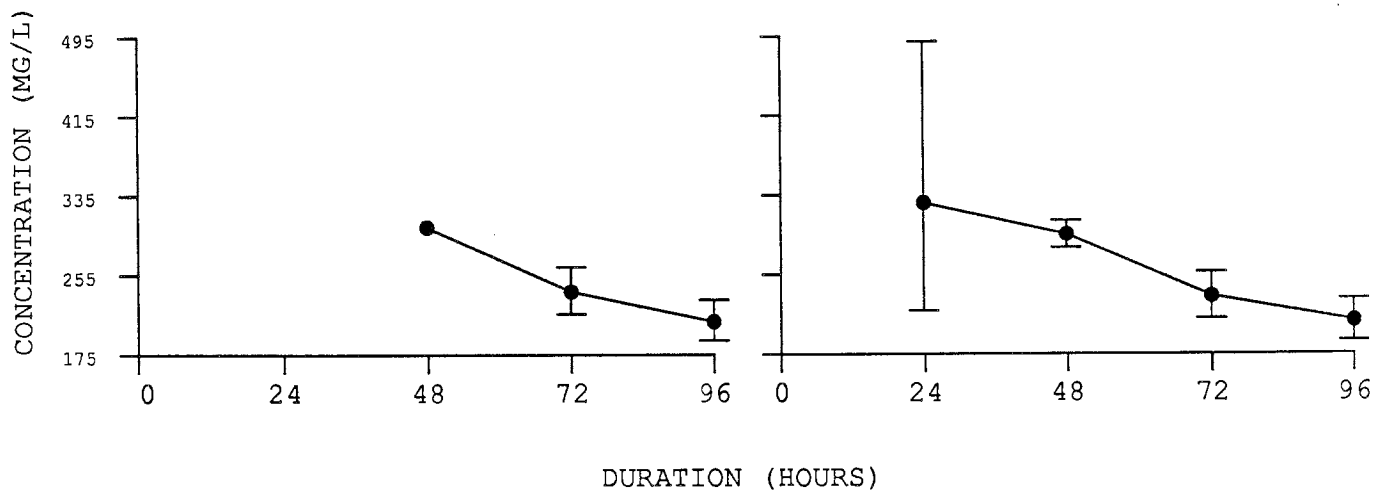
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					7	11
48					1	18
72					10	20
96				1	14	20

 (MG/L)
 96 HR EC50: 208
 CONF. LIM:
 (188- 230)

LC 50

EC 50



CHEMICAL: Cyclohexane

TEST DATE: 03/02/87

CAS NUMBER: 110827

MF: C6H12

MWT: 84.16

CHEMICAL SOURCE: MCB Manufacturing Chemists, Inc.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 37.9 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.2 (0.14)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.38)	ADDITIONS (V/D)	: 40
HARDNESS (MG/L CaCO3)	: 45.3 (0.65)	PH	: 7.5 (0.10)
ALKALINITY (MG/L CaCO3)	: 42.3 (0.21)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.62	3.24	4.86	6.48	8.10
03/02/87	<.04	2.11	3.42	4.33	6.41	7.76
03/03/87	<.04	1.74	3.39	4.56	6.56	8.06
03/04/87	<.04	1.95	3.70	5.10	6.68	9.54
03/05/87	<.04	1.91	3.59	4.93	7.62	9.13
03/06/87	<.04	2.13	3.22	4.91	6.95	9.09
AVERAGE:	<0.04	1.97	3.46	4.77	6.84	8.72
COR AVE:	<0.04	2.00	3.52	4.84	6.96	8.86
PERCENT RECOVERY	98.4	(2.8)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 20.5	MEAN WEIGHT (G)	: 0.119
SD LENGTH (mm)	: 1.716	SD WEIGHT (G)	: 0.0346
		LOADING (G/L/D)	: 0.1190

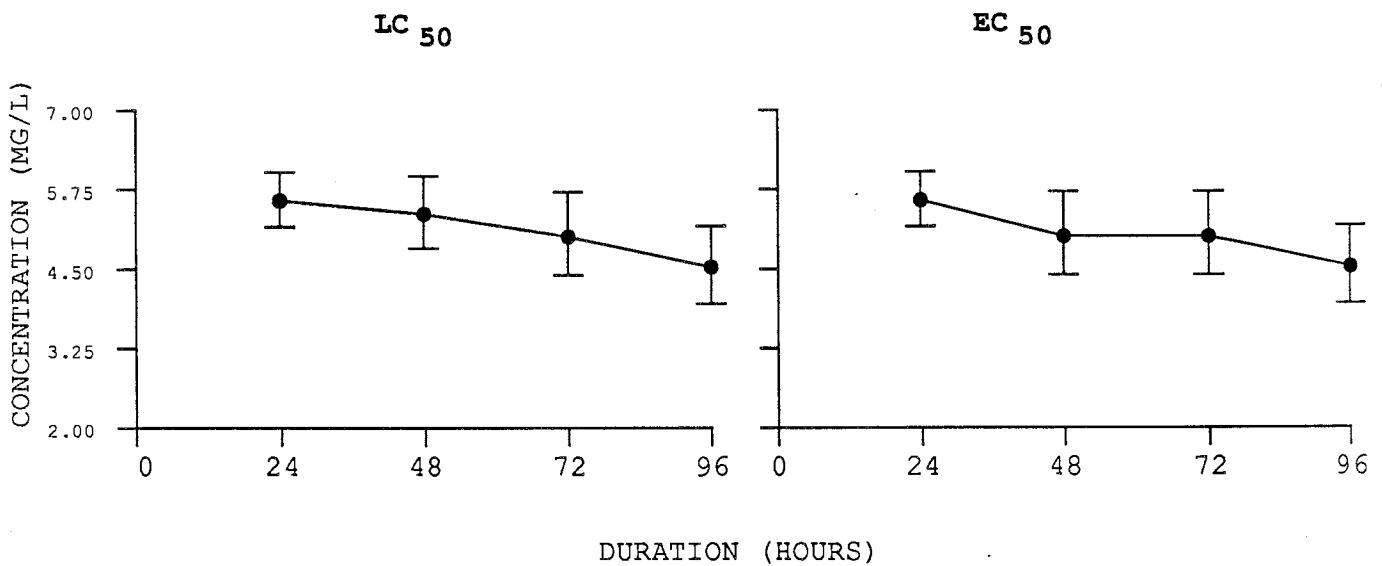
REMARKS

Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. An intermediate cell was used to further dilute the stock solution. Behavioral data were not recorded.

Cyclohexane

***** MORTALITIES *****							RESULTS
CON	A	B	C	D	E		
INITIAL 10	10	10	10	10	10	* * * * *	
24		1		10	10	* * * * *	
48		1	1	10	10	* * * * *	
72		1	3	10	10	* * * * *	
96		1	6	10	10	* * * * *	
							(MG/L)
							96 HR LC50: 4.53
							CONF. LIM: (3.96-5.18)
							* * * * *

***** EFFECT *****							RESULTS
CON	A	B	C	D	E		
INITIAL 10	10	10	10	10	10	* * * * *	
24		1		10	10	* * * * *	
48		1	3	10	10	* * * * *	
72		1	3	10	10	* * * * *	
96		1	6	10	10	* * * * *	
							(MG/L)
							96 HR EC50: 4.53
							CONF. LIM: (3.96-5.18)
							* * * * *



CHEMICAL: Hexanal (Test 2)

TEST DATE: 01/07/81

CAS NUMBER: 66251

MF: C6H12O

MWT: 100.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 33 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.5 (0.77)	TANK VOLUME (L)	: 7.3
DISSOLVED OXYGEN (MG/L)	: 8.2 (0.21)	ADDITIONS (V/D)	: 13
HARDNESS (MG/L CaCO3)	: 43.9 (1.37)	PH	: 7.1 (0.01)
ALKALINITY (MG/L CaCO3)	: 41.1 (0.50)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E						
NOMINAL:												
01/07/81	<1.0	6.0	9.5	18	28	45						
01/08/81	<1.0	2.9	5.4	7.3	15	27						
01/09/81	<1.0	4.0	7.2	10	20	35						
01/10/81	<1.0	2.5	4.4	8.8	16	32						
01/11/81												
AVERAGE:	<1.00	<1.00	5.00	2.70	8.35	4.90	14	8.05	24	16	40	30
COR AVE:	<0.85	<0.85	4.27	2.30	7.12	4.18	11.9	6.87	20.5	13.2	34.1	25.2
PERCENT RECOVERY			117.2	(8.3)	N=4							

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

REMARKS

This was a 100-hr test, not the standard 96 hr. Fish were transferred to clean tanks at 48 hr to reduce the biological degradation of the chemical. Individual lengths and weights were not recorded; however, the mean weight (0.132 g) and loading factor (0.45 g/L) were determined. Samples were not taken at 96 hr for determination of toxicant concentrations. Nominal concentrations and effect data were not recorded.

CHEMICAL: tert-Butyl Acetate

TEST DATE: 03/31/87

CAS NUMBER: 540885

MF: C6H12O2

MWT: 116.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 454 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.0 (0.10)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.7 (0.36)	ADDITIONS (V/D)	: 40
HARDNESS (MG/L CaCO3)	: 44.8 (0.25)	PH	: 7.5 (0.08)
ALKALINITY (MG/L CaCO3)	: 43.3 (0.65)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	90.8	182	272	363	454
03/31/87	<9.0	77.6	157	216	338	410
04/01/87	< 11	86.1	171	225	335	403
04/02/87	<8.0	77.8	153	206	302	394
04/03/87	<9.9	81.9	157	213	343	424
04/04/87						
AVERAGE:	<9.48	80.8	160	215	330	408
COR AVE:	<9.93	84.7	167	225	345	427
PERCENT RECOVERY	95.4	(6.2)	N=7			

FISH SIZES

MEAN LENGTH (mm) : 20.8
SD LENGTH (mm) : 0.789

MEAN WEIGHT (G) : 0.136
SD WEIGHT (G) : 0.0202
LOADING (G/L/D) : 0.1360

REMARKS

The pH of the stock solution was adjusted to that of lake water using NaOH. Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. Samples were not taken at 96 hr for determination of toxicant concentrations. Behavioral data were not recorded. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

tert-Butyl Acetate

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24				4	10	
48				4	10	
72				4	10	
96				5	10	

RESULTS

 (MG/L)
 96 HR LC50: 327
 CONF. LIM:
 (296- 362)

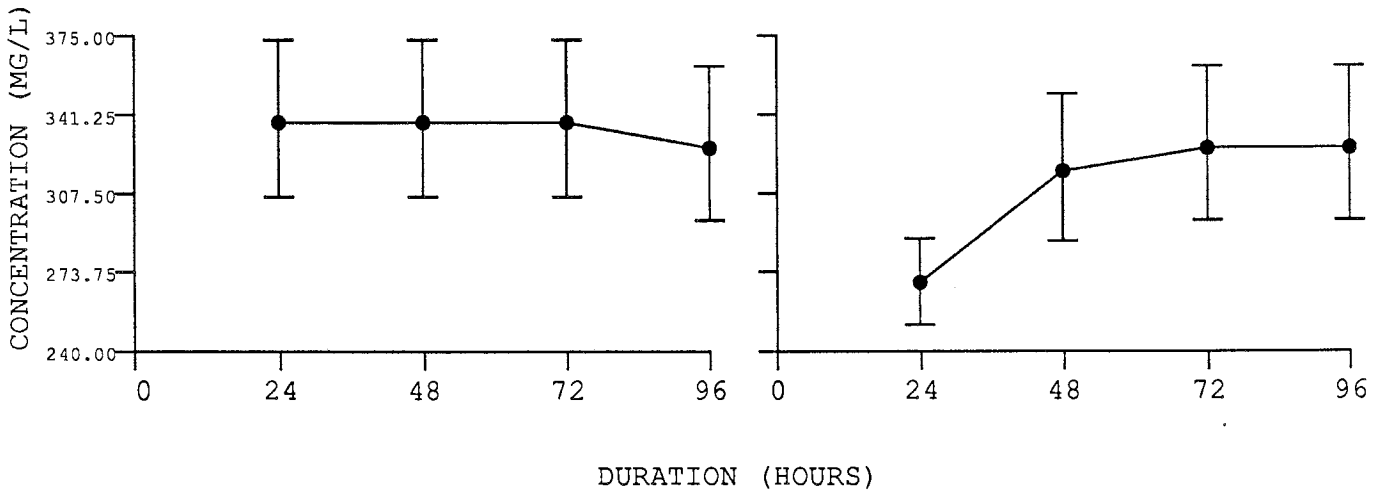
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24			1	10	10	
48				6	10	
72				5	10	
96				5	10	

 (MG/L)
 96 HR EC50: 327
 CONF. LIM:
 (296- 362)

LC 50

EC 50



CHEMICAL: N,N-Diethylacetamide

TEST DATE: 04/28/87

CAS NUMBER: 685916

MF: C6H13NO

MWT: 115.18

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 11.5 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.1 (0.42)	TANK VOLUME (L)	: 1.5
DISSOLVED OXYGEN (MG/L)	: 6.6 (0.31)	ADDITIONS (V/D)	: 2.0
HARDNESS (MG/L CaCO ₃)	: 45.0 (0.00)	PH	: 7.7 (0.04)
ALKALINITY (MG/L CaCO ₃)	: 43.5 (0.00)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.31	1.64	2.05	2.56	3.20
04/28/87			1.70	2.09	2.62	3.28
04/29/87		1.39	1.66	2.06	2.58	3.34
04/30/87		1.17	1.50	1.84		
05/01/87		1.16	1.48	1.82		
05/02/87		1.20	1.54	1.88		
AVERAGE: <		1.23	1.58	1.94	2.60	3.31
COR AVE: <0.00		1.24	1.59	1.96	2.63	3.34
PERCENT RECOVERY	99.0	(2.6) N=6				

FISH SIZES

MEAN LENGTH (mm)	: 20.0	MEAN WEIGHT (G)	: 0.111
SD LENGTH (mm)	: 0.707	SD WEIGHT (G)	: 0.0118
		LOADING (G/L/D)	: 0.1850

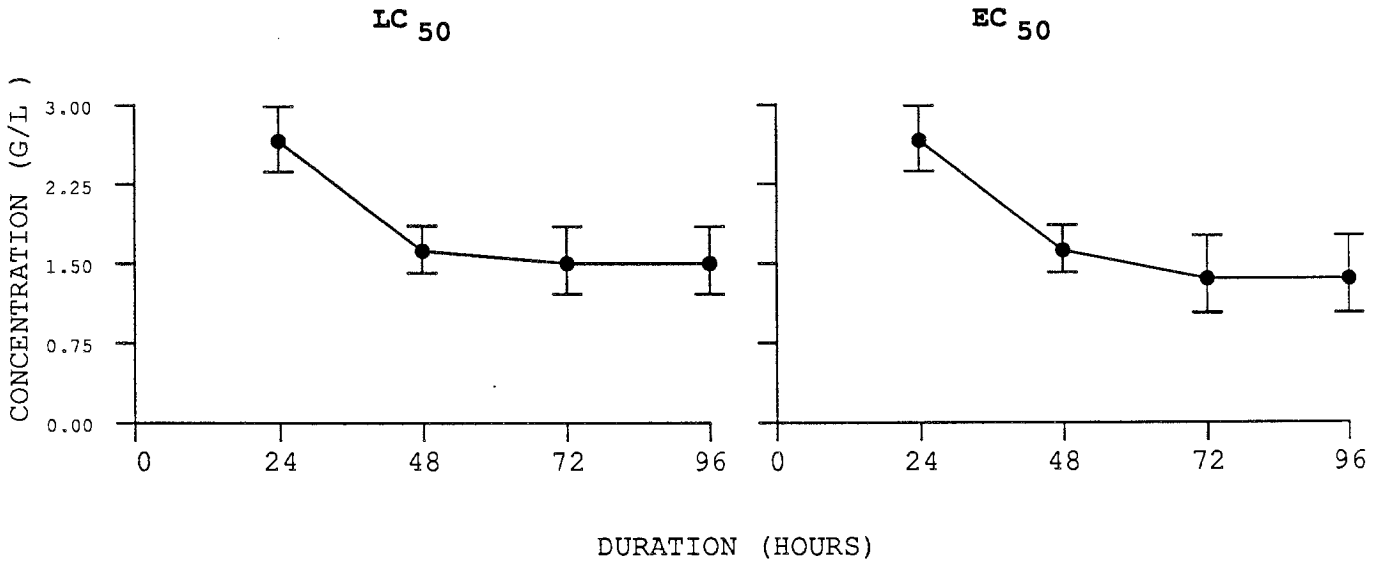
REMARKS

Due to the cost of the chemical, a measured renewal test was completed. The solutions were renewed twice during the test. The pH of the stock solution was adjusted to that of lake water using NaOH. The detectable limit for the control tank was <0.005 g/l. Behavioral data were not recorded.

N,N-Diethylacetamide

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	5	5	5	5	5	5	* * * * *
24					2	5	* (G/L) *
48			4	3	5	5	* 96 HR LC50: 1.50 *
72	1	4	4	3	5	5	* CONF. LIM: *
96	1	4	4	3	5	5	* (1.21-1.86) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	5	5	5	5	5	5	* * * * *
24					2	5	* (G/L) *
48			4	3	5	5	* 96 HR EC50: 1.35 *
72	2	4	4	3	5	5	* CONF. LIM: *
96	2	4	4	3	5	5	* (1.03-1.76) *
							* * * * *



CHEMICAL: Hexane

TEST DATE: 05/11/87

CAS NUMBER: 110543

MF: C6H14

MWT: 86.18

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 5.9 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.6 (0.14)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.5 (0.43)	ADDITIONS (V/D)	: 40.3
HARDNESS (MG/L CaCO3)	: 44.7 (0.54)	PH	: 7.4 (0.05)
ALKALINITY (MG/L CaCO3)	: 43.9 (0.30)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.18	2.36	3.54	4.72	5.90
05/11/87	<.07	0.78	1.47	2.07	3.09	3.08
05/12/87	<.30	1.09	1.91	2.86	4.32	5.15
05/13/87	<.19	0.85	1.79	2.47	4.10	5.02
05/14/87	<.16	0.87	1.68	2.16	3.74	4.94
05/15/87	<.12	0.89	1.80	2.54	3.56	5.14
AVERAGE:	<0.17	0.90	1.73	2.42	3.76	4.67
COR AVE:	<0.18	0.96	1.85	2.59	4.02	4.99
PERCENT RECOVERY	93.5	(9.6)	N=9			

FISH SIZES

MEAN LENGTH (mm)	: 20.4	MEAN WEIGHT (G)	: 0.123
SD LENGTH (mm)	: 1.430	SD WEIGHT (G)	: 0.0298
		LOADING (G/L/D)	: 0.1221

REMARKS

Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. Behavioral data were not recorded.

Hexane

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
3						10
24		2	2	10	10	
48		2	4	10	10	
72		2	4	10	10	
96		2	4	10	10	

RESULTS

 (MG/L)
 96 HR LC50: 2.50
 CONF. LIM:
 (2.10-2.98)

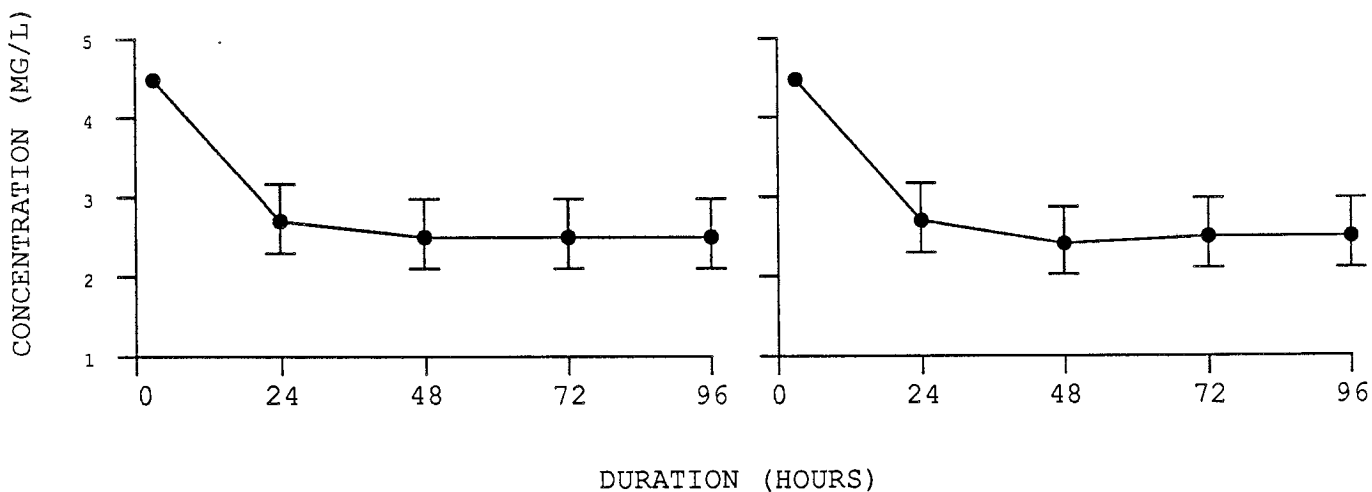
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
3						10
24		2	2	10	10	
48		2	5	10	10	
72		2	4	10	10	
96		2	4	10	10	

 (MG/L)
 96 HR EC50: 2.50
 CONF. LIM:
 (2.10-2.98)

LC 50

EC 50



CHEMICAL: Triethanolamine

TEST DATE: 01/20/87

CAS NUMBER: 102716

MF: C6H15NO3

MWT: 149.19

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 90.4 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.7 (0.38)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.3 (0.63)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: ()	PH	: 7.8 (0.07)
ALKALINITY (MG/L CaCO3)	: ()		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	7.30	11.2	17.3	26.6	40.9
01/20/87	<.02	6.42	10.4	16.2	26.4	41.8
01/21/87	<.02	6.21	10.2	16.2	25.8	40.1
01/22/87	<.02	6.53	10.7	16.4	27.0	40.7
01/23/87	<.02	7.16	11.0	17.1	25.6	40.9
01/24/87						
AVERAGE:	<0.02	6.58	10.6	16.5	26.2	40.9
COR AVE:	<0.02	6.14	9.86	15.4	24.4	38.1
PERCENT RECOVERY		107.2 (3.8)				
						N=4

FISH SIZES

MEAN LENGTH(mm)	: 18.1	MEAN WEIGHT(G)	: 0.083
SD LENGTH(mm)	: 0.788	SD WEIGHT(G)	: 0.0083
		LOADING(G/L/D)	: 0.1153

REMARKS

Affected fish lost schooling behavior, were hypoactive and darkly colored, had increased respiration and lost equilibrium prior to death. Hardness and alkalinity values were not recorded. Samples were not taken at 96 hr for determination of toxicant concentrations. The pH of the stock solution was adjusted to that of lake water using HCl.

Triethanolamine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1	15	20	20	
48		3	17	20	20	
72		4	18	20	20	
96		4	18	20	20	

RESULTS

 (G/L)
 96 HR LC50: 11.8
 CONF. LIM:
 (10.6-13.0)

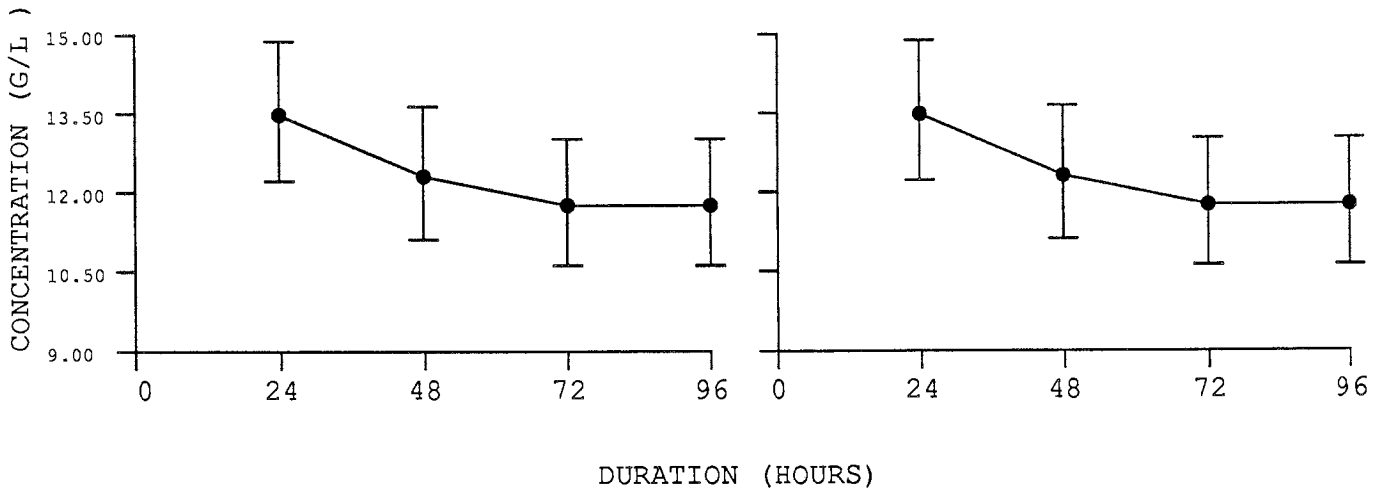
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1	15	20	20	
48		3	17	20	20	
72		4	18	20	20	
96		4	18	20	20	

 (G/L)
 96 HR EC50: 11.8
 CONF. LIM:
 (10.6-13.0)

LC 50

EC 50



CHEMICAL: 2,3,4,6-Tetrachlorophenol

TEST DATE: 02/09/87

CAS NUMBER: 58902

MF: C6H2Cl4O

MWT: 231.89

CHEMICAL SOURCE: Pfaltz and Bauer

PURITY: > 95%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 10.3 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.3 (0.28)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.35)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 42.3 (1.85)	PH	: 7.8 (0.06)
ALKALINITY (MG/L CaCO3)	: 45.6 (2.81)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.38	0.58	0.89	1.37	2.11
02/09/87		0.51	0.63	0.90	1.23	1.88
02/10/87		0.48	0.78	1.02	1.25	1.69
02/11/87		0.49	0.64	0.90	1.23	1.80
02/12/87		0.61	0.84	1.01	1.16	1.67
02/13/87		0.65	0.88	1.00	1.21	1.87
AVERAGE: <		0.55	0.75	0.97	1.22	1.78
COR AVE: <0.00		0.57	0.78	1.00	1.26	1.85
PERCENT RECOVERY	96.4	(6.1)	N=10			

FISH SIZES

MEAN LENGTH (mm) : 18.5
SD LENGTH (mm) : 1.234

MEAN WEIGHT (G) : 0.093
SD WEIGHT (G) : 0.0169
LOADING (G/L/D) : 0.0517

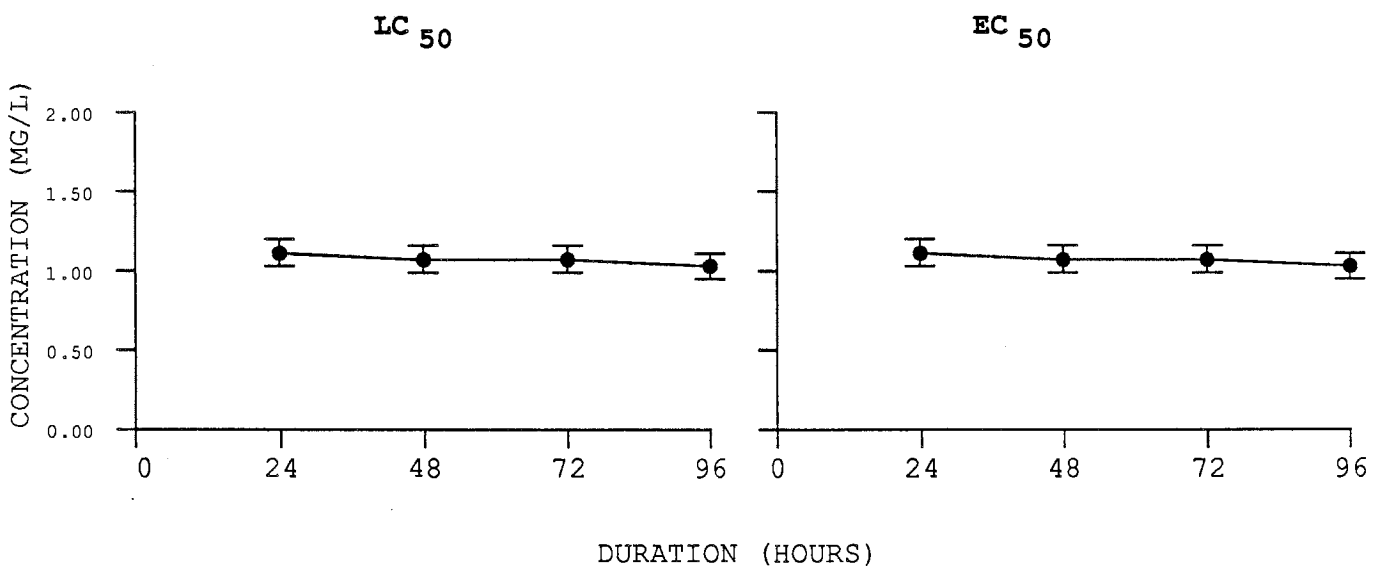
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had increased respiration. Equilibrium loss was not observed prior to death. Control tanks measured < 0.002 mg/l. NaOH was added to the stock increasing the amount of chemical in solution. HCl was then added to the stock solution to adjust the pH to that of lake water.

2,3,4,6-Tetrachlorophenol

***** MORTALITIES *****							RESULTS	
HOURL	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24				6	16	20	*	*
48		1	8	16	20			(MG/L)
72		1	8	16	20			
96		2	9	17	20			96 HR LC50: 1.03
								CONF. LIM:
								(0.95-1.11)

***** EFFECT *****								
HOURL	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24				6	16	20	*	*
48		1	8	16	20			(MG/L)
72		1	8	16	20			
96		2	9	17	20			96 HR EC50: 1.03
								CONF. LIM:
								(0.95-1.11)



CHEMICAL: 3,5-Dichloro-4-hydroxybenzoxonitrile

TEST DATE: 04/07/87

CAS NUMBER: 1891958

MF: C7H3Cl2NO

MWT: 188.01

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 95%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 77.5 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 26.3 (0.34)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.6 (0.47)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 44.9 (0.25)	PH	: 7.6 (0.06)
ALKALINITY (MG/L CaCO3)	: 44.6 (0.85)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A.	B	C	D	E
NOMINAL:	0	5.83	8.97	13.8	21.3	32.8
04/07/87	<0.5	3.56	6.63	11.4	18.9	26.9
04/08/87	<0.5	3.04	6.62	12.0	20.6	35.4
04/09/87	<0.5	5.59	8.99	13.8	21.6	38.4
04/10/87	<0.5	7.57	10.2	14.4	27.5	39.4
04/11/87	<0.5	7.00	9.50	13.7	29.1	40.4
AVERAGE:	<0.50	5.35	8.39	13.1	23.5	36.1
COR AVE:	<0.49	5.22	8.18	12.7	22.9	35.2
PERCENT RECOVERY		102.6 (6.9)	N=7			

FISH SIZES

MEAN LENGTH (mm) : 17.8
SD LENGTH (mm) : 3.443

MEAN WEIGHT (G) : 0.086
SD WEIGHT (G) : 0.0538
LOADING (G/L/D) : 0.1194

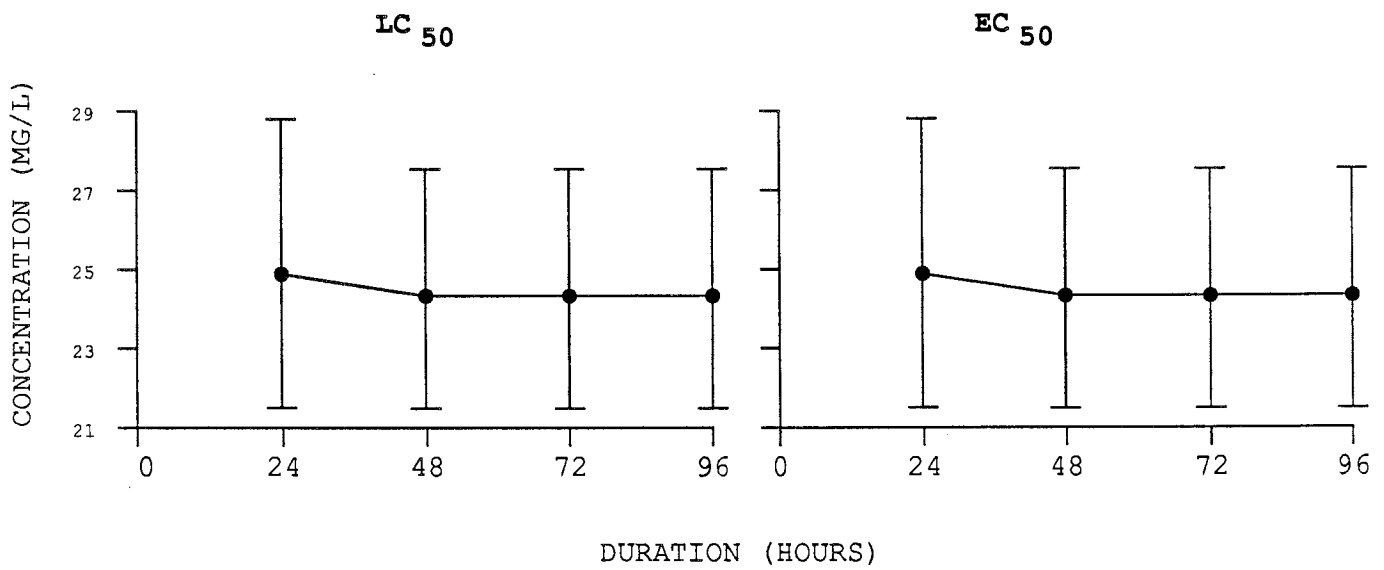
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had increased respiration. Equilibrium loss was not observed prior to death. NaOH was used to increase the solubility rate of the chemical. The pH of the stock solution was then adjusted to that of lake water using HCl.

3,5-Dichloro-4-hydroxybenzonitrile

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	
24				7	18		*	
48				7	19		*	(MG/L)
72				7	19		*	
96				7	19		*	96 HR LC50: 24.3
							*	
							*	CONF. LIM:
							*	(21.4-27.5)
							*	
							*	
							*	
							* * * * *	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	
24				7	18		*	
48				7	19		*	(MG/L)
72				7	19		*	
96				7	19		*	96 HR EC50: 24.3
							*	
							*	CONF. LIM:
							*	(21.4-27.5)
							*	
							*	
							*	
							* * * * *	



CHEMICAL: 3,5-Diiodo-4-hydroxybenzotrile

TEST DATE: 02/23/87

CAS NUMBER: 1689834

MF: C7H3I2NO

MWT: 370.91

CHEMICAL SOURCE: Lancaster Synthesis Ltd.

PURITY: Unavail.

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 34 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.2 (0.31)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.18)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 44.2 (0.24)	PH	: 7.8 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 44.2 (0.62)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.24	1.91	2.94	4.52	6.96
02/23/87	<.06	1.27	1.93	2.92	4.29	6.71
02/24/87	<.06	1.54	2.15	3.17	4.68	7.27
02/25/87	<.06	1.44	2.03	3.10	4.66	7.13
02/26/87	<.06	1.46	2.04	3.07	4.55	7.00
02/27/87	<.06	1.59	2.15	3.75	4.19	8.99
AVERAGE:	<0.06	1.46	2.06	3.20	4.47	7.42
COR AVE:	<0.07	1.58	2.23	3.47	4.85	8.05
PERCENT RECOVERY	92.2	(4.2) N=5				

FISH SIZES

MEAN LENGTH (mm) : 15.9
SD LENGTH (mm) : 1.447

MEAN WEIGHT (G) : 0.063
SD WEIGHT (G) : 0.0164
LOADING (G/L/D) : 0.0350

REMARKS

Affected fish schooled near the tank outlet when disturbed. NaOH was added to the chemical stock to increase the toxicant's solubility, then the pH of the stock solution was adjusted to that of lake water using HCl.

3,5-Diiodo-4-hydroxybenzoxonitrile

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					15	
48					15	
72					15	
96					15	

RESULTS

* * * * *
 * * * * *
 * * * * * (MG/L) * * * * *
 * * * * * 96 HR LC50: 6.80 * * * * *
 * * * * *
 * * * * * CONF. LIM: * * * * *
 * * * * * (NOT REL.) * * * * *
 * * * * *
 * * * * *
 * * * * *

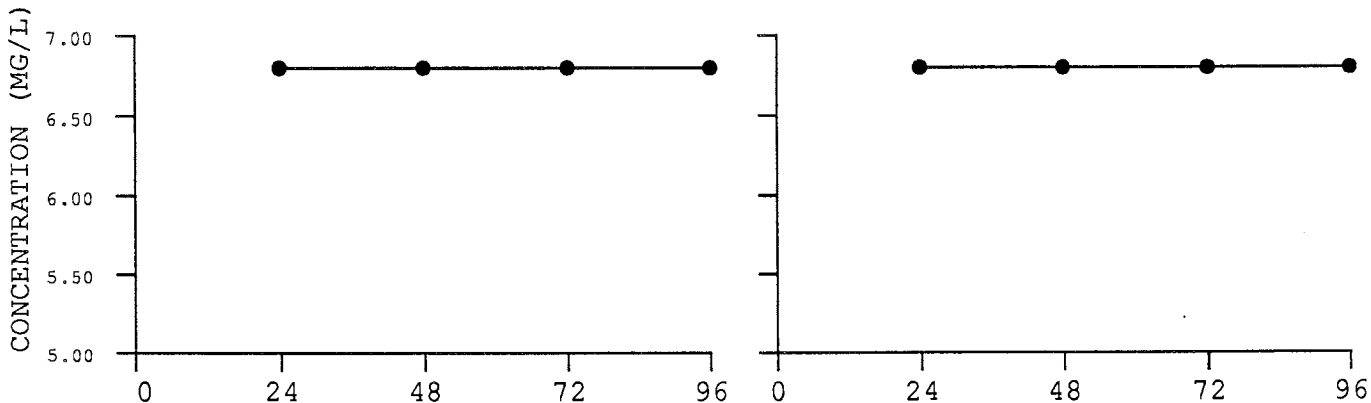
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					15	
48					15	
72					15	
96					15	

* * * * *
 * * * * *
 * * * * * (MG/L) * * * * *
 * * * * * 96 HR EC50: 6.80 * * * * *
 * * * * *
 * * * * * CONF. LIM: * * * * *
 * * * * * (NOT REL.) * * * * *
 * * * * *
 * * * * *
 * * * * *

LC 50

EC 50



DURATION (HOURS)

CHEMICAL: 3-Trifluoromethyl-4-nitrophenol

TEST DATE: 07/20/87

CAS NUMBER: 88302

MF: C7H4F3NO3

MWT: 207.12

CHEMICAL SOURCE: Alfred Bader Library of Rare Chemicals

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 61.4 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.31)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.4 (0.32)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.6 (0.25)	PH	: 7.9 (0.03)
ALKALINITY (MG/L CaCO3)	: 47.0 (2.65)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.16	3.32	5.11	7.86	12.1
07/20/87	<.05	2.28	3.32	4.80	7.20	11.2
07/21/87	<.05	2.28	3.33	4.83	7.33	11.3
07/22/87	<.05	2.37	3.40	4.83	7.49	11.6
07/23/87	<.05	2.38	3.51	5.20	7.71	12.0
07/24/87	<.05	2.46	3.59	5.25	7.81	12.0
AVERAGE:	<0.05	2.35	3.43	4.98	7.51	11.6
COR AVE:	<0.05	2.27	3.31	4.80	7.24	11.2
PERCENT RECOVERY		103.7 (1.1)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 16.3
SD LENGTH (mm) : 2.080

MEAN WEIGHT (G) : 0.059
SD WEIGHT (G) : 0.0278
LOADING (G/L/D) : 0.0328

REMARKS

Affected fish exhibited agonistic and cannibalistic behavior. The pH of the stock solution was adjusted to that of lake water using NaOH.

3-Trifluoromethyl-4-nitrophenol

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				2	16	
48				2	17	
72				2	17	
96				2	17	

RESULTS

 (MG/L)
 96 HR LC50: 9.14
 CONF. LIM:
 (8.59-9.72)

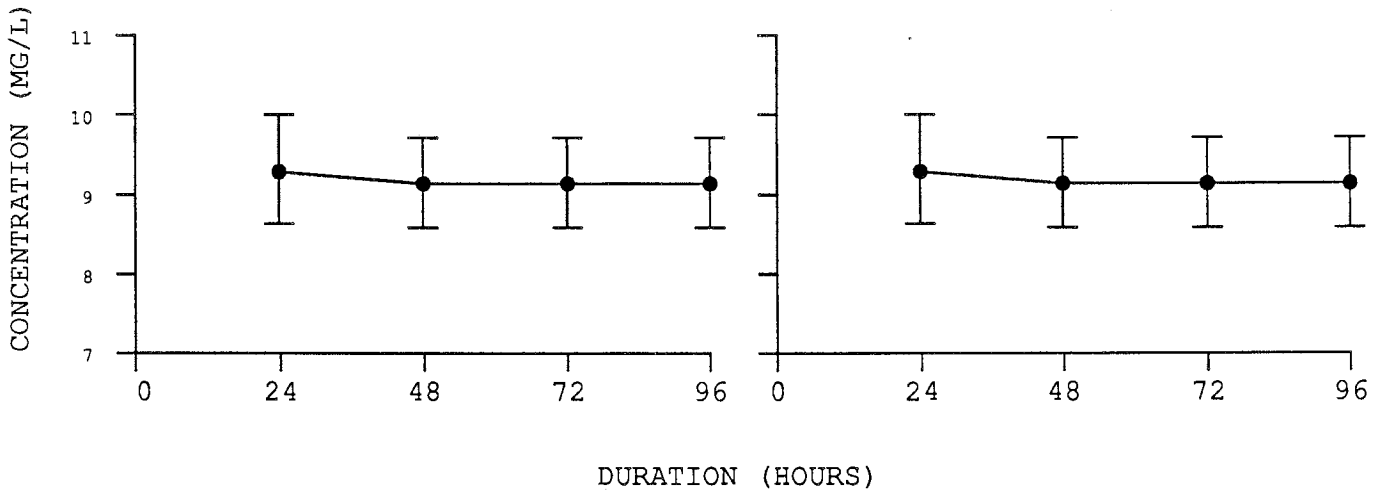
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				2	16	
48				2	17	
72				2	17	
96				2	17	

 (MG/L)
 96 HR EC50: 9.14
 CONF. LIM:
 (8.59-9.72)

LC 50

EC 50



CHEMICAL: 4-Nitrobenzaldehyde

TEST DATE: 01/06/87

CAS NUMBER: 555168

MF: C7H5NO3

MWT: 151.12

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 34.1 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.8 (0.34)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.62)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 43.1 (0.25)	PH	: 7.3 (0.06)
ALKALINITY (MG/L CaCO ₃)	: 41.4 (0.43)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.39	3.68	5.66	8.71	13.4
01/06/87	<0.2	1.91	2.54	3.90	6.23	9.69
01/07/87	<0.3	1.84	3.14	4.49	7.04	10.7
01/08/87	<0.2	1.79	2.89	4.26	6.93	10.3
01/09/87	<0.3	1.70	2.70	3.99	6.38	9.95
01/10/87	<0.3	2.10	3.06	3.93	5.60	11.5
AVERAGE:	<0.26	1.87	2.87	4.11	6.44	10.4
COR AVE:	<0.25	1.80	2.77	3.97	6.21	10.1
PERCENT RECOVERY		103.6	(3.6)	N=6		

FISH SIZES

MEAN LENGTH (mm):	20.5	MEAN WEIGHT (G):	0.128
SD LENGTH (mm):	1.606	SD WEIGHT (G):	0.0365
		LOADING (G/L/D):	0.1778

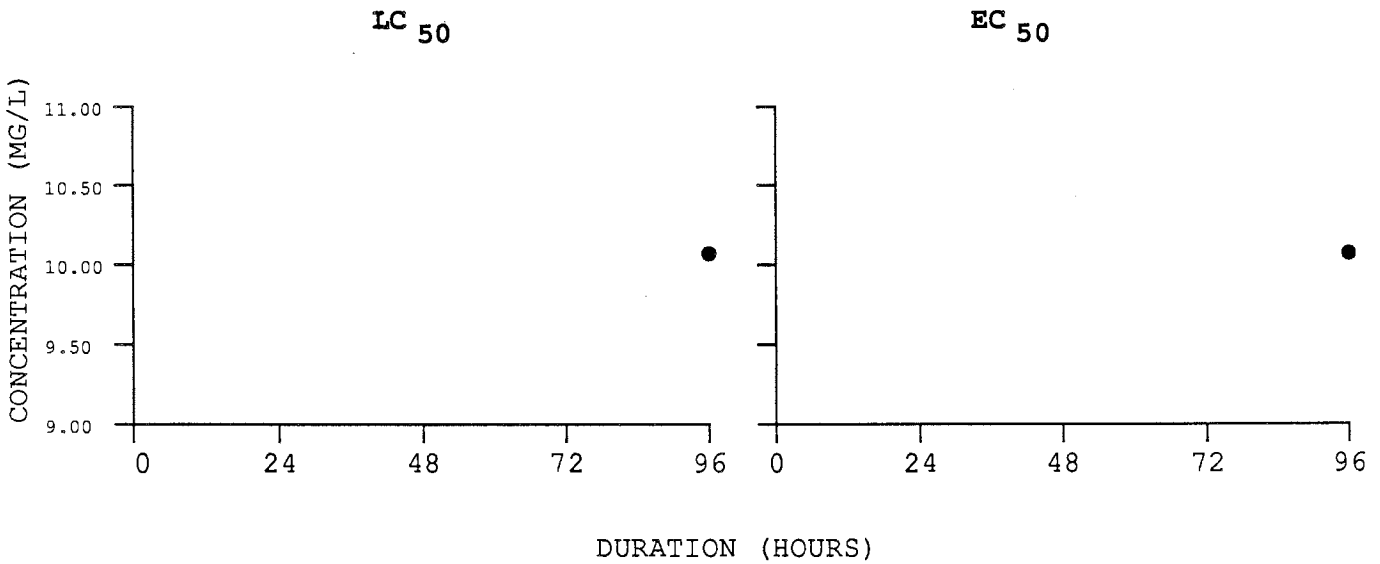
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli and swam near the tank surface. They also had increased respiration and lost equilibrium prior to death.

4-Nitrobenzaldehyde

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
48					2	2	* (MG/L) *
72				2	7		* 96 HR LC50: 10.1 *
96				3	10		* CONF. LIM: *
							* (NOT REL.) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
48						4	* (MG/L) *
72				2	7		* 96 HR EC50: 10.1 *
96				3	10		* CONF. LIM: *
							* (NOT REL.) *
							* * * * *



CHEMICAL: Benzothiazole

TEST DATE: 01/09/89

CAS NUMBER: 95169

MF: C7H5NS

MWT: 135.19

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 96+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1540 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.4 (0.19)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.40)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 46.7 (1.03)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 38.7 (0.70)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	27.7	42.6	65.6	101	155
01/09/89	<5.0	31.6	42.8	64.4	91.3	137
01/10/89	<5.0	34.9	49.0	72.8	106	156
01/11/89	<5.0	28.6	38.1	55.8	78.0	118
01/12/89	<5.0	29.6	41.8	60.6	91.4	134
01/13/89	<5.0	34.0	44.4	65.2	93.6	141
AVERAGE:	<5.00	31.7	43.2	63.8	92.1	137
COR AVE:	<5.05	32.1	43.7	64.4	93.0	139
PERCENT RECOVERY	99.0	(3.9) N=5				

FISH SIZES

MEAN LENGTH (mm)	: 18.5	MEAN WEIGHT (G)	: 0.098
SD LENGTH (mm)	: 2.856	SD WEIGHT (G)	: 0.0468
		LOADING (G/L/D)	: 0.0544

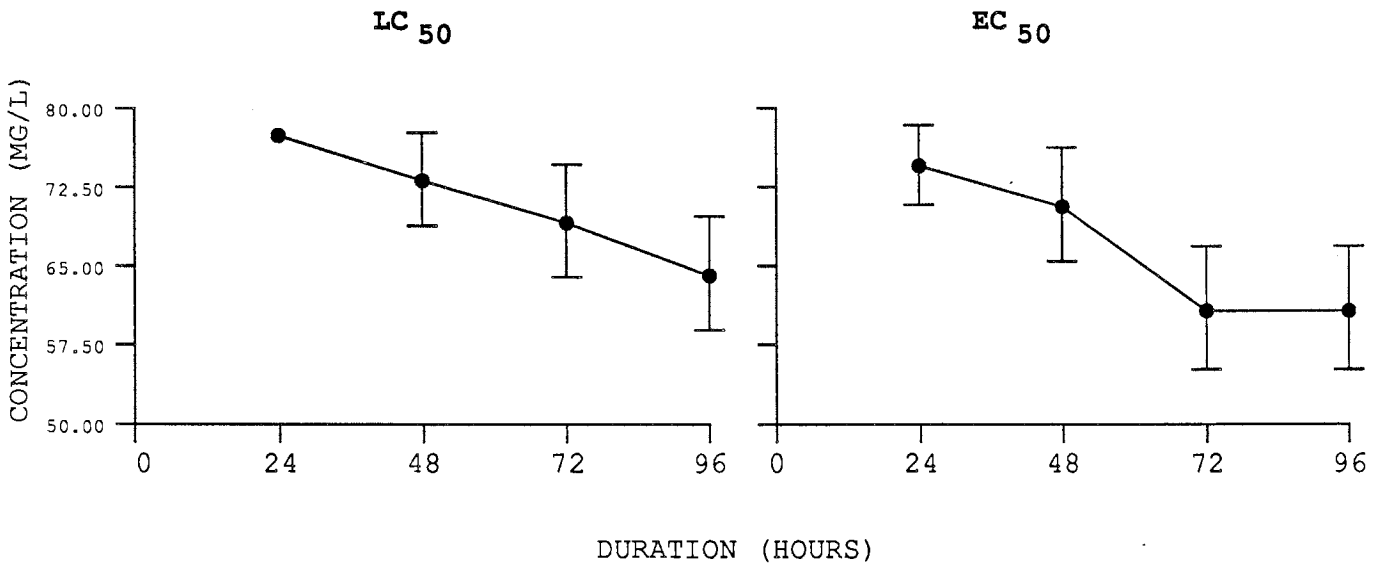
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, were darkly colored and lost equilibrium prior to death. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

Benzothiazole

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				20	20		* * * * *
48			3	20	20		(MG/L)
72			6	20	20		* * * * *
96			10	20	20		96 HR LC50: 64.0
							CONF. LIM: (58.8-69.7)

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	20	20	* * * * *
48		2	3	20	20		(MG/L)
72		2	11	20	20		* * * * *
96		2	11	20	20		96 HR EC50: 60.7
							CONF. LIM: (55.1-66.8)



CHEMICAL: 2,4-Dinitrotoluene

TEST DATE: 12/09/86

CAS NUMBER: 121142

MF: C7H6N2O4

MWT: 182.14

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 47.7 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 28 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.1 (0.21)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.28)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 44.2 (0.24)	PH	: 7.5 (0.03)
ALKALINITY (MG/L CaCO3)	: 44.4 (0.48)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	8.52	13.1	20.2	31.0	47.7
12/09/86	<0.1	8.30	12.3	17.6	26.0	38.1
12/10/86	<0.1	9.36	13.9	20.4	31.2	46.7
12/11/86	<0.1	10.1	14.9	22.3	32.3	48.5
12/12/86	<0.1	10.9	15.8	22.6	33.1	48.3
12/13/86	<0.1	9.03	13.6	20.7	31.2	47.7
AVERAGE:	<0.10	9.54	14.1	20.7	30.8	45.9
COR AVE:	<0.10	9.54	14.1	20.7	30.8	45.9
PERCENT RECOVERY	100	(2.0)	N=5			

FISH SIZES

MEAN LENGTH(mm) : 18.3
SD LENGTH(mm) : 0.967

MEAN WEIGHT(G) : 0.087
SD WEIGHT(G) : 0.0126
LOADING(G/L/D) : 0.1208

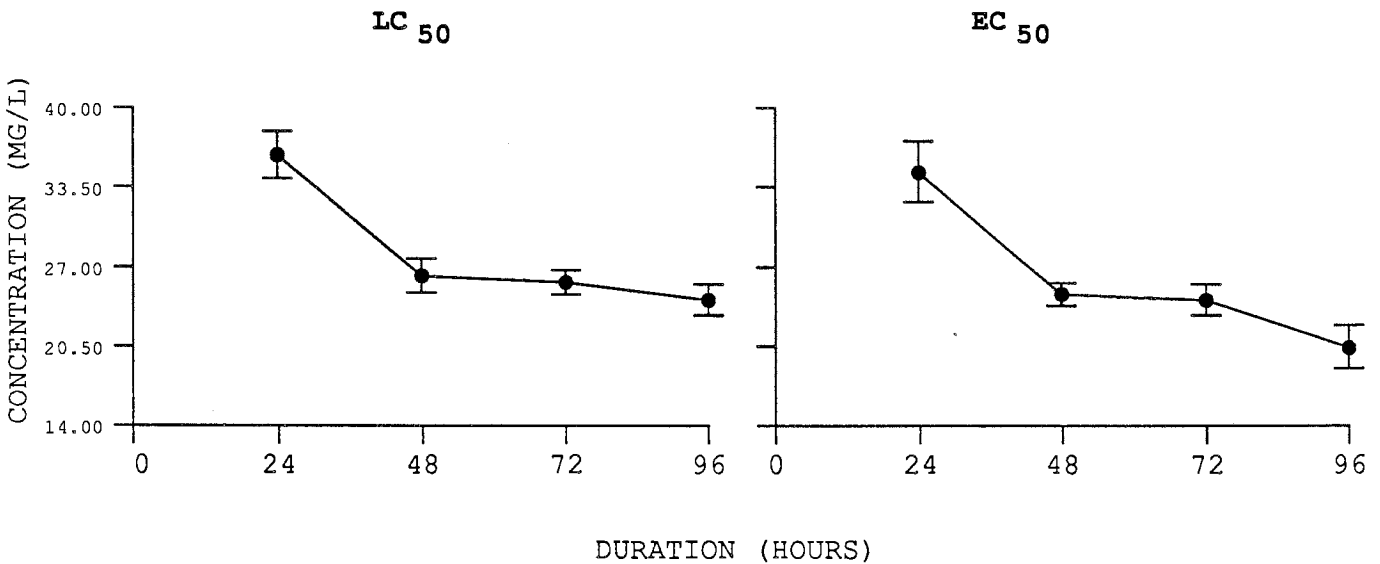
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, swam near the tank surface and had increased respiration. They also had rigid musculature, convulsions and spinal column deformities. In addition, the fish were darkly colored and lost equilibrium prior to death.

2,4-Dinitrotoluene

***** MORTALITIES *****							RESULTS
CON	A	B	C	D	E		
INITIAL 20	20	20	20	20	20	* * * * *	
24				2	20	* * * * *	
48				18	20	* * * * *	
72				19	20	* * * * *	
96			2	20	20	* * * * *	
							(MG/L)
							96 HR LC50: 24.3
							CONF. LIM: (23.0-25.6)
							* * * * *

***** EFFECT *****							
CON	A	B	C	D	E		
INITIAL 20	20	20	20	20	20	* * * * *	
24				4	20	* * * * *	
48			1	20	20	* * * * *	
72			2	20	20	* * * * *	
96			11	20	20	* * * * *	
							(MG/L)
							96 HR EC50: 20.4
							CONF. LIM: (18.7-22.2)
							* * * * *



CHEMICAL: Salicylaldoxime

TEST DATE: 05/09/89

CAS NUMBER: 94677

MF: C7H7NO2

MWT: 137.14

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 21.0 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.3 (0.38)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.30)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.9 (0.12)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 37.5 (0.00)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.74	1.14	1.76	2.71	4.17
05/09/89	<.04	0.63	1.08	1.56	2.26	3.61
05/10/89	<.04	0.70	1.06	2.12	2.35	3.71
05/11/89	<.04	0.90	1.23	1.86	2.67	4.18
05/12/89	<.04	0.69	1.18	1.83	2.70	4.31
05/13/89						
AVERAGE:	<0.04	0.73	1.14	1.84	2.50	3.95
COR AVE:	<0.04	0.79	1.23	1.99	2.69	4.27
PERCENT RECOVERY	92.6	(5.2)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.8	MEAN WEIGHT (G)	: 0.089
SD LENGTH (mm)	: 1.517	SD WEIGHT (G)	: 0.0248
		LOADING (G/L/D)	: 0.0494

REMARKS

Analytical determinations of toxicant concentration were not made at 96 hr. The chemical was very light sensitive, thus the stock solution remained covered for the exposure duration. Affected fish lost equilibrium prior to death.

Salicylaldoxime

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48				4	14	
72				6	16	
96				6	16	

RESULTS

* * * * *
 * (MG/L) *
 * 96 HR LC50: 3.23 *
 * * * * *
 * CONF. LIM: *
 * (2.73-3.83) *
 * * * * *

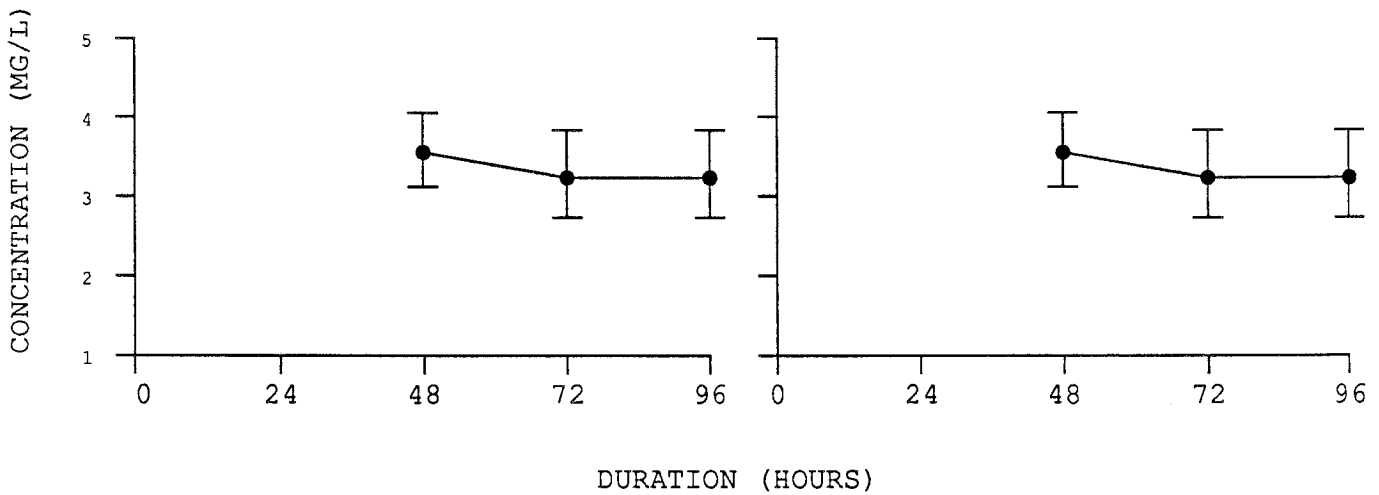
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48				4	14	
72				6	16	
96				6	16	

* * * * *
 * (MG/L) *
 * 96 HR EC50: 3.23 *
 * * * * *
 * CONF. LIM: *
 * (2.73-3.83) *
 * * * * *

LC 50

EC 50



CHEMICAL: Toluene (Test 2)

TEST DATE: 06/20/88

CAS NUMBER: 108883

MF: C7H8

MWT: 92.14

CHEMICAL SOURCE: Burdick and Jackson Laboratories, Inc.

PURITY: 99.8+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 183 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 30-31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.5 (0.35)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.40)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 46.7 (0.17)	PH	: 7.6 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 39.7 (0.90)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	13.1	20.1	30.9	47.6	73.2
06/20/88	<.25	8.58	11.9	19.9	34.8	55.8
06/21/88	<.25	11.8	16.8	25.6	47.8	70.1
06/22/88	<.25	15.5	22.9	37.0	58.4	80.2
06/23/88	<.25	11.9	17.9	29.5	45.1	52.3
06/24/88	<.25	12.0	18.4	28.8	46.7	68.1
AVERAGE:	<0.25	12.0	17.6	28.2	46.6	65.3
COR AVE:	<0.25	12.1	17.8	28.5	47.1	66.1
PERCENT RECOVERY	98.8	(5.1)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 16.5
SD LENGTH (mm) : 3.052

MEAN WEIGHT (G) : 0.067
SD WEIGHT (G) : 0.0418
LOADING (G/L/D) : 0.0372

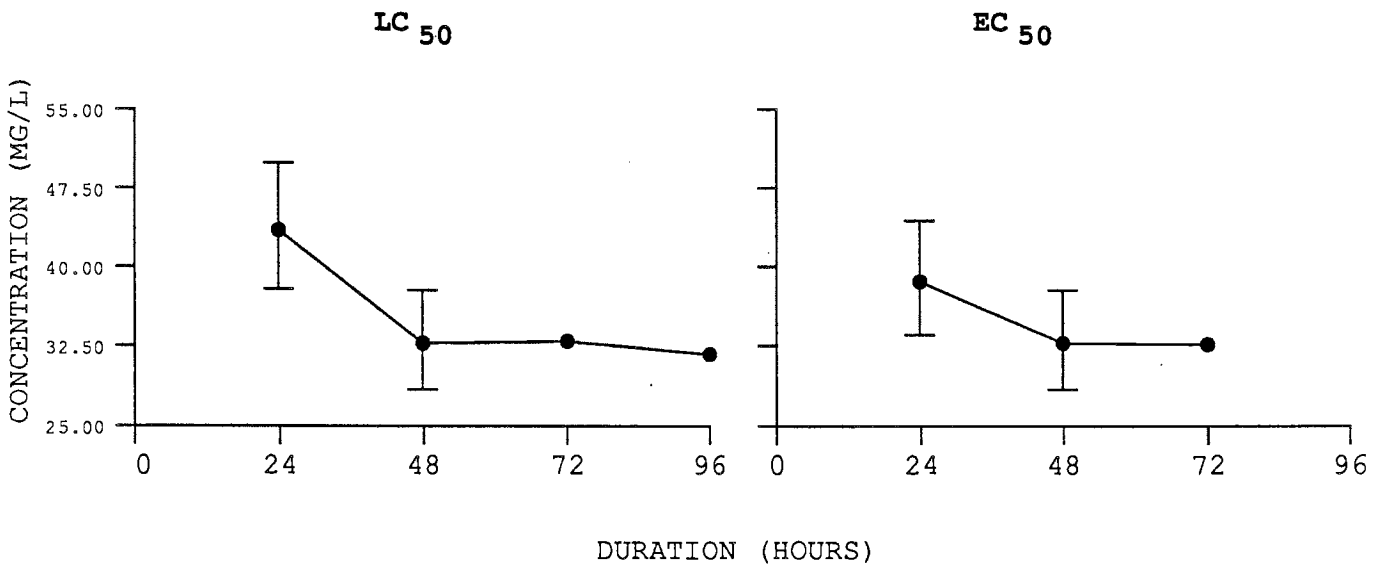
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface, had increased respiration and were darkly colored. Equilibrium loss was not observed prior to death. Two liquid-liquid equilibrators were used to obtain the desired high concentration. A 96-hr EC50 could not be calculated because the majority of fish were affected.

Toluene (Test 2)

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	2		3	9	20	20	* * * * *
48	4	2	5	20	20	20	(MG/L)
72	7	5	6	20	20	20	96 HR LC50: 31.7
96	9	6	7	20	20	20	CONF. LIM: (NOT REL.)
							* * * * *

***** EFFECT *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	2		4	13	20	20	* * * * *
48	4	2	5	20	20	20	(MG/L)
72	8	5	6	20	20	20	96 HR EC50: <12.1
96	11	10	12	20	20	20	CONF. LIM: (NOT REL.)
							* * * * *



CHEMICAL: o-Cresol

TEST DATE: 10/20/86

CAS NUMBER: 95487

MF: C7H8O

MWT: 108.14

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 225 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.6 (0.37)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.25)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 46.8 (0.68)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 44.4 (0.44)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	8.26	12.7	19.6	30.2	46.4
10/20/86	<1.0	8.09	11.8	17.3	26.0	35.8
10/21/86	<1.0	7.25	12.2	19.1	32.8	48.7
10/22/86	<1.0	7.58	13.2	19.1	32.5	48.1
10/23/86	<1.0	7.51	11.6	17.1	31.4	45.5
10/24/86	<1.0	8.14	12.1	18.7	32.6	45.7
AVERAGE:	<1.00	7.71	12.2	18.3	31.1	44.8
COR AVE:	<0.98	7.56	11.9	17.9	30.4	43.9
PERCENT RECOVERY		102.03(1.89)	N=10			

FISH SIZES

MEAN LENGTH(mm)	: 17.9	MEAN WEIGHT(G)	: 0.083
SD LENGTH(mm)	: 0.852	SD WEIGHT(G)	: 0.0135
		LOADING(G/L/D)	: 0.0461

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had increased respiration. They were also darkly colored. Equilibrium loss was not observed prior to death. NaOH was used to increase the solubility of the chemical. The pH of the stock solution was then adjusted to that of lake water.

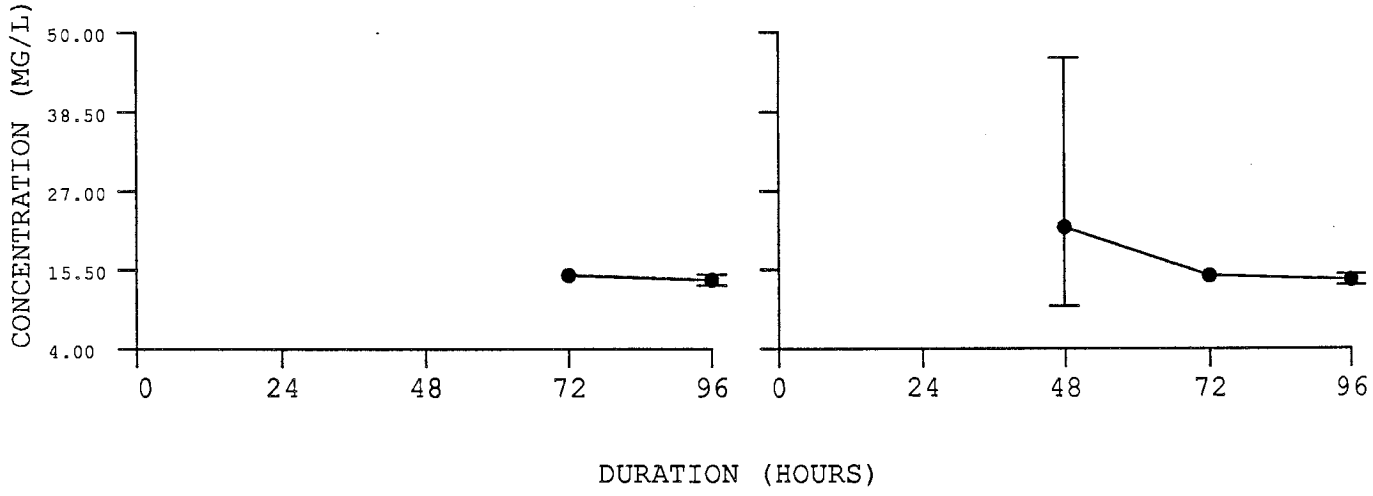
o-Cresol

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						1	*	*
48			9	14	5		*	(MG/L)
72			20	20	18		*	
96		2	20	20	20		*	96 HR LC50: 14.0
							*	
							*	CONF. LIM:
							*	(13.2-14.8)
							*	
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						1	*	*
48			9	15	9		*	(MG/L)
72			20	20	20		*	
96		2	20	20	20		*	96 HR EC50: 14.0
							*	
							*	CONF. LIM:
							*	(13.2-14.8)
							*	
							*	
							*	
							*	
							*	
							*	
							*	

LC 50

EC 50



CHEMICAL: Cresol (Mixed)

TEST DATE: 07/03/89

CAS NUMBER: 1319773

MF: C7H8O

MWT: 108.14

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: Tech.

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 398 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.8 (0.39)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.90)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.5 (0.10)	PH	: 7.6 (0.05)
ALKALINITY (MG/L CaCO3)	: 35.8 (0.35)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	7.14	11.0	16.9	25.9	39.9
07/03/89	<1.0	8.60	11.7	16.8	25.3	40.9
07/04/89	<1.0	8.98	13.0	18.0	26.9	42.5
07/05/89	<1.0	8.39	11.0	15.5	23.1	36.2
07/06/89	<1.0	8.04	10.4	12.1	19.0	32.5
07/07/89	<1.0	9.10	11.3	13.1	20.4	36.1
AVERAGE:	<1.00	8.62	11.5	15.1	22.9	37.6
COR AVE:	<0.97	8.37	11.1	14.7	22.3	36.5
PERCENT RECOVERY	103	(3.6)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 20.8	MEAN WEIGHT (G)	: 0.129
SD LENGTH (mm)	: 2.285	SD WEIGHT (G)	: 0.0353
		LOADING (G/L/D)	: 0.0717

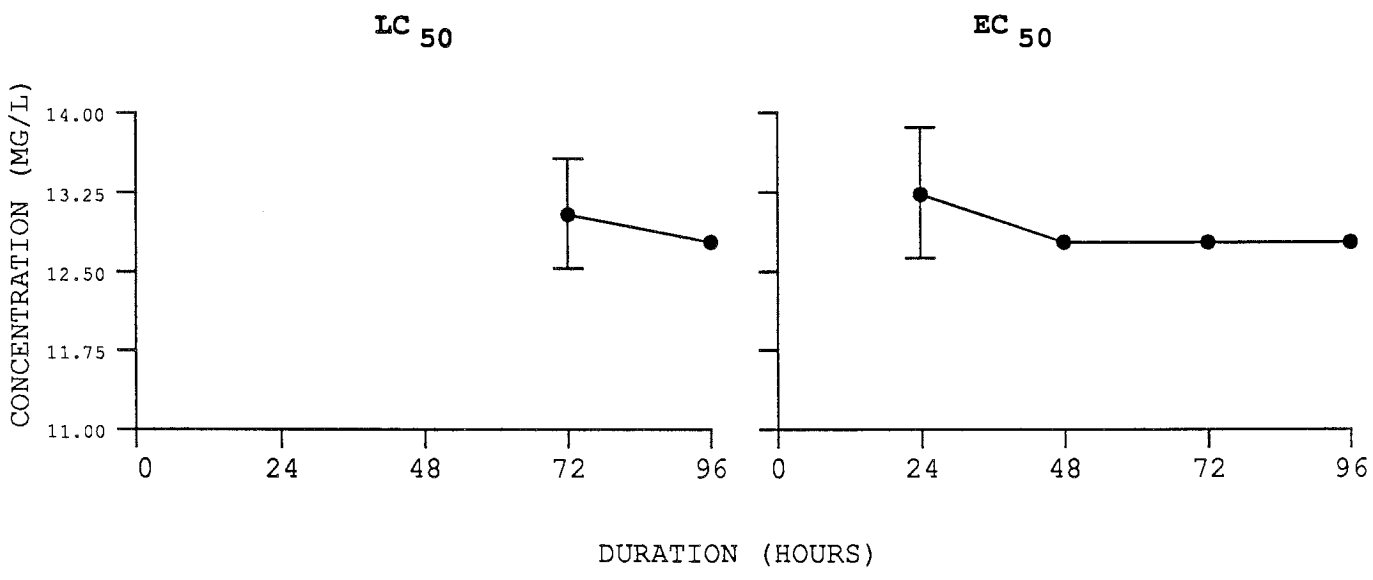
REMARKS

Affected fish lost schooling behavior, were hyperactive and swam near the tank surface, were overreactive to external stimuli and had increased respiration. They were also lightly colored and lost equilibrium prior to death.

Cresol (Mixed)

***** MORTALITIES *****							RESULTS	
HR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	
24				6	3	4	*	
48				14	6	9	*	(MG/L)
72				20	19	20	*	
96				20	20	20	*	96 HR LC50: 12.8
							*	
							*	
							*	CONF. LIM:
							*	(NOT REL.)
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	
24				18	20	20	*	
48				20	20	20	*	(MG/L)
72				20	20	20	*	
96				20	20	20	*	96 HR EC50: 12.8
							*	
							*	
							*	CONF. LIM:
							*	(NOT REL.)
							*	
							*	
							*	
							*	
							*	



CHEMICAL: Benzylamine

TEST DATE: 02/16/87

CAS NUMBER: 100469

MF: C7H9N

MWT: 107.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 980 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.9 (0.21)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.43)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.7 (0.36)	PH	: 7.9 (0.05)
ALKALINITY (MG/L CaCO3)	: 44.0 (0.41)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	35.7	54.9	84.5	130	200
02/16/87	<4.0	44.4	58.8	81.8	124	190
02/17/87	<4.0	49.9	63.6	90.1	136	207
02/18/87	<4.0	47.7	62.9	89.0	132	198
02/19/87	<4.0	49.0	62.8	89.4	136	202
02/20/87	<4.0	42.0	54.3	73.3	108	163
AVERAGE:	<4.00	46.6	60.5	84.7	127	192
COR AVE:	<3.85	44.9	58.3	81.6	123	185
PERCENT RECOVERY		103.8 (2.23)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.2	MEAN WEIGHT (G)	: 0.087
SD LENGTH (mm)	: 0.951	SD WEIGHT (G)	: 0.0125
		LOADING (G/L/D)	: 0.0483

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and were darkly colored. They also had spinal column deformities and lost equilibrium prior to death. The pH of the stock solution was adjusted to that of lake water using HCl.

Benzylamine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				10	20	
48				12	20	
72				12	20	
96				19	20	

RESULTS

 (MG/L)
 96 HR LC50: 102
 CONF. LIM:
 (97.9- 106)

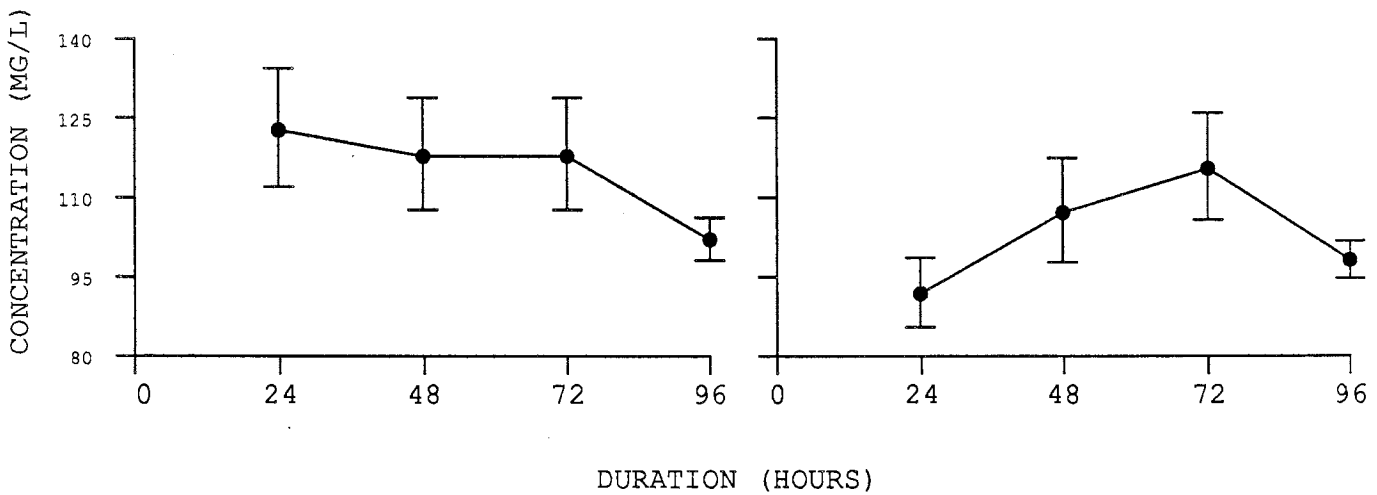
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		2	3	20	20	
48		1	1	15	20	
72			0	13	20	
96			1	20	20	

 (MG/L)
 96 HR EC50: 98.0
 CONF. LIM:
 (94.5- 102)

LC 50

EC 50



CHEMICAL: 2-Ethylpyridine

TEST DATE: 11/10/86

CAS NUMBER: 100710

MF: C7H9N

MWT: 107.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1310 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.3 (0.92)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.3 (0.39)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 44.5 (0.41)	PH	: 7.8 (0.09)
ALKALINITY (MG/L CaCO ₃)	: 44.2 (0.24)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	109	168	258	397	611
11/10/86	<1.0	79.1	125	193	314	470
11/11/86		84.7	136	215	344	547
11/12/86		86.1	138	216	353	562
11/13/86	<1.0	105	158	241	367	578
11/14/86	<1.0	99.5	151	236	347	542
AVERAGE:	<1.00	90.9	142	220	345	540
COR AVE:	<1.00	91.1	142	221	346	541
PERCENT RECOVERY		99.8 (5.2)				
						N=11

FISH SIZES

MEAN LENGTH (mm)	: 19.4	MEAN WEIGHT (G)	: 0.104
SD LENGTH (mm)	: 0.940	SD WEIGHT (G)	: 0.0173
		LOADING (G/L/D)	: 0.1444

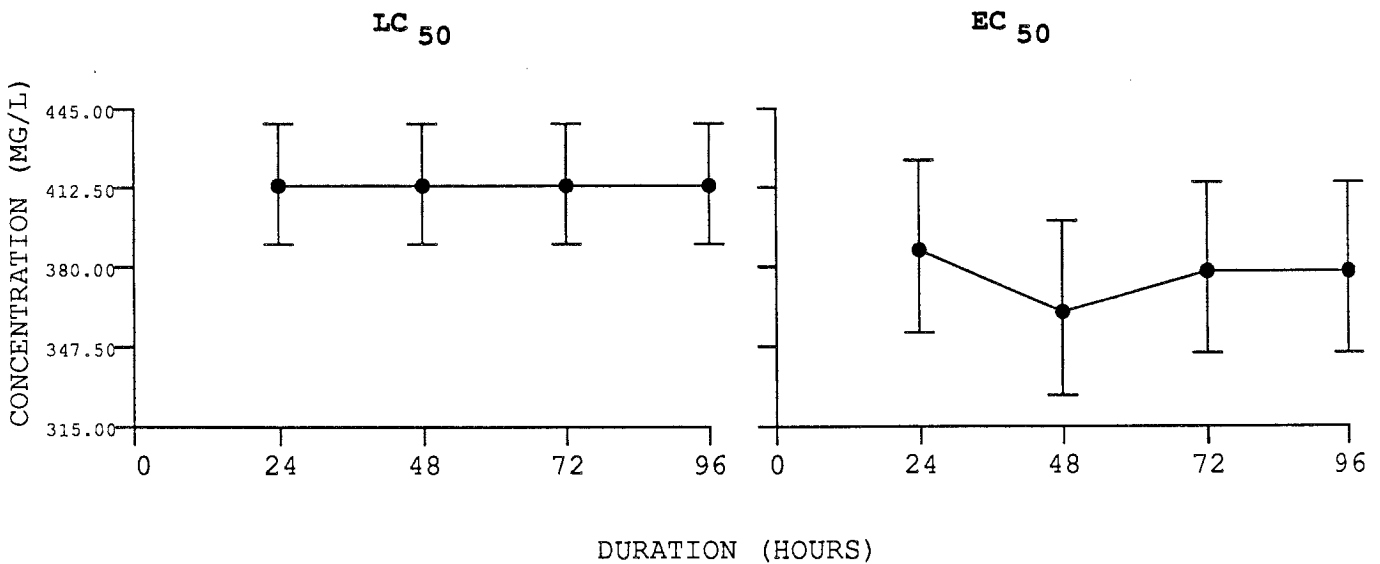
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, swam near the tank bottom and had increased respiration. They were also darkly colored and had edema. Equilibrium loss was not observed prior to death. The pH of the stock solution was adjusted to that of lake water using HCl.

2-Ethylpyridine

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24				2	20		*	*
48				2	20		*	(MG/L)
72				2	20		*	
96				2	20		*	96 HR LC50: 414
							*	
							*	
							*	CONF. LIM:
							*	(390- 439)
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24			1	4	20		*	*
48				8	20		*	(MG/L)
72				6	20		*	
96				6	20		*	96 HR EC50: 378
							*	
							*	
							*	CONF. LIM:
							*	(345- 415)
							*	
							*	
							*	
							*	
							*	



CHEMICAL: N-Methylaniline

TEST DATE: 10/13/86

CAS NUMBER: 100618

MF: C7H9N

MWT: 107.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1560 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.5 (0.80)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.22)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.8 (0.57)	PH	: 7.6 (0.12)
ALKALINITY (MG/L CaCO3)	: 45.1 (0.85)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	57.1	87.9	135	208	320
10/13/86	<1.0	52.4	73.5	108	182	281
10/14/86	<1.0	58.0	84.2	129	192	300
10/15/86	<1.0	61.8	85.8	130	195	303
10/16/86	<1.0	58.6	84.2	132	202	314
10/17/86	<1.0	56.0	81.9	127	200	317
AVERAGE:	<1.00	57.4	81.9	125	194	303
COR AVE:	<0.99	57.0	81.4	124	193	301
PERCENT RECOVERY		100.7 (3.3)	N=6			

FISH SIZES

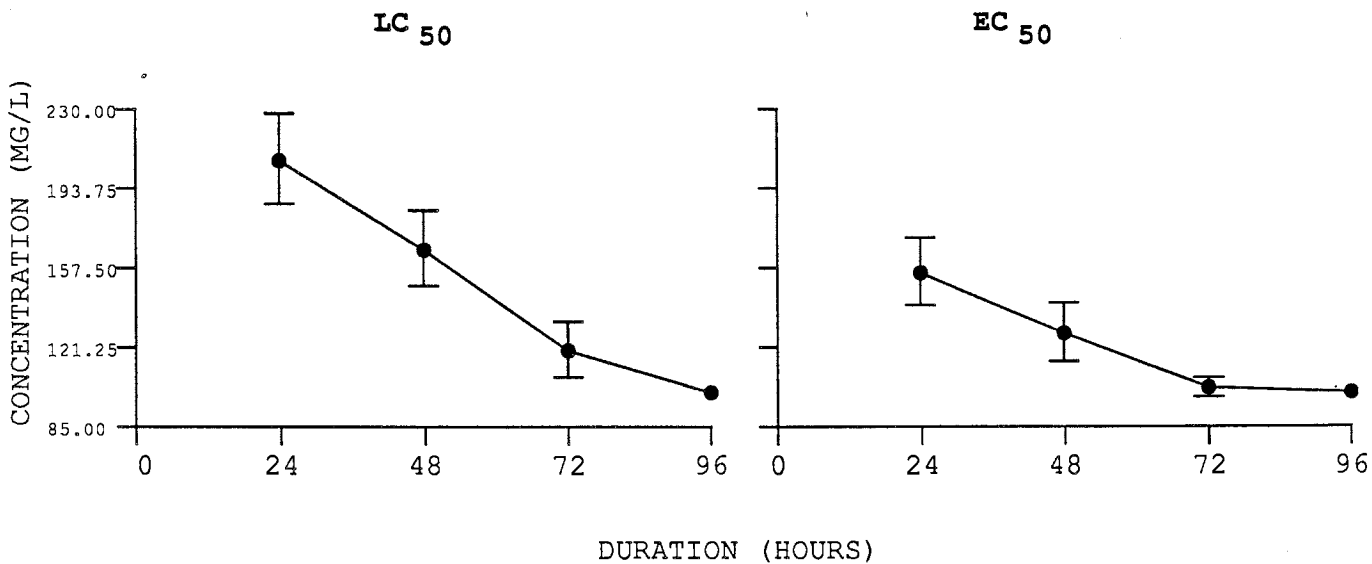
MEAN LENGTH (mm)	: 22.1	MEAN WEIGHT (G)	: 0.164
SD LENGTH (mm)	: 3.478	SD WEIGHT (G)	: 0.0656
		LOADING (G/L/D)	: 0.0911

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had increased respiration. They also had convulsions and lost equilibrium prior to death.

N-Methylaniline

***** MORTALITIES *****						***** RESULTS *****	
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				1	6	20	* * * * *
48				2	15	20	* * * * *
72				14	18	20	* * * * *
96				20	20	20	* * * * *
							(MG/L)
							96 HR LC50: 100
							CONF. LIM: (NOT REL.)
							* * * * *
***** EFFECT *****						***** *****	
INITIAL	20	20	20	20	20	20	* * * * *
24				3	17	20	* * * * *
48				10	19	20	* * * * *
72				20	19	20	* * * * *
96				20	20	20	* * * * *
							(MG/L)
							96 HR EC50: 100
							CONF. LIM: (NOT REL.)
							* * * * *



CHEMICAL: 4-Toluidine (Test 2)

TEST DATE: 04/21/87

CAS NUMBER: 106490

MF: C7H9N

MWT: 107.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 1040 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.8 (0.44)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.11)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.2 (0.56)	PH	: 7.9 (0.04)
ALKALINITY (MG/L CaCO ₃)	: 43.8 (0.25)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	37.6	57.8	89.0	137	210
04/21/87	<2.0	38.7	70.6	99.7	147	220
04/22/87	<2.0	44.7	65.7	92.1	144	217
04/23/87	<2.0	42.0	63.7	98.2	140	226
04/24/87	<2.0	42.0	61.9	99.5	145	226
04/25/87	<2.0	41.1	61.1	95.4	140	221
AVERAGE:	<2.00	41.7	64.6	97.0	143	222
COR AVE:	<1.92	40.1	62.1	93.2	138	213
PERCENT RECOVERY		104.1	(4.5)	N=10		

FISH SIZES

MEAN LENGTH (mm) : 20.1
SD LENGTH (mm) : 1.553

MEAN WEIGHT (G) : 0.115
SD WEIGHT (G) : 0.0271
LOADING (G/L/D) : 0.0639

REMARKS

Affected fish were hyperactive and overreactive to external stimuli, had increased respiration, convulsions and were hemorrhaging. Equilibrium loss was observed prior to death.

4-Toluidine (Test 2)

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24						3
48				2	10	
72				2	11	
96				7	13	

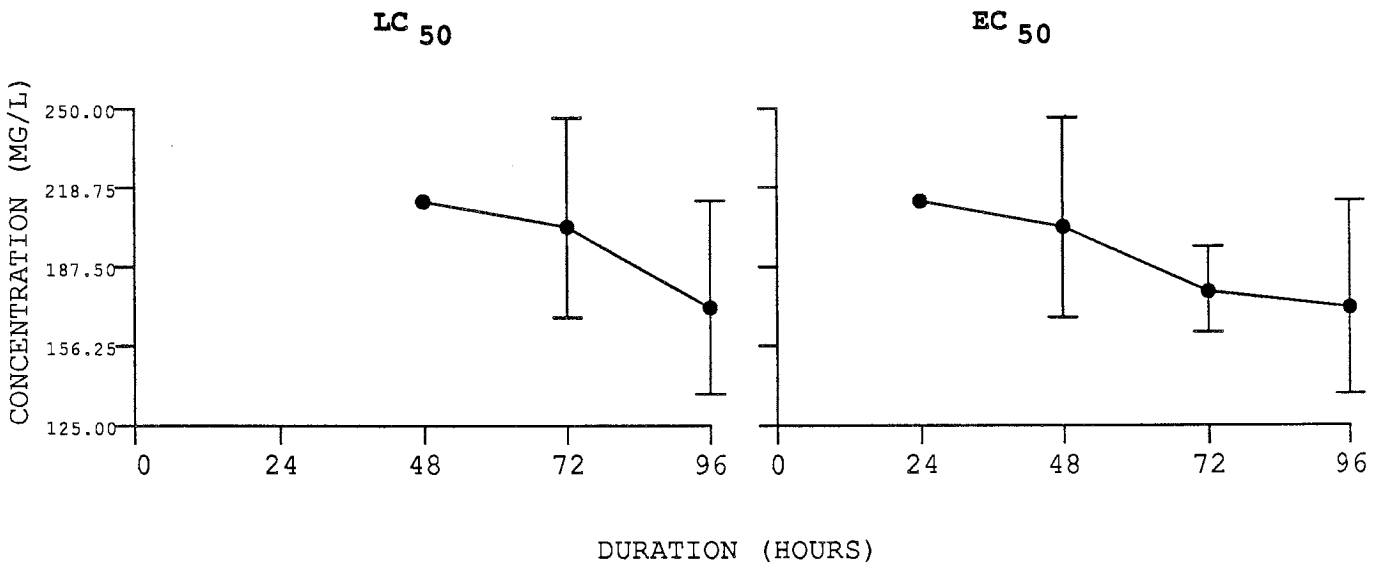
RESULTS

 (MG/L)
 96 HR LC50: 171
 CONF. LIM:
 (138- 213)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24						10
48				2	11	
72				3	15	
96				7	13	

 (MG/L)
 96 HR EC50: 171
 CONF. LIM:
 (137- 213)



CHEMICAL: 2-(2-Aminoethyl)pyridine

TEST DATE: 05/26/87

CAS NUMBER: 2706561 MF: C7H10N2
CHEMICAL SOURCE: Aldrich Chemical Co.

MWT: 122.17
PURITY: 95%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 210 mg/l Diluted (Blended)
ORGANISM: Fathead Minnow AGE: 33 D

***** TEST CONDITIONS *****

TEMPERATURE (C)	: 24.8 (0.18)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.35)	ADDITIONS (V/D)	: 28.8
HARDNESS (MG/L CaCO3)	: 47.0 (0.00)	PH	: 7.8 (0.00)
ALKALINITY (MG/L CaCO3)	: 56.0 (0.00)		

***** TOXICANT CONCENTRATIONS (MG/L) *****

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
05/26/87						203
05/27/87						217
05/28/87						224
05/29/87						232
05/30/87						
AVERAGE: <						219
COR AVE: <0.00						208
PERCENT RECOVERY	105.5	(3.9)				N=7

***** FISH SIZES *****

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

***** REMARKS *****

The pH of the stock solution was adjusted to that of lake water using HCl. The stock solution was mixed at a concentration that produced an emulsion. The test was run using the single-cell toxicity screening system and a 99% saturated solution (208 mg/l) of the chemical. No mortalities occurred nor were the fish stressed during the test. Samples were not taken at 96 hr for determination of toxicant concentrations. Individual lengths and weights of the test fish were not recorded.

2-(2-Aminoethyl)pyridine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL					5	
24					0	
48					0	
72					0	
96					0	

RESULTS

```
* * * * *
*
* (MG/L)
*
* 96 HR LC50: NOT CAL.
*
*
* CONF. LIM:
* ( )
*
*
* * * * *
```

***** EFFECT *****

INITIAL					5
24					0
48					0
72					0
96					0

```
* * * * *
*
* (MG/L)
*
* 96 HR EC50: NOT CAL.
*
*
* CONF. LIM:
* ( )
*
*
* * * * *
```

CHEMICAL: 2,4-Diaminotoluene

TEST DATE: 10/17/88

CAS NUMBER: 95807

MF: C7H10N2

MWT: 122.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 7260 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30-31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.2 (0.46)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.90)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 46.3 (0.29)	PH	: 7.6 (0.14)
ALKALINITY (MG/L CaCO3)	: 123. (117.)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	562	864	1330	2040	3140
10/17/88	<25	522	751	1070	1640	2420
10/18/88	<25	519	793	1150	1810	2810
10/19/88	<35	532	793	1190	1800	2790
10/20/88	<20	543	834	1230	1880	2940
10/21/88	<20	541	821	1210	1900	2900
AVERAGE: < 25		531	798	1170	1806	2772
COR AVE: <24.4		519	780	1143	1764	2707
PERCENT RECOVERY	102.4 (4.1)	N=6				

FISH SIZES

MEAN LENGTH (mm)	: 20.5	MEAN WEIGHT (G)	: 0.073
SD LENGTH (mm)	: 3.364	SD WEIGHT (G)	: 0.0474
		LOADING (G/L/D)	: 0.0406

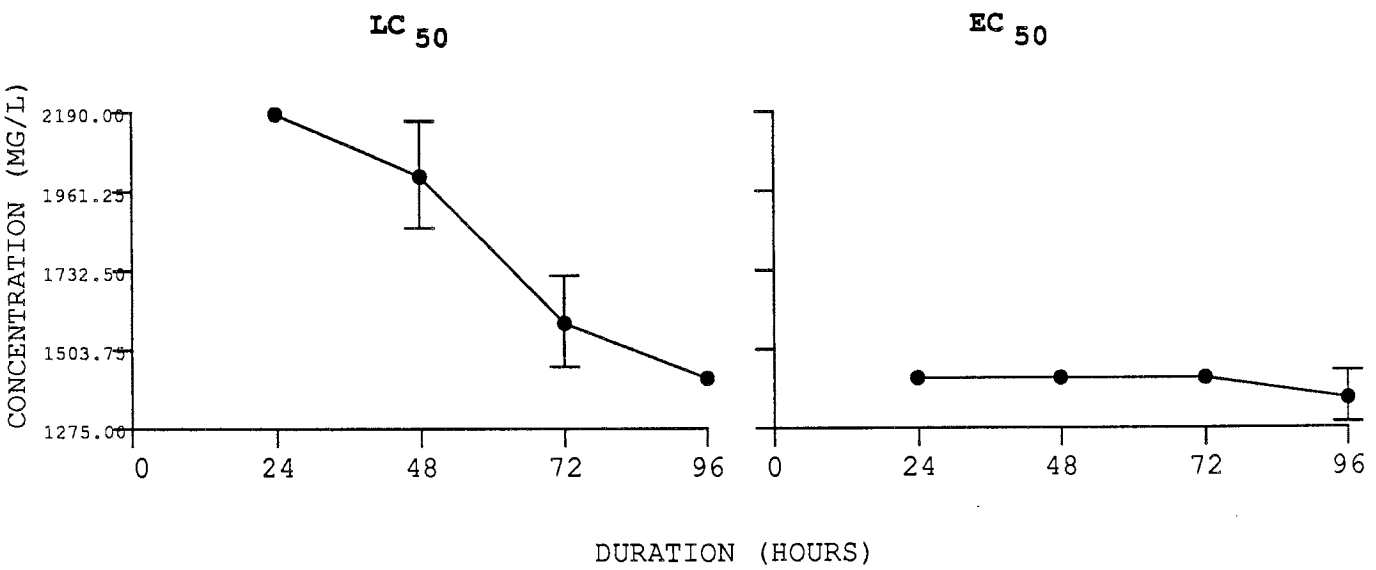
REMARKS

Affected fish were hypoactive and underreactive to external stimuli, were darkly colored and lost equilibrium prior to death. Alkalinity values for the C and E tanks were greater than 250 mg/l CaCO₃. Some carry-over of the chemical occurred in the control tanks. Increased alkalinity values were due to a reaction between the titrant and toxicant.

2,4-Diaminotoluene

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						20	*	*
48					4	20	*	(MG/L)
72					15	20	*	*
96					20	20	*	96 HR LC50: 1420
							*	*
							*	CONF. LIM:
							*	(NOT REL.)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	* * * * *	* * * * *
24						20	*	*
48						20	*	(MG/L)
72						20	*	*
96				2		20	*	96 HR EC50: 1360
							*	*
							*	CONF. LIM:
							*	(1290-1440)
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*
							*	*



CHEMICAL: 3,3-Dimethylglutaric Acid (Static)

TEST DATE: 09/03/86

CAS NUMBER: 4839467

MF: C7H12O4

MWT: 160.17

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Analytical Method Not Developed

TOXICANT STOCK: 20.0 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.5 (0.64)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.33)	ADDITIONS (V/D)	:
HARDNESS (MG/L CaCO3)	: 43.0 (0.00)	PH	: 7.9 (0.19)
ALKALINITY (MG/L CaCO3)	: 44.2 (0.00)		

TOXICANT CONCENTRATIONS (G/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:		1.25	2.50	5.01	10.0	20.0
09/03/86		1.25	2.50	5.01	10.0	20.0
09/04/86						
09/05/86						
AVERAGE: <		1.25	2.50	5.01	10.0	20.0
COR AVE: <0.00		1.25	2.50	5.01	10.0	20.0
PERCENT RECOVERY	100	(0.0)	N=0			

FISH SIZES

MEAN LENGTH (mm) : 18.8
SD LENGTH (mm) : 1.304

MEAN WEIGHT (G) : 0.091
SD WEIGHT (G) : 0.0203
LOADING (G/L/D) :

REMARKS

NaOH was used to increase the solubility rate of the chemical. The pH of the stock solution was then adjusted to that of lake water. An analytical method for measuring the test concentrations could not be developed; therefore, nominal values were used in this 48-hr static test. Behavioral data were not recorded.

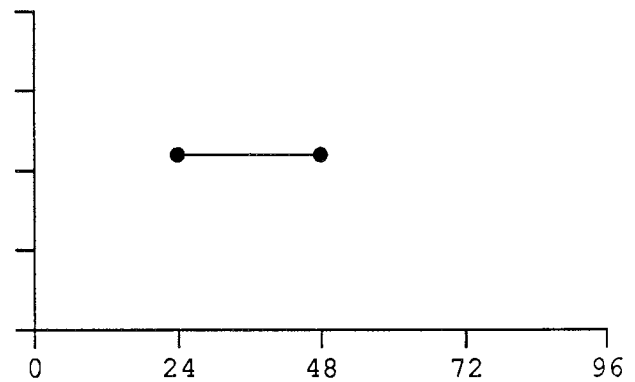
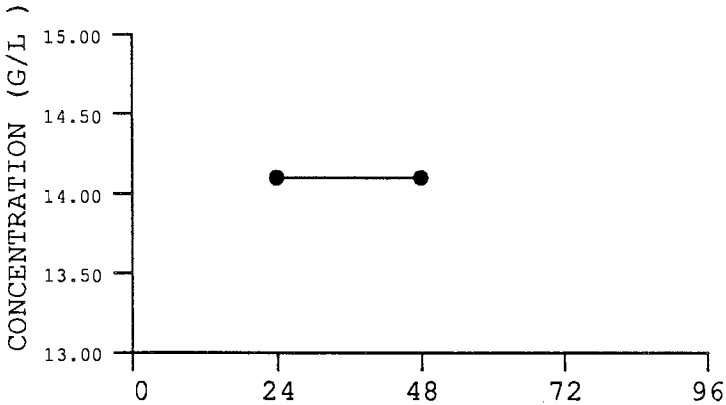
3,3-Dimethylglutaric Acid (Static)

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	5	5	5	5	5	5	* * * * *
24						5	* (G/L) *
48						5	* 48 HR LC50: 14.1 *
							* CONF. LIM: *
							* (NOT REL.) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	5	5	5	5	5	5	* * * * *
24						5	* (G/L) *
48						5	* 48 HR EC50: 14.1 *
							* CONF. LIM: *
							* (NOT REL.) *
							* * * * *

LC₅₀

EC₅₀



DURATION (HOURS)

CHEMICAL: Oxamyl

TEST DATE: 09/15/86

CAS NUMBER: 23135220

MF: C7H13N3O3S

MWT: 219.29

CHEMICAL SOURCE: Chem Service Inc.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 500 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.2 (1.16)	TANK VOLUME (L)	: 1.8
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.42)	ADDITIONS (V/D)	: 12
HARDNESS (MG/L CaCO ₃)	: 50.7 (0.97)	PH	: 7.2 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 41.9 (1.08)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.98	3.05	4.69	7.22	11.1
09/15/86	<0.4	4.25	4.98	6.58	9.23	13.0
09/16/86	<0.4	4.19	4.66	6.30	8.36	11.9
09/17/86	<0.4	4.23	4.59		8.65	12.4
09/18/86	<0.4	4.26	4.84	6.45	8.67	
09/19/86	<0.4	4.04	4.35	6.00	8.67	
AVERAGE:	<0.40	4.19	4.68	6.33	8.72	12.4
COR AVE:	<0.42	4.40	4.91	6.64	9.14	13.0
PERCENT RECOVERY	95.4	(3.6)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 20.5	MEAN WEIGHT (G)	: 0.148
SD LENGTH (mm)	: 2.259	SD WEIGHT (G)	: 0.0431
		LOADING (G/L/D)	: 0.1370

REMARKS

Affected fish lost schooling behavior, were hyperactive, swam near the tank surface, were overreactive to external stimuli and had increased respiration. They were also darkly colored and exhibited abnormally red gills. Equilibrium loss was not observed prior to death. Measured concentrations varied from nominal concentrations due to diluter problems. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

Oxamyl

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1	4	3	4	8
48		2	6	4	6	20
72		2	6	5	7	20
96		3	7	7	7	20

RESULTS

 (MG/L)
 96 HR LC50: 8.30
 CONF. LIM:
 (7.13-9.66)

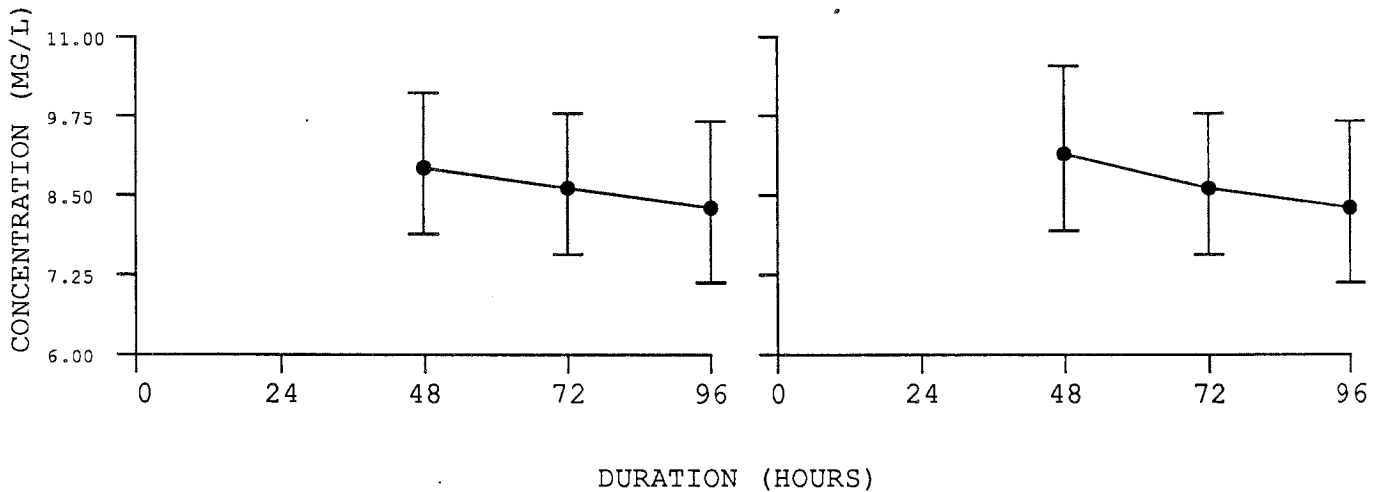
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1	4	3	4	8
48		3	6	4	6	20
72		2	6	5	7	20
96		3	7	7	7	20

 (MG/L)
 96 HR EC50: 8.30
 CONF. LIM:
 (7.13-9.66)

LC 50

EC 50



CHEMICAL: Aldicarb

TEST DATE: 09/19/88

CAS NUMBER: 116063

MF: C7H14N2O2S

MWT: 190.30

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 21.2 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.8 (0.37)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.3 (0.45)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 46.1 (0.48)	PH	: 8.0 (0.09)
ALKALINITY (MG/L CaCO3)	: 40.5 (0.38)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	190	300	460	710	1090
09/19/88	<50	279	369	512	700	1060
09/20/88	<50	305	396	501	756	1080
09/21/88	<50	259	382	497	753	1040
09/22/88	<50	240	316	449	665	990
09/23/88	<50	226	322	452	696	1040
AVERAGE: < 50		262	357	482	714	1042
COR AVE: <50.0		262	357	482	713	1041
PERCENT RECOVERY	100.1 (9.8)	N=5				

FISH SIZES

MEAN LENGTH (mm)	: 15.8	MEAN WEIGHT (G)	: 0.057
SD LENGTH (mm)	: 1.824	SD WEIGHT (G)	: 0.0297
		LOADING (G/L/D)	: 0.0317

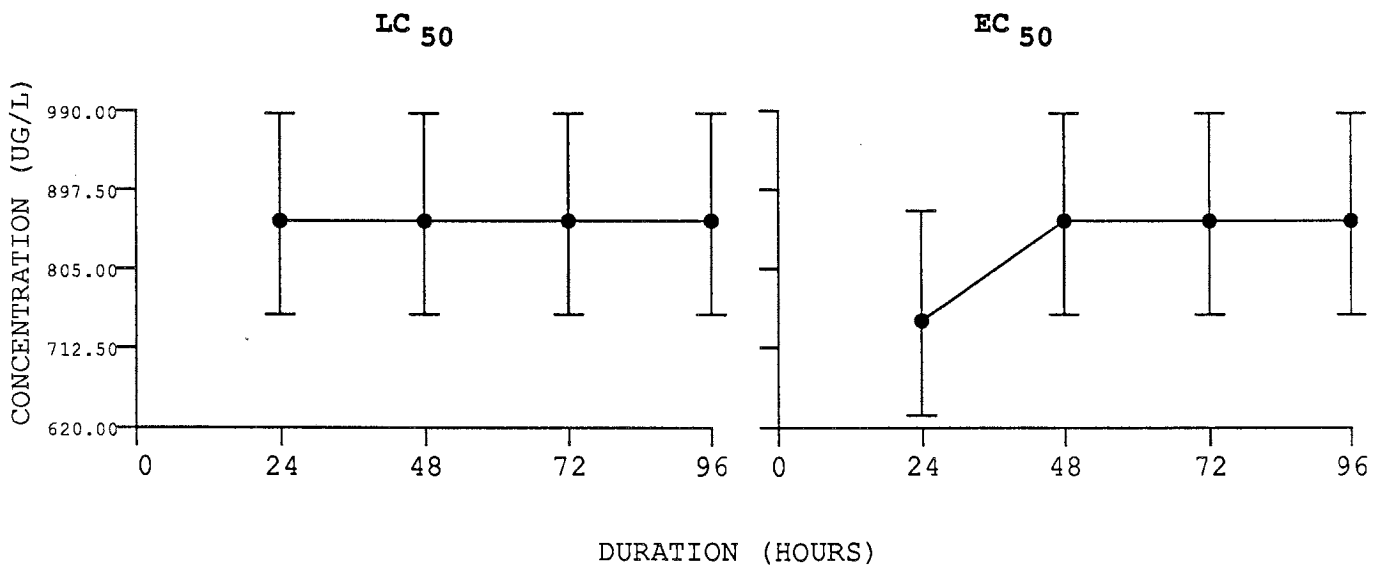
REMARKS

Affected fish were hyperactive and overreactive to external stimuli. They also had increased respiration, convulsions and spinal column deformities. They were darkly colored and lost equilibrium prior to death.

Aldicarb

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	1	2	3	6	14	14	* (UG/L) *
48	1	2	3	6	14	14	* 96 HR LC50: 861 *
72	1	2	3	6	14	14	* CONF. LIM: *
96	1	2	3	6	14	14	* (751- 987) *

***** EFFECT *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	1	2	3	9	16	16	* (UG/L) *
48	1	2	3	6	14	14	* 96 HR EC50: 861 *
72	1	2	3	6	14	14	* CONF. LIM: *
96	1	2	3	6	14	14	* (751- 987) *



CHEMICAL: Styrene

TEST DATE: 05/11/87

CAS NUMBER: 100425

MF: C8H8

MWT: 104.15

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 131 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 21.3 (0.42)	TANK VOLUME (L)	: 1.5
DISSOLVED OXYGEN (MG/L)	: 8.1 (0.39)	ADDITIONS (V/D)	: 15.4
HARDNESS (MG/L CaCO3)	: 52.8 (2.44)	PH	: 7.2 (0.05)
ALKALINITY (MG/L CaCO3)	: 40.5 (1.11)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.12	6.25	12.5	25.0	50.0
05/11/87	<.04 <.04	0.5 0.5	1.4 1.4	2.9 2.5	7.5 7.7	13.5 15.9
05/12/87	<.04	0.1	0.7	1.8	5.9	12.3
05/13/87	<.04 <.04	0.1 0.1	0.7 0.2	1.8 1.9	6.2 6.3	13.0 12.2
05/14/87	<.04	0.5	0.4	1.8	6.1	13.8
05/15/87	<.04 <.04	0.1 0.2	0.5 0.5	1.4 1.6	5.6 5.7	14.7 13.3
AVERAGE:	<0.04 <0.04	0.20 0.33	0.82 0.63	1.98 1.95	6.30 6.45	13.4 13.8
COR AVE:	<0.04 <0.04	0.21 0.34	0.85 0.65	2.04 2.01	6.51 6.66	13.8 14.3
PERCENT RECOVERY	96.8	(3.6)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 19.0	MEAN WEIGHT (G)	: 0.101
SD LENGTH (mm)	: 2.404	SD WEIGHT (G)	: 0.0398
		LOADING (G/L/D)	: 0.0437

REMARKS

Affected fish lost equilibrium prior to death. The compound had an inhibitor (4-tert-butylcatechol) which was tested at a concentration which exceeded its measurement in the styrene exposure chambers by more than 1,000 times. No mortalities or effects occurred due to the presence of the inhibitor. Measured concentrations were lower than nominal concentrations due to volatility.

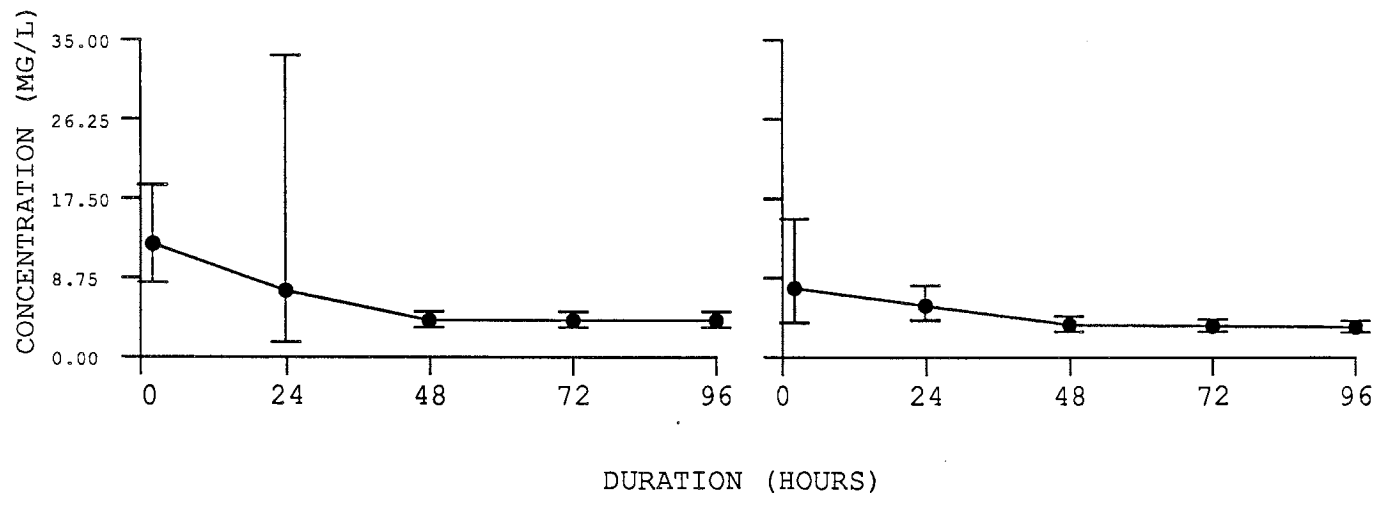
Styrene

***** MORTALITIES *****											***** RESULTS *****																			
HOUR	CON	A	B	C	D	E																								
INITIAL	10	10	10	10	10	10	10	10	10	10	10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2							1	1	3	5	6	*												*						
24		1	1	1	1	4	6	5	7			*	(MG/L)											*						
48		2	1	1	1	7	9	8	7			*	96 HR LC50: 4.02											*						
72		2	1	1	1	7	9	8	7			*	CONF. LIM:											*						
96		2	1	1	1	7	9	8	7			*	(3.24-4.99)											*						
												*												*						
												*												*						
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***** EFFECT *****											***** RESULTS *****																		
HOUR	CON	A	B	C	D	E																							
INITIAL	10	10	10	10	10	10	10	10	10	10	10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2							1	4	5	8	6	*												*					
24		1	1	1	1	5	6	8	9			*	(MG/L)											*					
48		2	1	1	1	8	10	10	9			*	96 HR EC50: 3.32											*					
72		2	1	1	1	9	10	10	10			*	CONF. LIM:											*					
96		2	1	1	1	10	10	10	10			*	(2.75-4.01)											*					
												*												*					
												*												*					
												*												*					
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LC 50

EC 50



CHEMICAL: Ethylbenzene (Test 2)

TEST DATE: 02/16/87

CAS NUMBER: 100414

MF: C8H10

MWT: 106.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 119 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 28-32 D

TEST CONDITIONS

TEMPERATURE (C)	: 22.3 (0.35)	TANK VOLUME (L)	: 1.5
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.52)	ADDITIONS (V/D)	: 15.4
HARDNESS (MG/L CaCO3)	: 50.0 (0.00)	PH	: 7.2 (0.08)
ALKALINITY (MG/L CaCO3)	: 41.5 (0.58)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.88	7.75	15.5	31.0	62.0
02/16/87	<0.3 <0.3	0.90 0.82	1.74 2.24	7.95 6.14	12.7 14.4	27.1 27.8
02/17/87	<0.3 <0.3	0.97	0.94	6.80	14.0	27.5
02/18/87	<0.3 <0.3	1.50 1.20	1.50 2.60	6.60 5.90	12.1 12.6	25.4
02/19/87	<0.3 <0.3	0.98 0.94	1.30 1.70	5.30 5.10	12.0 14.7	
02/20/87	<0.3 <0.3	0.98 0.94	1.90 2.30	6.25 6.10	13.3	
AVERAGE:	<0.30 <0.30	1.07 0.98	1.48 2.21	6.58 5.81	12.8 13.9	27.3 26.6
COR AVE:	<0.32 <0.32	1.14 1.05	1.58 2.37	7.06 6.23	13.8 14.9	29.3 28.5
PERCENT RECOVERY	93.2	(6.8)	N=7			

FISH SIZES

MEAN LENGTH(mm)	: 19.5	MEAN WEIGHT(G)	: 0.088
SD LENGTH(mm)	: 3.206	SD WEIGHT(G)	: 0.0552
		LOADING(G/L/D)	: 0.0381

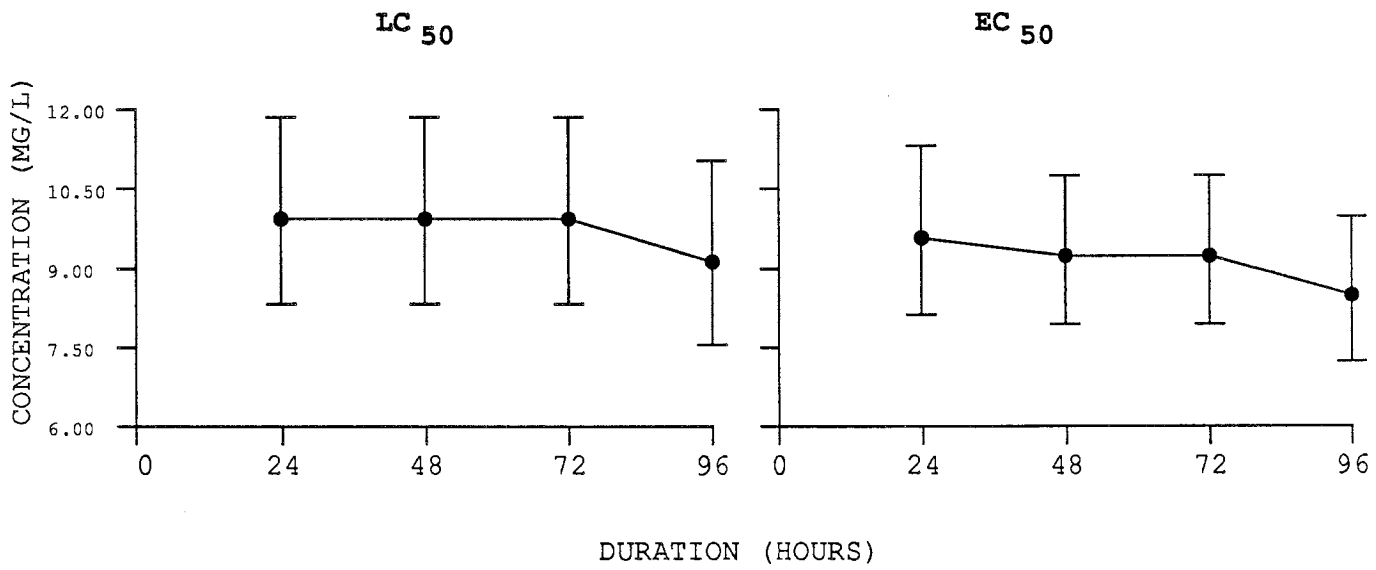
REMARKS

Affected fish lost schooling behavior, were hypoactive, were underreactive to external stimuli and were darkly colored. Equilibrium loss was observed prior to death. Measured concentrations were lower than nominal concentrations due to volatility.

Ethylbenzene (Test 2)

***** MORTALITIES *****											***** RESULTS *****										
HOUR	CON	A	B	C	D	E															
INITIAL	10	10	10	10	10	10	* * * * *														
24			2		7	10	* * * * *														
48			2		7	10	(MG/L)														
72			2		7	10	* * * * *														
96			3		8	10	* * * * *														
							96 HR LC50: 9.09														
							CONF. LIM: (7.55-11.0)														

***** EFFECT *****											***** RESULTS *****										
HOUR	CON	A	B	C	D	E															
INITIAL	10	10	10	10	10	10	* * * * *														
24			2		8	10	* * * * *														
48			2		9	10	(MG/L)														
72			2		9	10	* * * * *														
96			3		10	10	* * * * *														
							96 HR EC50: 8.45														
							CONF. LIM: (7.21-9.90)														



CHEMICAL: o-Xylene (Test 1)

TEST DATE: 01/21/86

CAS NUMBER: 95476

MF: C8H10

MWT: 106.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Emulsified

ORGANISM: Fathead Minnow

AGE: 55-57 D

TEST CONDITIONS

TEMPERATURE (C)	: 17.3 (0.00)	TANK VOLUME (L)	: 41
DISSOLVED OXYGEN (MG/L)	: 8.2 (0.67)	ADDITIONS (V/D)	: 7.0
HARDNESS (MG/L CaCO3)	: 45.3 (0.48)	PH	: 7.3 (0.20)
ALKALINITY (MG/L CaCO3)	: 42.7 (0.63)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
01/21/86	<.20	1.44	2.30	4.87	10.2	20.4
01/22/86	<.20	1.78	2.81	5.86	11.9	23.5
01/23/86	<.20	1.78	2.74	5.75	12.1	22.1
01/24/86	<.20	1.68	2.59	5.87	12.0	23.5
01/25/86						
AVERAGE:	<0.20	1.61	1.73	2.52	2.70	5.31 5.87 11.2 11.9 21.3 23.5
COR AVE:	<0.20	1.64	1.77	2.57	2.76	5.42 5.98 11.4 12.2 21.7 24.0
PERCENT RECOVERY	98	(5.6) N=4				

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

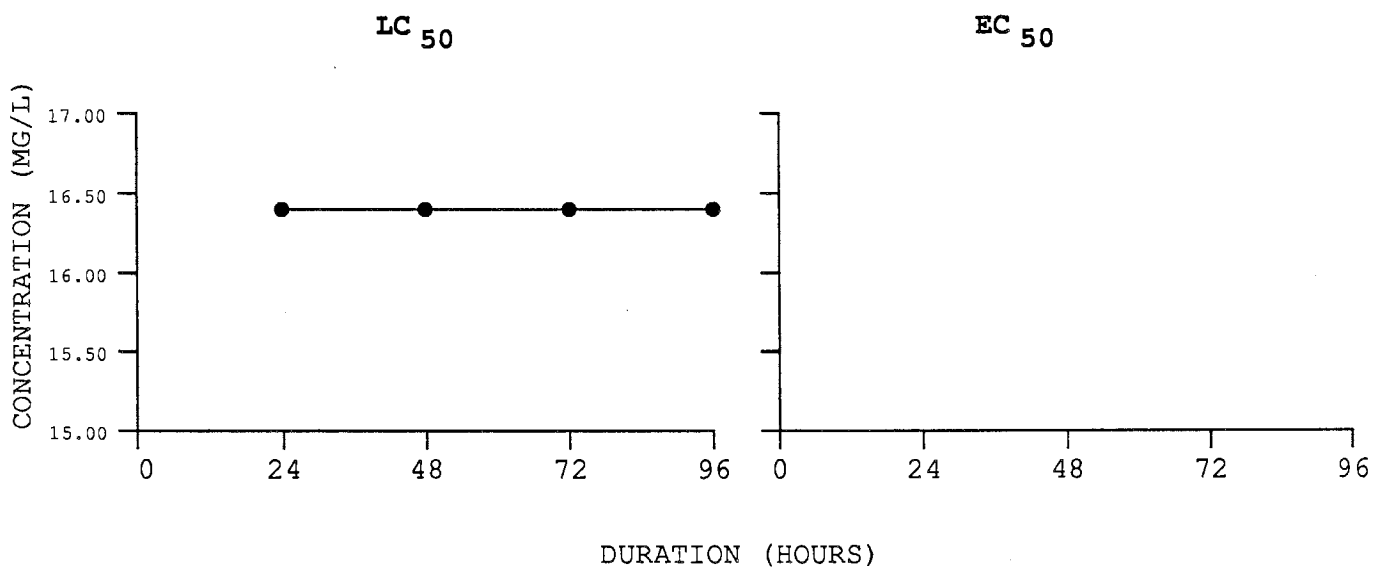
REMARKS

Affected fish lost schooling behavior, were hypoactive and lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.29 g. Samples were not taken at 96 hr for determination of toxicant concentrations, nor were nominal concentrations recorded. The tank volume ranged from 40-42 L.

o-Xylene (Test 1)

***** MORTALITIES *****							RESULTS	
HR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24						20	*	*
48						20	*	(MG/L)
72						20	*	
96						20	*	96 HR LC50: 16.4
							*	
							*	CONF. LIM:
							*	(NOT REL.)
							*	
							*	
							*	
							*	
							*	
							*	

***** EFFECT *****								
HR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24							*	*
48							*	(MG/L)
72							*	
96							*	96 HR EC50: NOT DET.
							*	
							*	CONF. LIM:
							*	()
							*	
							*	
							*	
							*	
							*	
							*	



CHEMICAL: o-Xylene (Test 2)

TEST DATE: 11/16/87

CAS NUMBER: 95476

MF: C8H10

MWT: 106.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 25.4 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.0 (0.22)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.3 (0.38)	ADDITIONS (V/D)	: 40.3
HARDNESS (MG/L CaCO ₃)	: 45.4 (0.35)	PH	: 7.3 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 40.0 (0.41)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	5.08	10.2	15.2	20.3	25.4
11/16/87	<0.2	3.53	6.74	9.66	14.2	19.5
11/17/87	<0.2	3.94	6.73	8.76	14.1	19.3
11/18/87	<0.2	3.51	6.54	9.38	14.2	18.3
11/19/87	<0.2	3.95	6.86	9.94	14.3	19.9
11/20/87	<0.2	4.15	6.75	9.76	13.6	20.0
AVERAGE:	<0.20	3.82	6.72	9.50	14.1	19.4
COR AVE:	<0.20	3.79	6.67	9.43	14.0	19.2
PERCENT RECOVERY	100.78 (4.4) N=6					

FISH SIZES

MEAN LENGTH (mm) : 20.8
SD LENGTH (mm) : 1.874

MEAN WEIGHT (G) : 0.114
SD WEIGHT (G) : 0.0262
LOADING (G/L/D) : 0.1132

REMARKS

Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. Behavioral data were not recorded. Measured concentrations were lower than nominal concentrations due to volatility.

o-Xylene (Test 2)

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					9	
48					9	
72					9	
96					10	

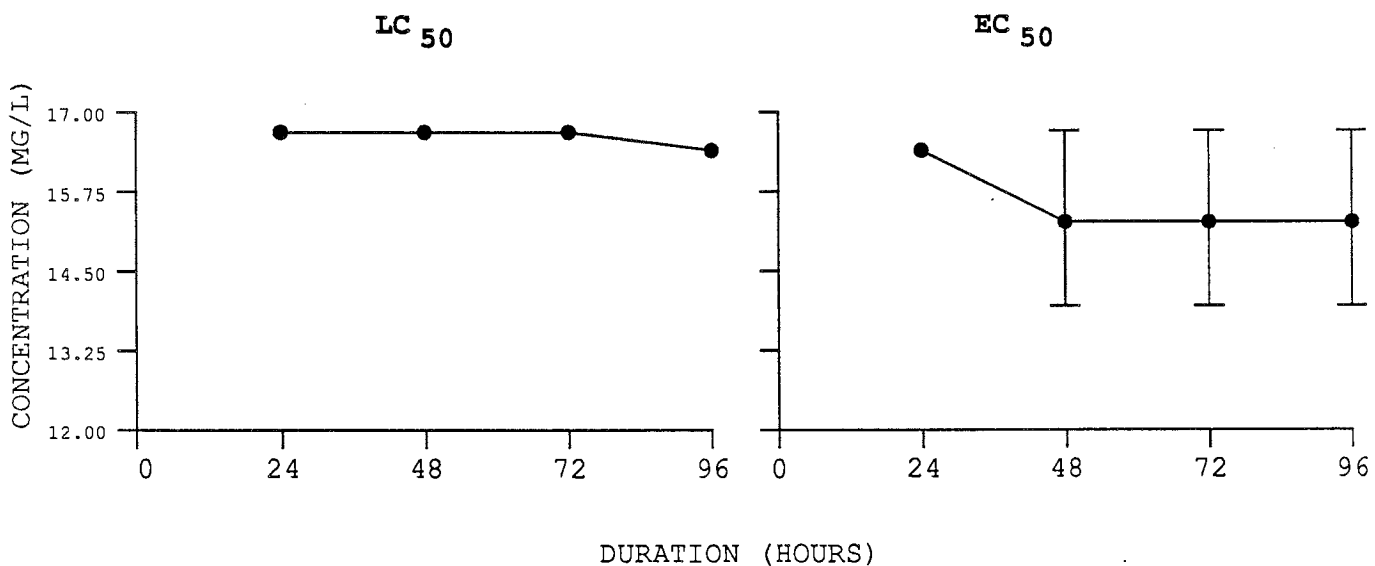
RESULTS

 (MG/L)
 96 HR LC50: 16.4
 CONF. LIM:
 (NOT REL.)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					10	
48				2	10	
72				2	10	
96				2	10	

 (MG/L)
 96 HR EC50: 15.3
 CONF. LIM:
 (14.0-16.7)



CHEMICAL: m-Xylene

TEST DATE: 01/03/89

CAS NUMBER: 108383

MF: C8H10

MWT: 106.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 54.6 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.5 (0.30)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.17)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 45.5 (0.00)	PH	: 7.6 (0.02)
ALKALINITY (MG/L CaCO3)	: 45.6 (0.00)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	9.75	15.0	23.1	35.5	54.6
01/03/89	<.25	1.80	5.24	10.3	15.6	27.6
01/04/89	<.25	2.82	3.11	8.11	19.0	29.2
01/05/89	<.25	2.98	5.28	9.68	9.68	16.8
01/06/89	<.25	2.75	5.88	10.3	14.9	30.4
01/07/89	<.25	2.84	5.84	9.04	13.4	29.3
AVERAGE:	<0.25	2.64	5.07	9.49	14.5	26.7
COR AVE:	<0.26	2.71	5.22	9.76	14.9	27.4
PERCENT RECOVERY	97.2	(7.0)	N=8			

FISH SIZES

MEAN LENGTH (mm)	: 19.0	MEAN WEIGHT (G)	: 0.099
SD LENGTH (mm)	: 2.781	SD WEIGHT (G)	: 0.0404
		LOADING (G/L/D)	: 0.1375

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, were darkly colored and lost equilibrium prior to death. At 24 hr, the researcher noticed a toxicant flow problem. The problem was corrected and the tanks were immediately sampled, then resampled later that afternoon allowing time for the concentrations to reach equilibrium in the tanks. The two measurements for 1/4/89 were averaged. Measured concentrations were lower than nominal concentrations due to volatility. Alkalinity and hardness measurements were not taken for the treatment tanks.

m-Xylene

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	
24				4	20	
48				9	20	
72				9	20	
96				9	20	

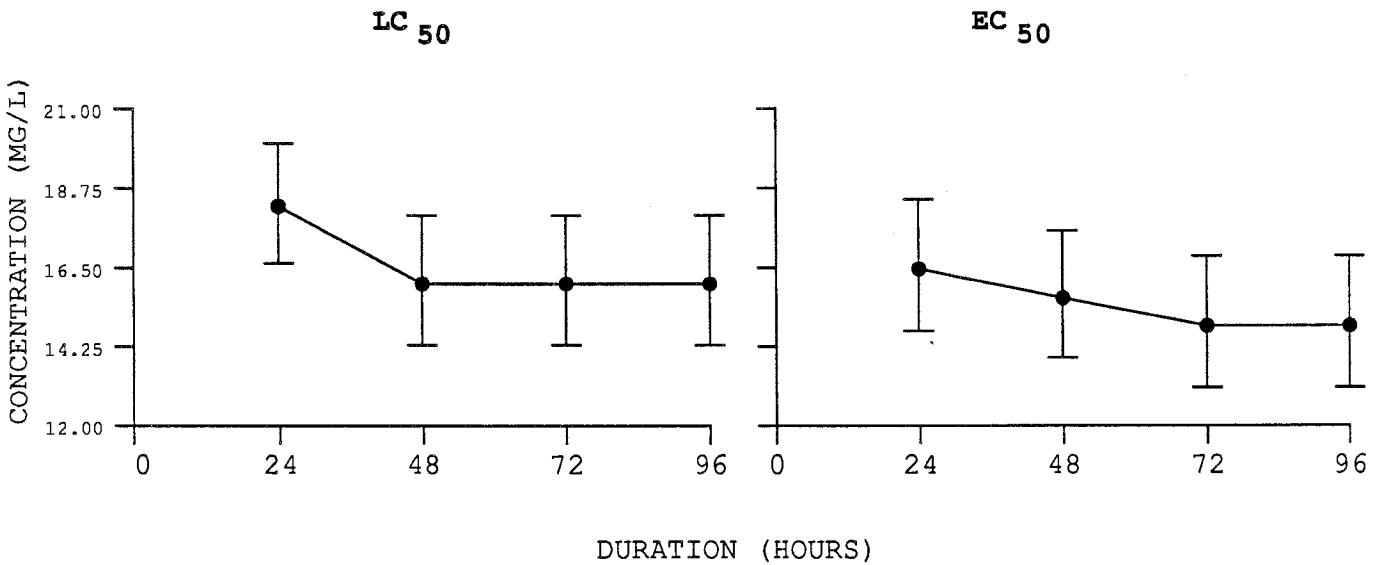
RESULTS

 (MG/L)
 96 HR LC50: 16.0
 CONF. LIM:
 (14.3-18.0)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	
24				8	20	
48				10	20	
72			1	11	20	
96			1	11	20	

 (MG/L)
 96 HR EC50: 14.8
 CONF. LIM:
 (13.1-16.8)



CHEMICAL: Xylene, Mixed

TEST DATE: 01/16/89

CAS NUMBER: 1330207

MF: C8H10

MWT: 106.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: Reagent

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 43.8 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.0 (0.18)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.26)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 47.3 (0.35)	PH	: 7.3 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 39.2 (0.44)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	7.8	12.0	18.5	28.5	43.8
01/16/89	<.25	1.48	3.18	5.44	10.9	19.3
01/17/89	<.25	1.08	2.13	3.72	7.29	16.7
01/18/89	<.25	0.90	1.93	3.18	6.76	11.6
01/19/89	<.25	1.01	2.41	3.73	8.08	14.6
01/20/89	<.25	1.22	2.95	3.82	7.24	13.8
AVERAGE:	<0.25	1.14	2.52	3.98	8.05	15.2
COR AVE:	<0.24	1.11	2.47	3.89	7.88	14.9
PERCENT RECOVERY	102.2	(1.1)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.4	MEAN WEIGHT (G)	: 0.077
SD LENGTH (mm)	: 1.465	SD WEIGHT (G)	: 0.0245
		LOADING (G/L/D)	: 0.1069

REMARKS

Affected fish lost schooling behavior, had convulsions, were darkly colored and lost equilibrium prior to death. The test chemical is a mixture of ortho- (2.5%), meta- (52%) and para- (22%) xylenes. The chemical also contained ethylbenzene (23%) and toluene (0.05%). The nominal and measured toxicant concentrations varied considerably due to chemical volatility.

Xylene, Mixed

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					11	
48					12	
72					12	
96					12	

RESULTS

* * * * *
 * * * * *
 * (MG/L) *
 * * * * *
 * 96 HR LC50: 13.4 *
 * * * * *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *
 * * * * *

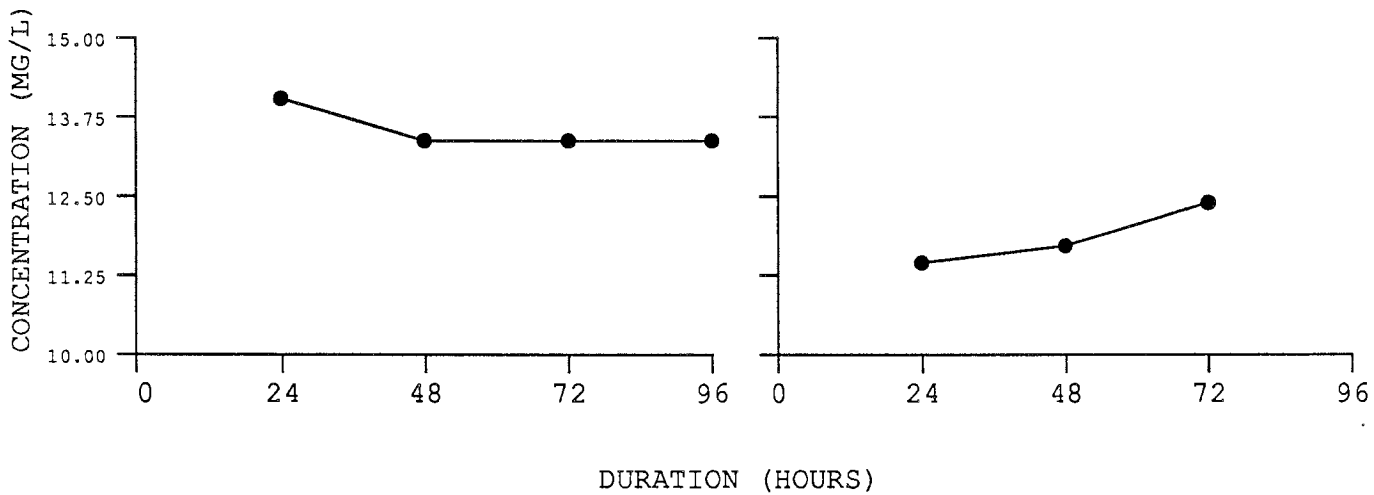
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					17	
48					16	
72					14	
96					14	

* * * * *
 * * * * *
 * (MG/L) *
 * * * * *
 * 96 HR EC50: 12.4 *
 * * * * *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *
 * * * * *

LC 50

EC 50



CHEMICAL: 1-Octanol (Test 5)

TEST DATE: 07/18/88

CAS NUMBER: 111875

MF: C8H18O

MWT: 130.23

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 150 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 26.3 (1.81)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.1 (0.59)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.6 (0.29)	PH	: 7.7 (0.04)
ALKALINITY (MG/L CaCO3)	: 38.5 (0.00)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.35	5.15	7.93	12.2	18.8
07/18/88	<0.5	2.90	3.98	5.63	9.69	15.9
07/19/88	<0.5	2.38	3.35	4.69	7.80	13.1
07/20/88	<0.5	3.11	4.31	6.84	10.6	17.1
07/21/88	<0.5	3.28	4.24	6.64	10.8	17.8
07/22/88	<0.5	3.02	4.00	5.98	10.1	17.1
AVERAGE:	<0.50	2.94	3.98	5.96	9.80	16.2
COR AVE:	<0.52	3.06	4.15	6.21	10.2	16.9
PERCENT RECOVERY	95.9	(2.4) N=6				

FISH SIZES

MEAN LENGTH (mm)	: 15.2	MEAN WEIGHT (G)	: 0.046
SD LENGTH (mm)	: 2.858	SD WEIGHT (G)	: 0.0331
		LOADING (G/L/D)	: 0.0256

REMARKS

Affected fish lost schooling behavior, were hypoactive and darkly colored. Equilibrium loss was observed prior to death. Two acute tests with 1-octanol were run simultaneously for the purpose of comparing two different strains of fathead minnows. Fathead minnows from ERL-D were used with 1-octanol (test #5) and fish from the Newtown, Ohio laboratory (U.S. EPA) were used with test #6. At approximately 24 hr, the toxicant float valve stuck and the tank concentrations increased. Adjustments were made and the researchers felt the test was valid.

1-Octanol (Test 5)

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24						20
48						20
72						20
96						20

RESULTS

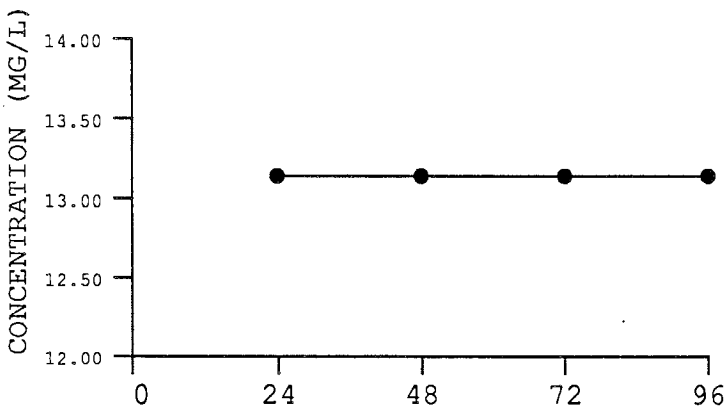
* * * * *
 * (MG/L) *
 * 96 HR LC50: 13.1 *
 * * * * *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *

***** EFFECT *****

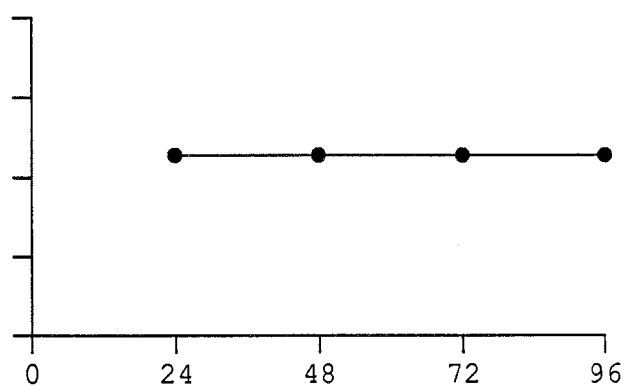
INITIAL	20	20	20	20	20
24					20
48					20
72					20
96					20

* * * * *
 * (MG/L) *
 * 96 HR EC50: 13.1 *
 * * * * *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: 1-Octanol (Test 6)

TEST DATE: 07/18/88

CAS NUMBER: 111875

MF: C8H18O

MWT: 130.23

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 150 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 26.5 (1.74)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.4 (0.62)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.9 (0.10)	PH	: 7.7 (0.01)
ALKALINITY (MG/L CaCO ₃)	: 38.3 (0.15)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.41	5.24	8.06	12.4	19.1
07/18/88	<0.5	2.97	4.10	6.36	9.79	15.3
07/19/88	<0.5	3.16	4.27	6.68	10.4	16.3
07/20/88	<0.5	3.49	4.64	7.11	10.8	17.2
07/21/88	<0.5	3.24	4.58	7.04	10.2	17.4
07/22/88	<0.5	3.06	4.13	6.26	10.5	17.5
AVERAGE:	<0.50	3.18	4.34	6.69	10.3	16.7
COR AVE:	<0.51	3.22	4.39	6.76	10.4	16.9
PERCENT RECOVERY	99.0	(2.4)	N=6			

FISH SIZES

MEAN LENGTH (mm) : 13.8
SD LENGTH (mm) : 1.803

MEAN WEIGHT (G) : 0.032
SD WEIGHT (G) : 0.0133
LOADING (G/L/D) : 0.0178

REMARKS

Affected fish lost schooling behavior, were hypoactive and darkly colored. Equilibrium loss was observed prior to death. Two acute tests with 1-octanol were run simultaneously for the purpose of comparing two different strains of fathead minnows. Fathead minnows from ERL-D were used with 1-octanol (Test #5) and fish from the Newtown, Ohio laboratory (U.S. EPA) were used with test #6.

1-Octanol (Test 6)

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				1	20	
48				1	20	
72				1	20	
96				1	20	

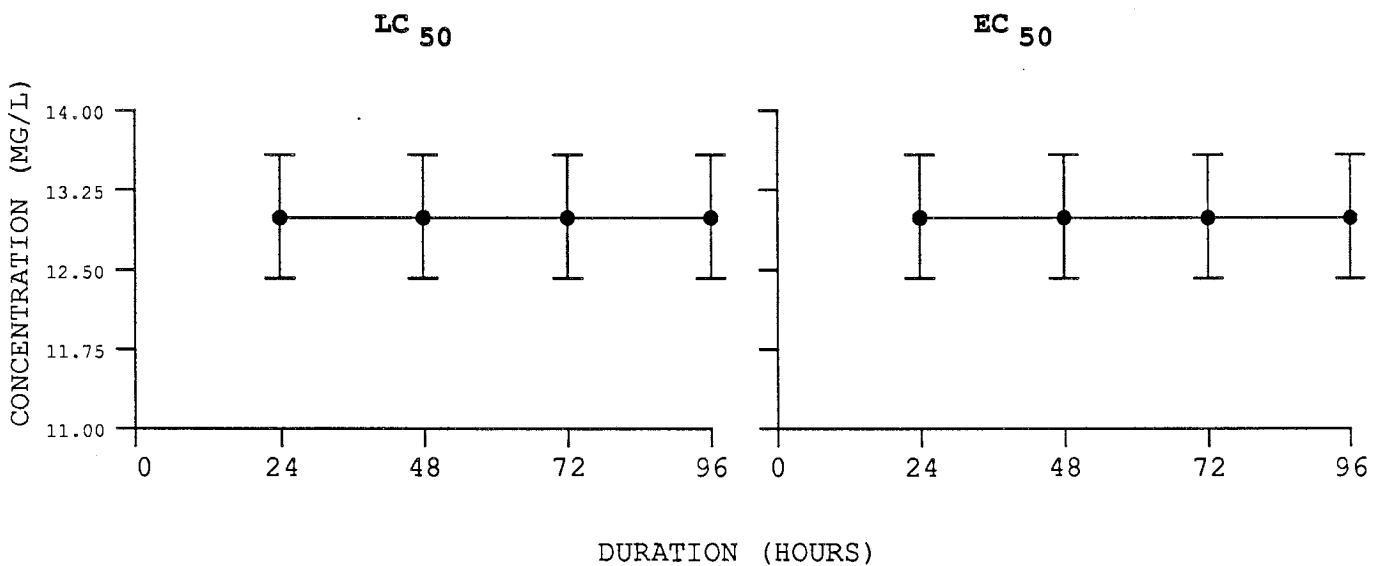
RESULTS

* * * * *
 * (MG/L) *
 * 96 HR LC50: 13.0 *
 * * * * *
 * CONF. LIM: *
 * (12.4-13.6) *
 * * * * *

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				1	20	
48				1	20	
72				1	20	
96				1	20	

* * * * *
 * (MG/L) *
 * 96 HR EC50: 13.0 *
 * * * * *
 * CONF. LIM: *
 * (12.4-13.6) *
 * * * * *



CHEMICAL: Demeton

TEST DATE: 08/13/84

CAS NUMBER: 8065483

MF: C8H19O3PS2

MWT: 258.34

CHEMICAL SOURCE: Mobay Chemical Corp.

PURITY: 95%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 53-55 D

TEST CONDITIONS

TEMPERATURE (C)	: 18.2 (0.00)	TANK VOLUME (L)	: 34.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (1.74)	ADDITIONS (V/D)	: 4.7
HARDNESS (MG/L CaCO ₃)	: 45.9 (0.00)	PH	: 7.3 (0.13)
ALKALINITY (MG/L CaCO ₃)	: 44.8 (2.42)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.50	5.0	10.0	20.0	40.0
08/13/84						
08/14/84	<0.1	3.32	5.19	8.75	12.9	26.1
08/15/84	<0.1	3.23	5.05	8.55	13.2	27.0
08/16/84	<0.1	3.19	5.22	8.72	13.1	25.8
08/17/84	<0.1	3.47	5.20	8.76	13.3	26.5
AVERAGE:	<0.10	3.26	5.20	8.74	13.0	26.0
COR AVE:	<0.10	3.29	5.26	8.82	13.1	26.2
PERCENT RECOVERY	99.0	(2.2)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

REMARKS

The chemical was dissolved in dimethylformamide (DMF) to increase the amount of chemical in the stock solution. Affected fish were lethargic, had spinal column deformities and were hemorrhaging. They also exhibited tetany and lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.30 g. Samples were not taken at 0 hr for determination of toxicant concentrations.

Demeton

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	40	40	40	40	40	40
24		3	2	6	35	
48		4	2	6	39	
72	1	4	2	6	40	
96	1	5	2	7	40	

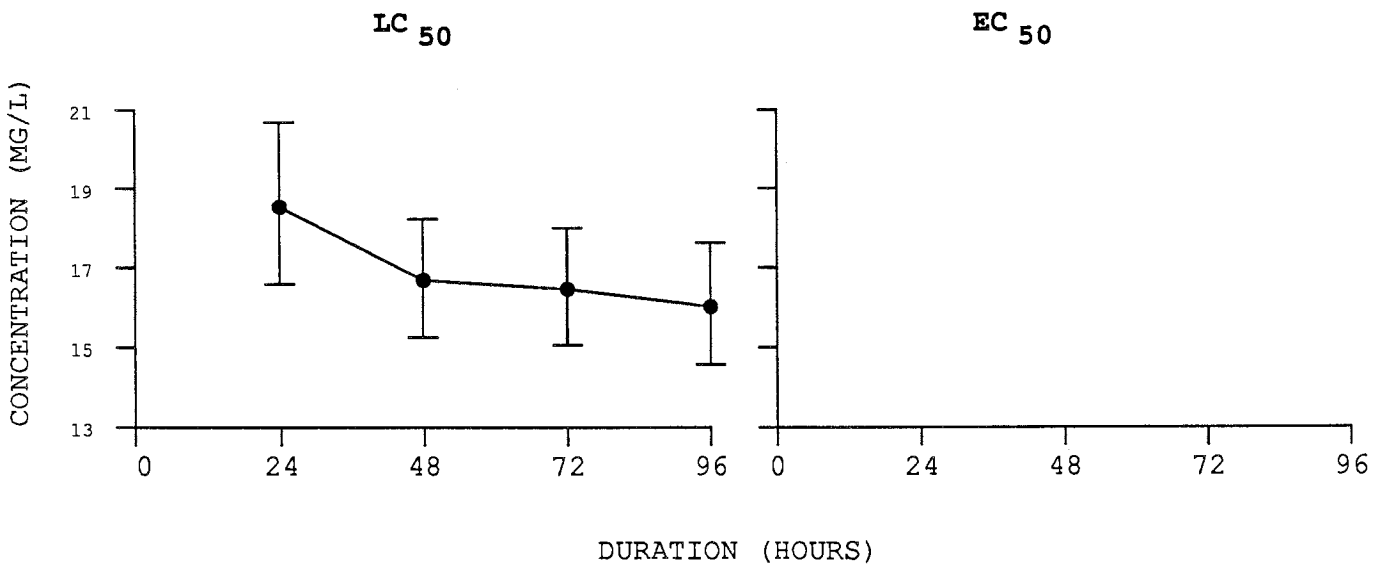
RESULTS

 (MG/L)
 96 HR LC50: 16.0
 CONF. LIM:
 (14.6-17.6)

***** EFFECT *****

INITIAL	40	40	40	40	40
24					
48					
72					
96					

 (MG/L)
 96 HR EC50: NOT DET.
 CONF. LIM:
 ()



CHEMICAL: Tetraethyltin

TEST DATE: 12/15/86

CAS NUMBER: 597648

MF: C8H20Sn

MWT: 234.94

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 82.2 ug/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 28 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.2 (0.17)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.2 (0.25)	ADDITIONS (V/D)	: 40.3
HARDNESS (MG/L CaCO3)	: 43.7 (0.39)	PH	: 7.5 (0.05)
ALKALINITY (MG/L CaCO3)	: 41.6 (0.53)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	16.4	32.9	49.3	65.8	82.2
12/15/86	<1	9.38	15.1	24.1	32.0	40.9
12/16/86	<1	5.19	12.8	19.8	28.8	44.5
12/17/86	<1	6.99	16.9	23.0	26.0	40.5
12/18/86	<1	8.66	15.4	18.0	26.4	48.3
12/19/86	<1	6.12	7.85	19.8	37.8	48.0
AVERAGE: <	1	7.27	13.6	20.9	30.2	44.4
COR AVE: <0.99		7.19	13.5	20.7	29.9	44.0
PERCENT RECOVERY	101.1 (8.9)					
						N=7

FISH SIZES

MEAN LENGTH (mm):	18.6	MEAN WEIGHT (G):	0.089
SD LENGTH (mm):	0.516	SD WEIGHT (G):	0.0084
		LOADING (G/L/D):	0.0883

REMARKS

Affected fish were underreactive to external stimuli, had increased respiration, were darkly colored and had spinal deformities. Equilibrium loss was observed prior to death. Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. Measured concentrations were lower than nominal concentrations due to volatility.

Tetraethyltin

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24				1	2	
48		2	1	7	8	
72		3	7	10	9	
96		8	10	10	10	

RESULTS

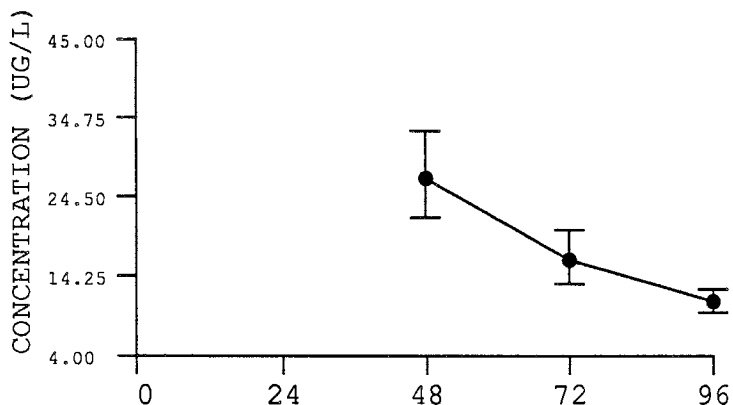
 (UG/L)
 96 HR LC50: 11.0
 CONF. LIM:
 (9.58-12.5)

***** EFFECT *****

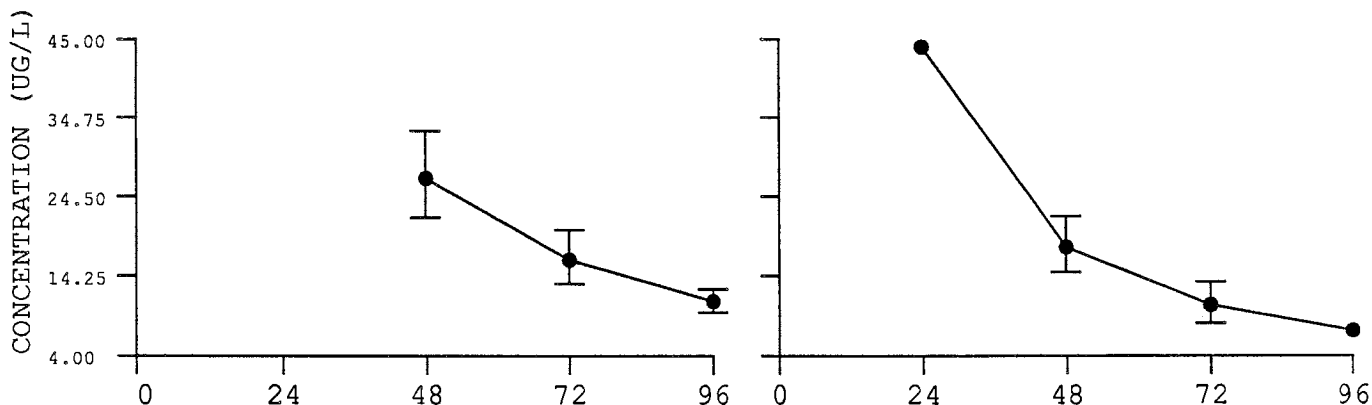
HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24				3	5	
48		4	3	10	10	
72	2	7	10	10	10	
96	5	10	10	10	10	

 (UG/L)
 96 HR EC50: 7.19
 CONF. LIM:
 (NOT REL.)

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: Quinoline

TEST DATE: 10/20/87

CAS NUMBER: 91225

MF: C9H7N

MWT: 129.16

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 344 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 29 & 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.1 (0.92)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.53)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 45.9 (0.25)	PH	: 7.5 (0.06)
ALKALINITY (MG/L CaCO ₃)	: 53.8 (14.6)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	26.8	41.2	63.4	97.5	150
10/20/87	<0.3	26.1	38.5	56.0	87.2	126
10/21/87	<0.3	27.3	44.4	56.7	90.5	131
10/22/87	<0.3	31.4	46.5	60.5	91.1	137
10/23/87	<0.3	29.7	46.8	66.3	101	144
10/24/87						
AVERAGE:	<0.30	28.6	44.1	59.9	92.4	135
COR AVE:	<0.31	29.9	46.1	62.6	96.7	141
PERCENT RECOVERY	95.6	(5.0)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 17.9	MEAN WEIGHT (G)	: 0.075
SD LENGTH (mm)	: 1.944	SD WEIGHT (G)	: 0.0273
		LOADING (G/L/D)	: 0.1042

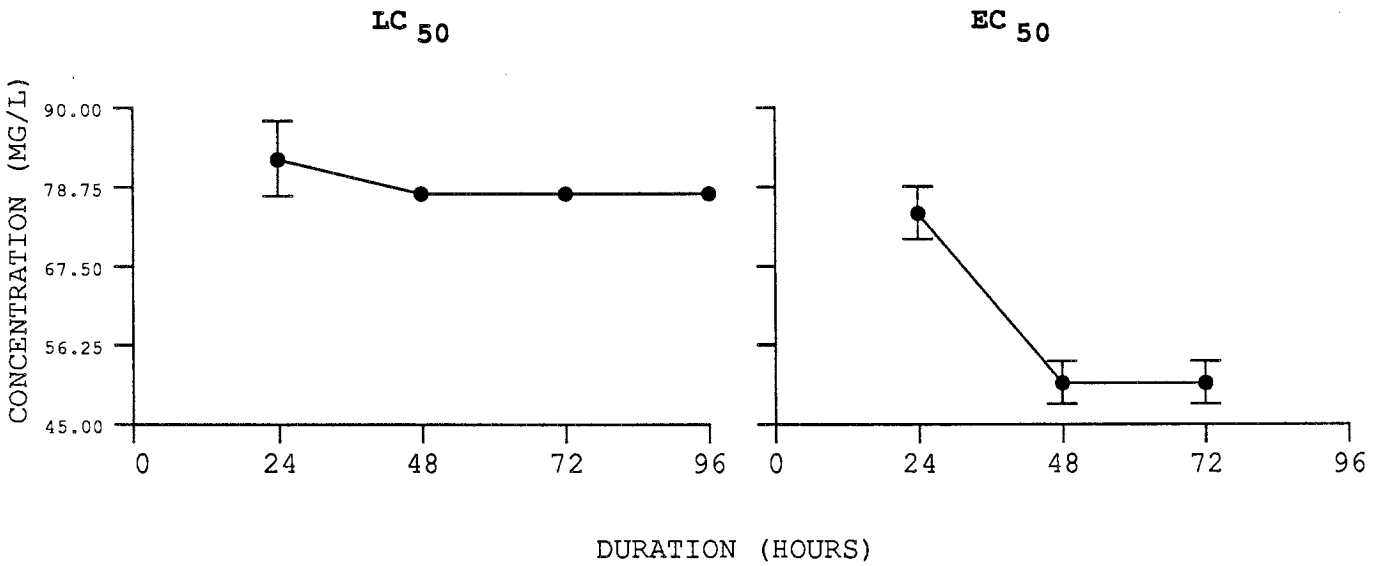
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and convulsions. They were also hemorrhaging and had spinal column deformities. Equilibrium loss was observed prior to death. All fish in the treatment tanks were affected at 96 hr, therefore an EC50 value could not be calculated. Alkalinity values increased with toxicant concentration and were due to a reaction between the titrant and toxicant.

Quinoline

***** MORTALITIES *****						RESULTS	
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20		* * * * *
24				17	20		* (MG/L) *
48				20	20		* 96 HR LC50: 77.8 *
72				20	20		* CONF. LIM: *
96				20	20		* (NOT REL.) *

***** EFFECT *****						RESULTS	
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20		* * * * *
24			2	20	20		* (MG/L) *
48		3	20	20	20		* 96 HR EC50: <29.9 *
72		3	20	20	20		* CONF. LIM: *
96	20	20	20	20	20		* (NOT REL.) *



CHEMICAL: 3-Methylindole

TEST DATE: 12/15/86

CAS NUMBER: 83341

MF: C9H9N

MWT: 131.18

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 145 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.9 (0.28)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.27)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: ()	PH	: 7.6 (0.08)
ALKALINITY (MG/L CaCO ₃)	: ()		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
12/15/86	<0.5	5.67	7.82	11.2	17.3	26.3
12/16/86	<0.5	5.35	7.77	11.3	18.1	27.8
12/17/86	<0.5	5.56	8.38	12.1	18.4	28.2
12/18/86	<0.5	5.51	7.98	12.4	18.7	28.6
12/19/86	<0.5	5.62	8.04	12.3	18.2	27.9
AVERAGE:	<0.50	5.54	8.00	11.9	18.1	27.8
COR AVE:	<0.49	5.45	7.87	11.7	17.9	27.3
PERCENT RECOVERY	101.6	(5.6)	N=5			

FISH SIZES

MEAN LENGTH(mm)	: 18.6	MEAN WEIGHT(G)	: 0.089
SD LENGTH(mm)	: 0.516	SD WEIGHT(G)	: 0.0084
		LOADING(G/L/D)	: 0.0247

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, had increased respiration and rigid musculature. They also had convulsions, were darkly colored and lost equilibrium prior to death. Alkalinity and hardness measurements were not taken nor were nominal concentrations recorded.

3-Methylindole

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				9	20	
48			3	18	20	
72			10	19	20	
96	4	8	14	20	20	

RESULTS

* * * * *
 * (MG/L) *
 * 96 HR LC50: 8.84 *
 * * * * *
 * CONF. LIM: *
 * (7.35-10.6) *
 * * * * *

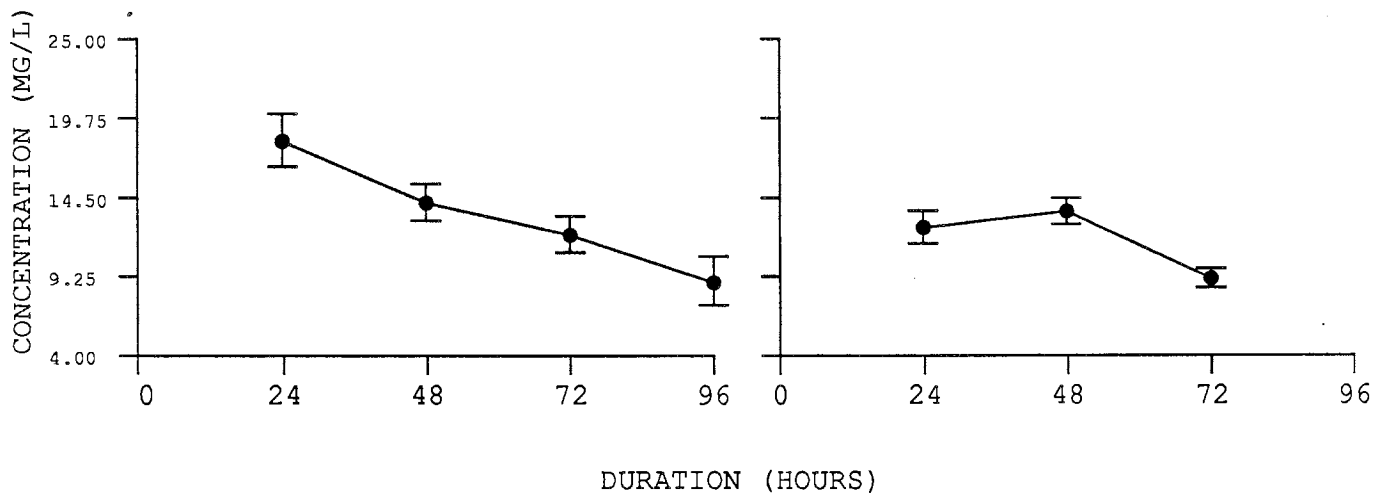
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			7	20	20	
48			3	20	20	
72	1	3	20	20	20	
96	20	20	20	20	20	

* * * * *
 * (MG/L) *
 * 96 HR EC50: <5.45 *
 * * * * *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *

LC 50

EC 50



CHEMICAL: Ethyl Benzoate

TEST DATE: 07/17/89

CAS NUMBER: 93890

MF: C9H10O2

MWT: 150.18

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 478 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 33 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.46)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.29)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.4 (0.48)	PH	: 7.6 (0.04)
ALKALINITY (MG/L CaCO3)	: 35.1 (0.65)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	8.48	13.0	20.1	30.9	47.5
07/17/89	<2.5	7.76	11.3	15.6	23.7	38.0
07/18/89	<2.5	8.18	12.2	18.3	26.9	43.5
07/19/89	<2.5	7.74	12.4	18.4	28.0	45.3
07/20/89	<2.5	7.17	11.4	17.1	26.1	41.5
07/21/89	<2.5	6.44	10.0	15.5	25.6	42.8
AVERAGE:	<2.50	7.46	11.5	17.0	26.1	42.2
COR AVE:	<2.45	7.30	11.2	16.6	25.5	41.3
PERCENT RECOVERY		102.2 (3.8)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 17.8	MEAN WEIGHT (G)	: 0.083
SD LENGTH (mm)	: 1.209	SD WEIGHT (G)	: 0.0139
		LOADING (G/L/D)	: 0.0461

REMARKS

The pH of the stock solution was adjusted to that of lake water using NaOH. Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli. They were also darkly colored and lost equilibrium prior to death.

Ethyl Benzoate

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1				20
48		1	4	18		20
72	1	3	13	18		20
96	2	11	18	19		20

RESULTS

 (MG/L)
 96 HR LC50: 10.8
 CONF. LIM:
 (9.56-12.2)

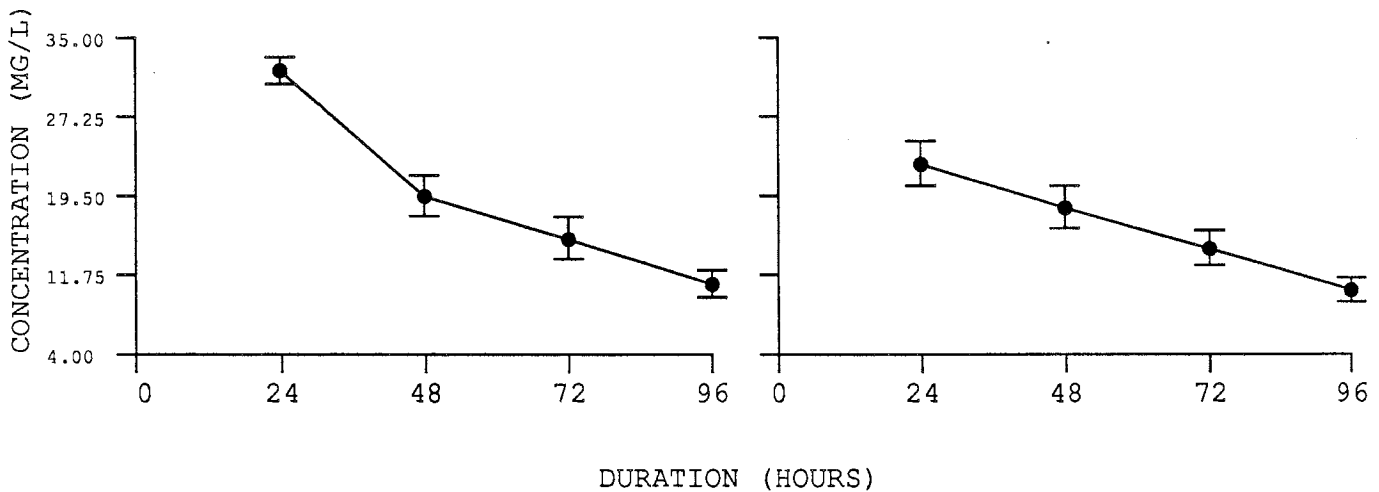
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1		15		20
48		1	7	18		20
72	1	3	15	19		20
96	2	13	19	19		20

 (MG/L)
 96 HR EC50: 10.2
 CONF. LIM:
 (9.07-11.4)

LC 50

EC 50



CHEMICAL: 4'-Aminopropiophenone

TEST DATE: 01/27/87

CAS NUMBER: 70699

MF: C9H11NO

MWT: 149.19

CHEMICAL SOURCE: Eastman Kodak Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 514 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 26.1 (0.33)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.44)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 44.6 (0.48)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO3)	: 43.4 (1.31)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	41.7	64.2	98.8	152	234
01/27/87	<2.0	18.0	31.7	75.7	117	200
01/28/87	<2.0	28.1	57.3	79.6	136	203
01/29/87	<2.0	32.9	60.7	91.6	131	202
01/30/87	<2.0	35.5	55.3	97.2	125	201
01/31/87	<2.0	44.0	55.0	109	140	191
AVERAGE:	<2.00	31.7	52.0	90.6	130	199
COR AVE:	<1.92	30.5	50.0	87.2	125	192
PERCENT RECOVERY		103.9 (7.4)				

FISH SIZES

MEAN LENGTH (mm):	19.0	MEAN WEIGHT (G)	: 0.098
SD LENGTH (mm)	: 1.298	SD WEIGHT (G)	: 0.0177
		LOADING (G/L/D)	: 0.1361

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and were darkly colored. They also had rigid musculature and lost equilibrium prior to death. The pH of the stock solution was adjusted to that of lake water using HCl.

4'-Aminopropiophenone

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24						20
48				2	20	
72				2	20	
96				3	20	

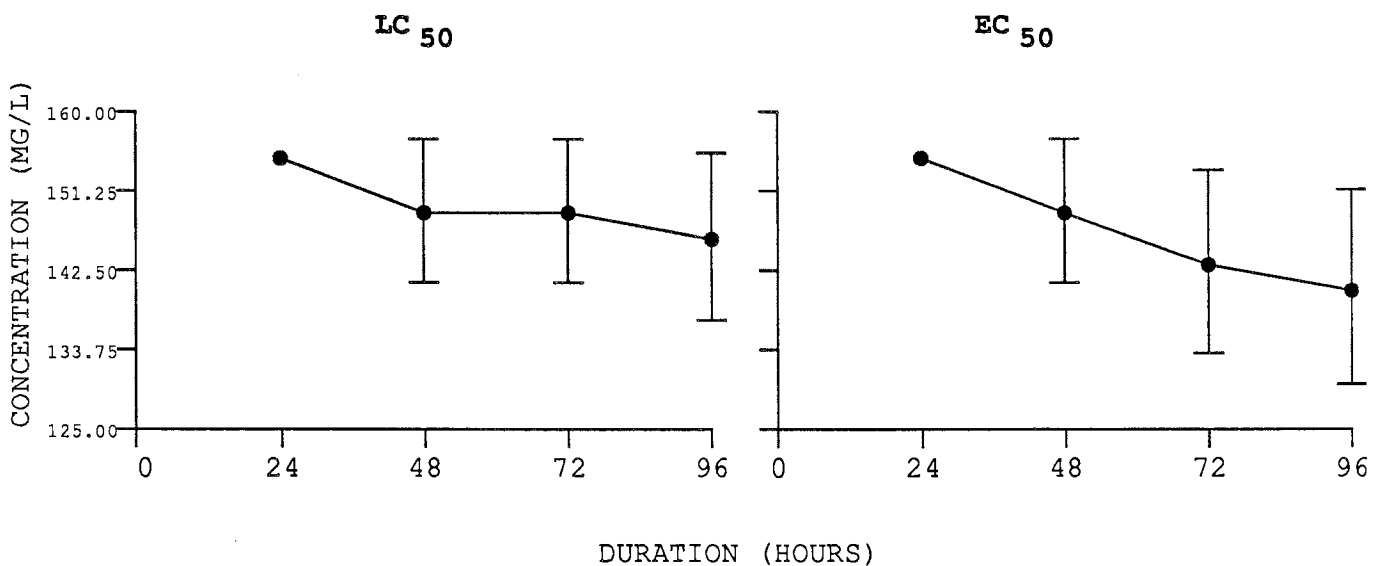
RESULTS

 (MG/L)
 96 HR LC50: 146
 CONF. LIM:
 (137- 156)

***** EFFECT *****

INITIAL	20	20	20	20	20
24					20
48				2	20
72				4	20
96				5	20

 (MG/L)
 96 HR EC50: 140
 CONF. LIM:
 (130- 152)



CHEMICAL: 2,3,6-Trimethylphenol

TEST DATE: 01/12/87

CAS NUMBER: 2416946

MF: C9H12O

MWT: 136.19

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: Unavail.

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 70.9 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.7 (0.71)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.50)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.1 (0.48)	PH	: 7.8 (0.05)
ALKALINITY (MG/L CaCO ₃)	: 43.3 (0.65)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.59	3.98	6.12	9.42	14.5
01/12/87	<0.1	2.46	3.12	5.72	7.99	13.8
01/13/87	<0.1	2.55	3.85	5.77	8.87	13.2
01/14/87	<0.2	2.41	4.14	6.40	10.7	15.8
01/15/87	<0.2	2.49	3.82	6.10	8.88	15.0
01/16/87	<0.2	2.38	3.51	5.69	8.05	13.2
AVERAGE:	<0.16	2.46	3.69	5.94	8.90	14.2
COR AVE:	<0.16	2.38	3.57	5.75	8.62	13.8
PERCENT RECOVERY		103.2 (16.0)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 19.8	MEAN WEIGHT (G)	: 0.106
SD LENGTH (mm)	: 1.196	SD WEIGHT (G)	: 0.0171
		LOADING (G/L/D)	: 0.0589

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and were darkly colored. Equilibrium loss was observed prior to death. Fish also exhibited cannibalistic behavior.

2,3,6-Trimethylphenol

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48						12
72					6	19
96				2	12	19

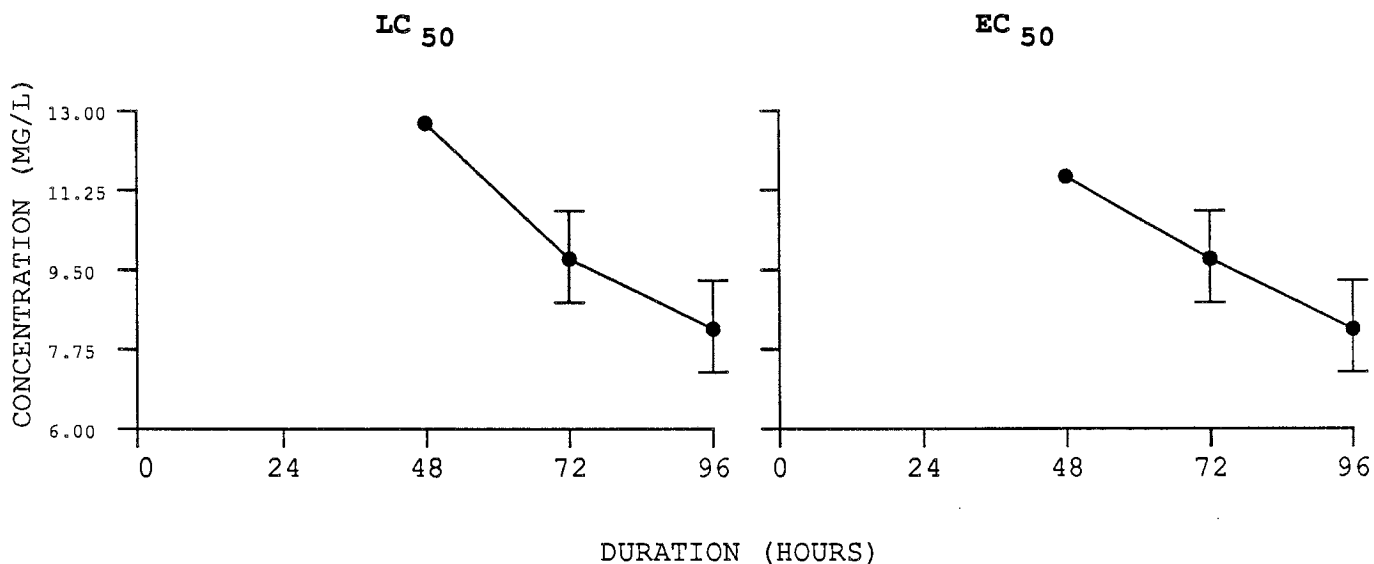
RESULTS

 (MG/L)
 96 HR LC50: 8.20
 CONF. LIM:
 (7.25-9.28)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
48						16
72					6	19
96				2	12	19

 (MG/L)
 96 HR EC50: 8.20
 CONF. LIM:
 (7.25-9.28)



CHEMICAL: 2,4,6-Trimethylphenol

TEST DATE: 12/01/86

CAS NUMBER: 527606

MF: C9H12O

MWT: 136.19

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 65 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.0 (0.15)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.31)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 44.8 (0.29)	PH	: 7.6 (0.03)
ALKALINITY (MG/L CaCO3)	: 44.0 (0.41)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	5.32	8.19	12.6	19.4	29.8
12/01/86	<0.4	4.32	6.69	10.8	16.7	26.0
12/02/86	<0.6	4.98	7.04	12.2	17.7	30.0
12/03/86	<0.8	4.20	6.90	10.6	16.1	27.2
12/04/86	<0.4	5.23	7.90	11.1	17.7	26.1
12/05/86	<0.5	5.53	8.67	11.7	18.9	26.6
AVERAGE:	<0.54	4.85	7.44	11.3	17.4	27.2
COR AVE:	<0.54	4.89	7.50	11.4	17.6	27.4
PERCENT RECOVERY	99.2	(2.2)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 20.5	MEAN WEIGHT (G)	: 0.111
SD LENGTH (mm)	: 2.328	SD WEIGHT (G)	: 0.0379
		LOADING (G/L/D)	: 0.1542

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and were darkly colored. Equilibrium loss was observed prior to death.

2,4,6-Trimethylphenol

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				20	20	
48		1		20	20	
72		3		20	20	
96		3	1	20	20	

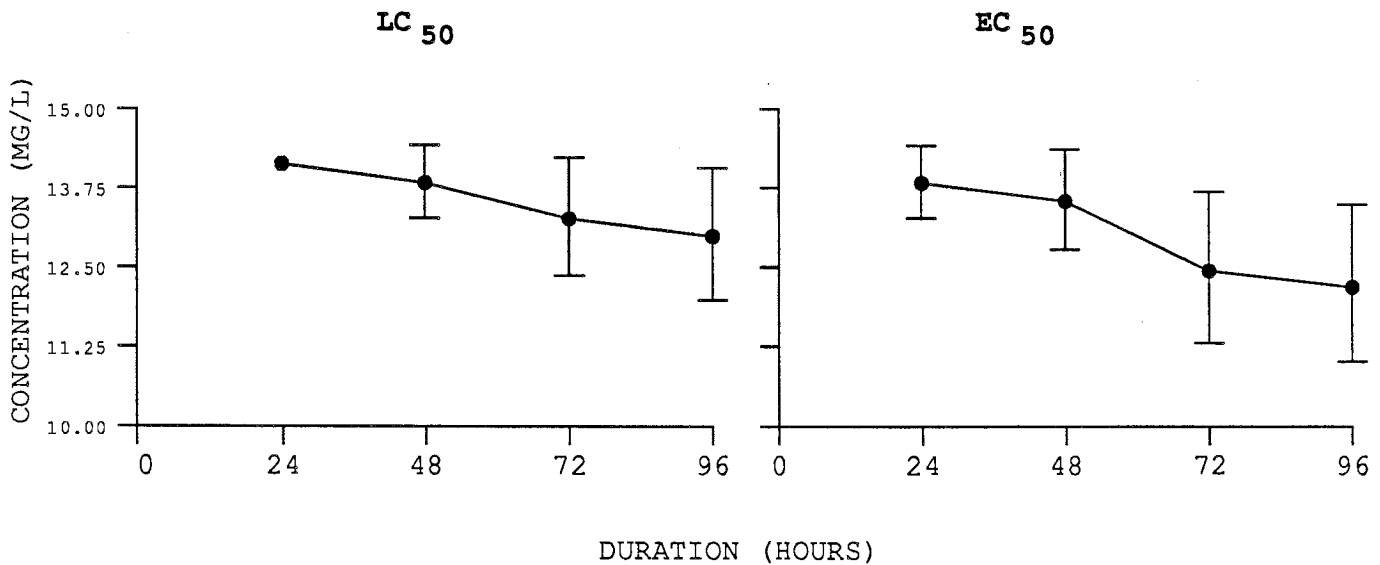
RESULTS

 (MG/L)
 96 HR LC50: 13.0
 CONF. LIM:
 (12.0-14.1)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			1	20	20	
48		1	1	20	20	
72		3	3	20	20	
96		3	4	20	20	

 (MG/L)
 96 HR EC50: 12.2
 CONF. LIM:
 (11.0-13.5)



CHEMICAL: Isophorone

TEST DATE: 01/30/89

CAS NUMBER: 78591

MF: C9H14O

MWT: 138.21

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1180 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.5 (0.34)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.17)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 50.0 (0.41)	PH	: 7.5 (0.04)
ALKALINITY (MG/L CaCO ₃)	: 40.5 (0.78)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	46.5	71.5	110	170	261
01/30/89	<5.0	32.6	54.1	89.8	147	213
01/31/89	<5.0	43.0	73.1	115	184	279
02/01/89	<5.0	43.6	77.0	127	211	317
02/02/89	<5.0	54.5	81.0	123	194	282
02/03/89	<5.0	45.4	75.0	115	196	284
AVERAGE:	<5.00	43.8	72.0	114	186	275
COR AVE:	<4.79	42.0	69.1	109	179	264
PERCENT RECOVERY	104.3 (5.3)	N=5				

FISH SIZES

MEAN LENGTH (mm)	: 15.5	MEAN WEIGHT (G)	: 0.052
SD LENGTH (mm)	: 2.212	SD WEIGHT (G)	: 0.0272
		LOADING (G/L/D)	: 0.0722

REMARKS

The pH of the stock solution was adjusted to that of lake water using NaOH. Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli and were darkly colored. They also had spinal column deformities and lost equilibrium prior to death.

Isophorone

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24						
48					2	
72					11	
96					16	

RESULTS

* * * * *
 *
 * (MG/L) *
 * 96 HR LC50: 228 *
 *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *

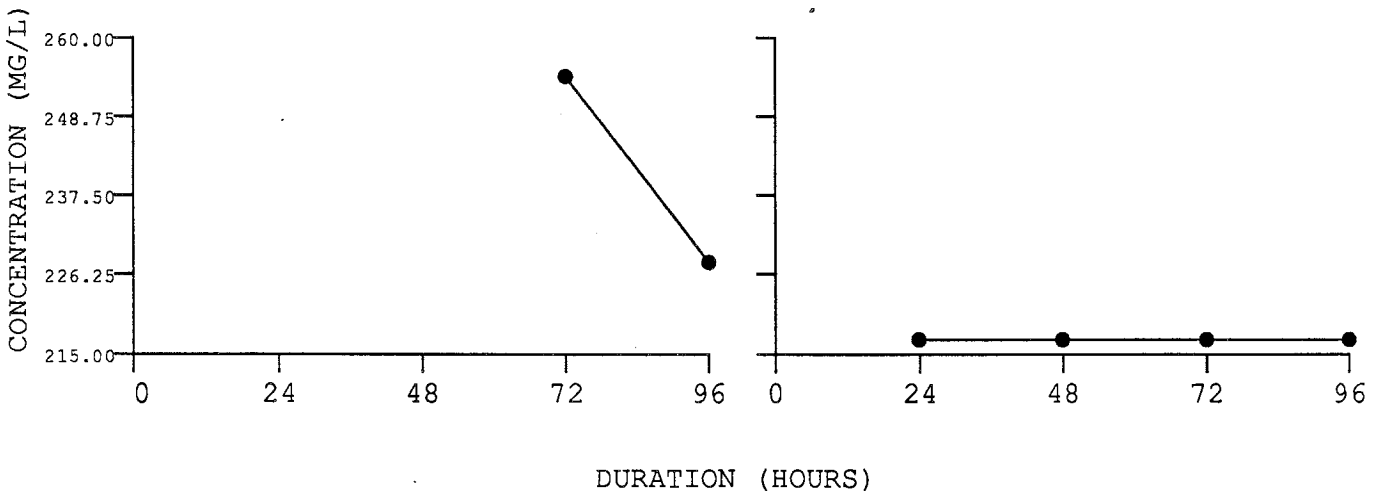
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					20	
48					20	
72					20	
96					20	

* * * * *
 * (MG/L) *
 * 96 HR EC50: 217 *
 *
 * CONF. LIM: *
 * (NOT REL.) *
 * * * * *

LC 50

EC 50



CHEMICAL: Nonylamine

TEST DATE: 10/27/86

CAS NUMBER: 112209

MF: C9H21N

MWT: 143.27

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 33.0 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (0.15)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.24)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 49.4 (1.09)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 46.1 (2.25)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.19	1.83	2.82	4.34	6.67
10/27/86	<.02	1.06	1.58	2.43	4.15	6.10
10/28/86	<.02	1.02	1.73	2.93	4.98	6.66
10/29/86	<.02	1.05	1.67	2.38	4.50	6.47
10/30/86	<.02	0.87	1.40	2.39	4.21	6.04
10/31/86						
AVERAGE:	<0.02	1.00	1.60	2.53	4.46	6.32
COR AVE:	<0.02	1.12	1.79	2.85	5.01	7.10
PERCENT RECOVERY		89.0	(4.9)	N=8		

FISH SIZES

MEAN LENGTH (mm)	: 20.3	MEAN WEIGHT (G)	: 0.107
SD LENGTH (mm)	: 2.468	SD WEIGHT (G)	: 0.0375
		LOADING (G/L/D)	: 0.0594

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli and had increased respiration. Equilibrium loss was observed prior to death. The 96-hr samples were unreasonably low and, therefore, omitted (tanks were sampled 1/2 hour after termination of the test). The pH of the stock solution was adjusted to that of lake water using HCl.

Nonylamine

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24			19	20	20	
48			20	20	20	
72			20	20	20	
96		2	20	20	20	

RESULTS

 (MG/L)
 96 HR LC50: 2.16
 CONF. LIM:
 (2.02-2.29)

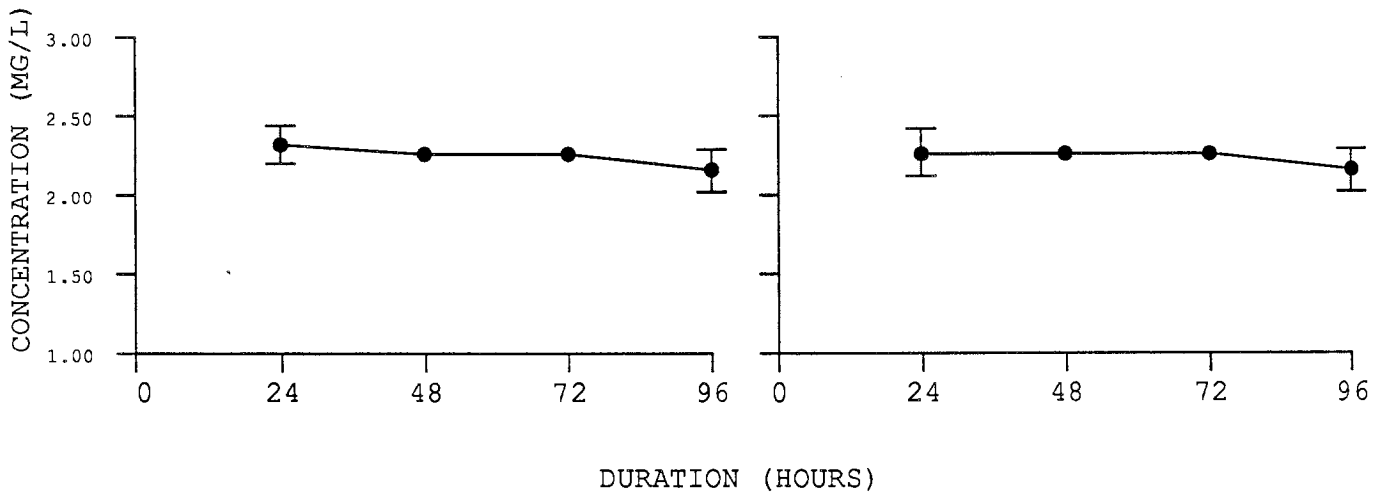
***** EFFECT *****

INITIAL	20	20	20	20	20
24		1	19	20	20
48		0	20	20	20
72		0	20	20	20
96		2	20	20	20

 (MG/L)
 96 HR EC50: 2.16
 CONF. LIM:
 (2.02-2.29)

LC 50

EC 50



CHEMICAL: Terbufos

TEST DATE: 12/01/86

CAS NUMBER: 13071799

MF: C9H21O2PS3

MWT: 288.45

CHEMICAL SOURCE: Chem Service Inc.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 5 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.0 (0.68)	TANK VOLUME (L)	: 1.7
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.34)	ADDITIONS (V/D)	: 27.4
HARDNESS (MG/L CaCO3)	: 49.4 (0.96)	PH	: 7.5 (0.11)
ALKALINITY (MG/L CaCO3)	: 40.8 (0.96)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
12/01/86	<0.3	6.4	6.6	11.0	17.0	20.0
12/02/86	<0.3	5.4	6.3	11.0	15.0	26.0
12/03/86	<0.3	5.5	5.9	9.0	14.0	21.0
12/04/86	<0.3	4.8	5.6	8.6	13.0	18.0
12/05/86	<0.3	8.7	10.0	16.0	25.0	34.0
AVERAGE:	<0.30	6.16	6.88	11.1	16.8	23.8
COR AVE:	<0.27	5.64	6.30	10.2	15.4	21.8
PERCENT RECOVERY	109.2 (9.2) N=5					

FISH SIZES

MEAN LENGTH (mm)	: 18.4	MEAN WEIGHT (G)	: 0.096
SD LENGTH (mm)	: 2.113	SD WEIGHT (G)	: 0.0245
		LOADING (G/L/D)	: 0.0412

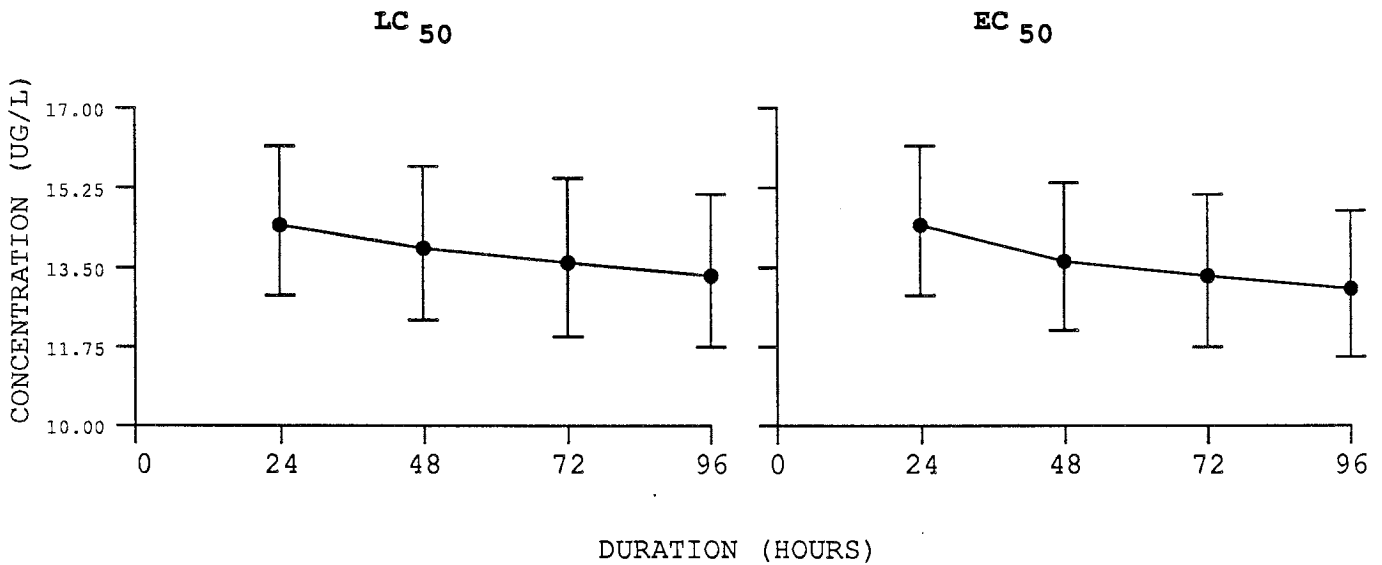
REMARKS

Nominal concentrations were not recorded. Affected fish lost schooling behavior, swam near the tank surface, were underreactive to external stimuli, were hypoactive and darkly colored. Equilibrium loss was observed prior to death.

Terbufos

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	12	18	* * * * *
48				3	12	19	* * * * *
72				4	12	19	* * * * *
96				4	13	19	* * * * *
							(UG/L)
							96 HR LC50: 13.3
							CONF. LIM: (11.8-15.1)

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	12	18	* * * * *
48				3	13	19	* * * * *
72				4	13	19	* * * * *
96				4	14	19	* * * * *
							(UG/L)
							96 HR EC50: 13.1
							CONF. LIM: (11.5-14.8)



CHEMICAL: 1-Benzoylacetone

TEST DATE: 05/29/84

CAS NUMBER: 93914

MF: C10H10O2

MWT: 162.19

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2.5 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.4 (0.52)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.1 (0.51)	ADDITIONS (V/D)	: 40.4
HARDNESS (MG/L CaCO3)	: 45.6 (1.44)	PH	: 7.8 (0.10)
ALKALINITY (MG/L CaCO3)	: 45.9 (1.31)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.38	0.76	1.1	1.5	1.9
05/29/84	<0.1	0.42	0.71	1.0	1.6	2.0
05/30/84	<0.1	0.39	0.69	0.96	1.5	2.0
05/31/84	<0.1	0.36	0.63	0.90	1.4	1.8
06/01/84	<0.1	0.42	0.76	1.0	1.7	2.2
06/02/84						
AVERAGE:	<0.10	0.40	0.70	0.97	1.55	2.00
COR AVE:	<0.10	0.39	0.68	0.94	1.50	1.94
PERCENT RECOVERY	103	(11)	N=4			

FISH SIZES

MEAN LENGTH (mm):	22.3	MEAN WEIGHT (G)	: 0.148
SD LENGTH (mm)	: 1.398	SD WEIGHT (G)	: 0.0319
		LOADING (G/L/D)	: 0.1465

REMARKS

Affected fish lost schooling behavior, swam near the surface, were hypoactive and underreactive to external stimuli, had increased respiration, and lost equilibrium prior to death. Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution.

1-Benzoylacetone

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24			1	5	5	
48			1	6	7	
72			2	7	9	
96			2	9	9	

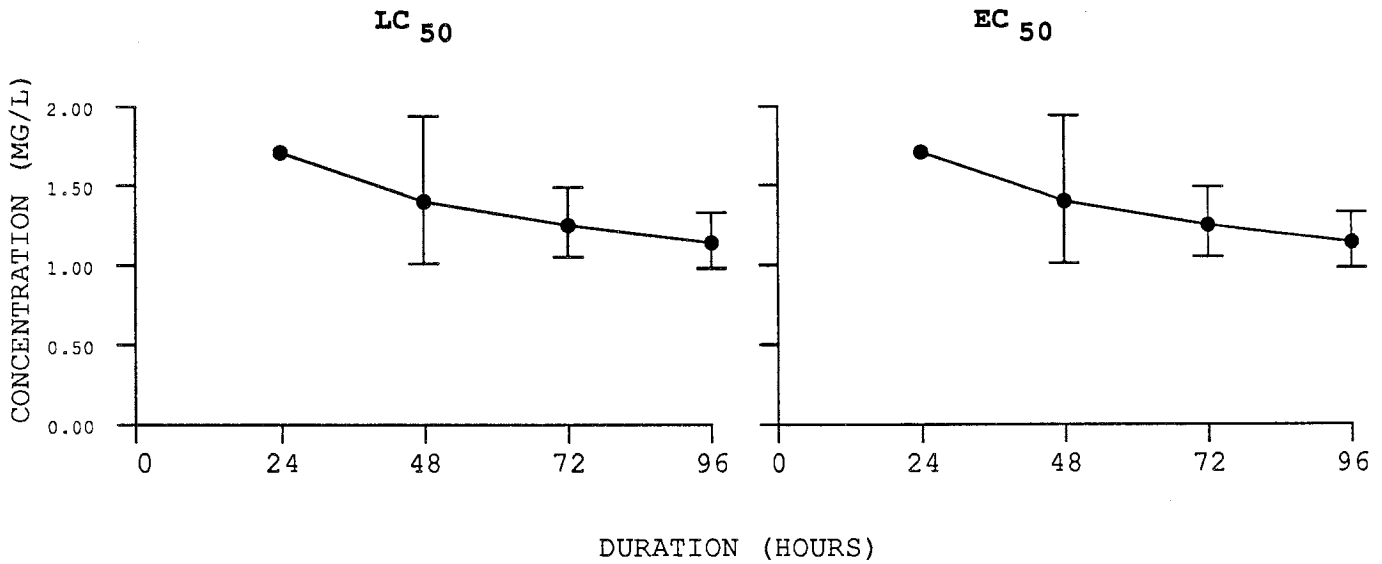
RESULTS

 (MG/L)
 96 HR LC50: 1.1
 CONF. LIM:
 (1.0- 1.3)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24			1	5	5	
48			1	6	7	
72			2	7	9	
96			2	9	9	

 (MG/L)
 96 HR EC50: 1.1
 CONF. LIM:
 (1.0- 1.3)



CHEMICAL: Dimethyl Phthalate

TEST DATE: 05/22/89

CAS NUMBER: 131113

MF: C10H10O4

MWT: 194.19

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2370 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30-31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.4 (0.48)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.18)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.8 (0.21)	PH	: 7.7 (0.11)
ALKALINITY (MG/L CaCO ₃)	: 39.0 (0.00)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	40.6	62.5	96.2	148	228
05/22/89	<10	46.2	61.7	98.6	143	209
05/23/89	<10	37.2	56.7	99.2	127	231
05/24/89	<10	41.7	75.9	93.8	161	226
05/25/89	<10	61.0	78.4	109	163	251
05/26/89	<10	63.8	80.7	110	162	259
AVERAGE: < 10		50.0	70.7	102	151	235
COR AVE: <10.1		50.4	71.3	103	153	237
PERCENT RECOVERY	99.1	(3.6) N=5				

FISH SIZES

MEAN LENGTH(mm)	: 18.1	MEAN WEIGHT(G)	: 0.082
SD LENGTH(mm)	: 2.826	SD WEIGHT(G)	: 0.0425
		LOADING(G/L/D)	: 0.0387

REMARKS

The pH of the stock solution was adjusted to that of lake water using NaOH. Affected fish swam sporadically near the tank surface, were underreactive to external stimuli and were darkly colored. Equilibrium loss was observed prior to death.

Dimethyl Phthalate

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	19	20	20	20	20
24		1	3	18	20	
48		1	3	18	20	
72		1	3	18	20	
96		1	3	18	20	

RESULTS

 (MG/L)
 96 HR LC50: 121
 CONF. LIM:
 (111- 132)

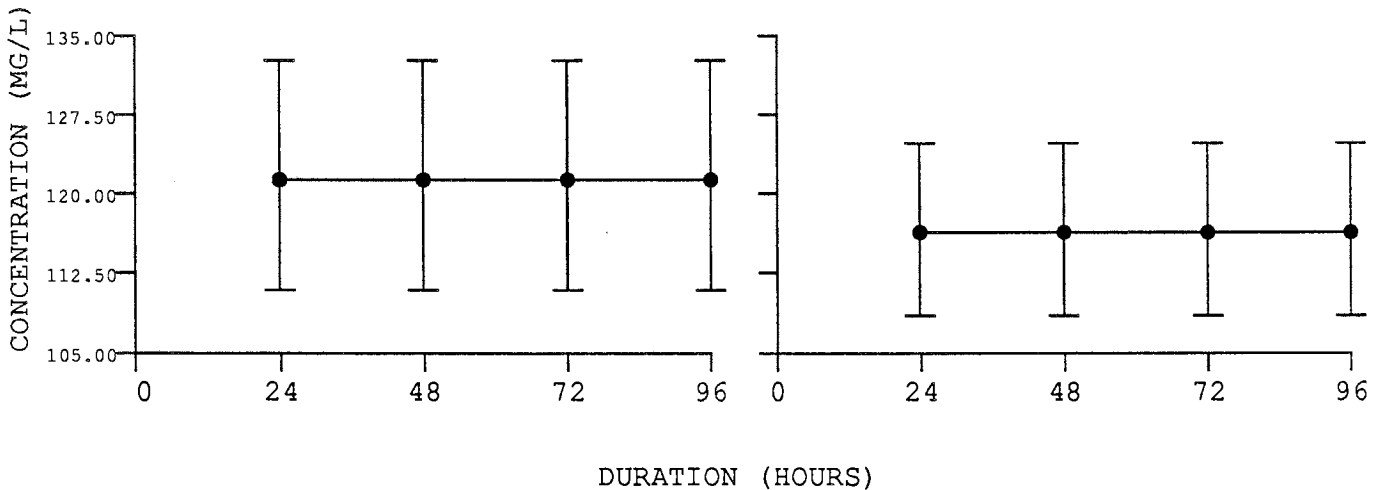
***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	19	20	20	20	20
24		1	3	20	20	
48		1	3	20	20	
72		1	3	20	20	
96		1	3	20	20	

 (MG/L)
 96 HR EC50: 116
 CONF. LIM:
 (108- 124)

LC 50

EC 50



CHEMICAL: Azinphos-methyl

TEST DATE: 06/18/84

CAS NUMBER: 86500

MF: C10H12N3O3PS2

MWT: 317.33

CHEMICAL SOURCE: Mobay Chemical Corp.

PURITY: 91%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2310 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 70-74 D

TEST CONDITIONS

TEMPERATURE (C)	: 19.0 (0.00)	TANK VOLUME (L)	: 34.0
DISSOLVED OXYGEN (MG/L)	: 8.9 (0.06)	ADDITIONS (V/D)	: 14.1
HARDNESS (MG/L CaCO3)	: 47.6 (0.00)	PH	: 7.7 (0.07)
ALKALINITY (MG/L CaCO3)	: 45.0 (1.10)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E	
NOMINAL:	0	15.6	31.2	62.5	125	250	
06/18/84	<5.0	22.4	41.3	62.8	118	194	
06/19/84	<5.0	23.6	41.9	80.0	137	201	
06/20/84			36.4	70.5	105	246	
06/21/84	<5.0	25.9	37.7	86.9	161	298	
06/22/84							
AVERAGE:	<5.00	<5.00	22.4 24.8	38.9 39.8	66.7 83.5	112 149	220 250
COR AVE:	<4.57	<4.57	20.5 22.6	35.5 36.4	60.9 76.3	102 136	201 228
PERCENT RECOVERY		109.4	(4.3)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

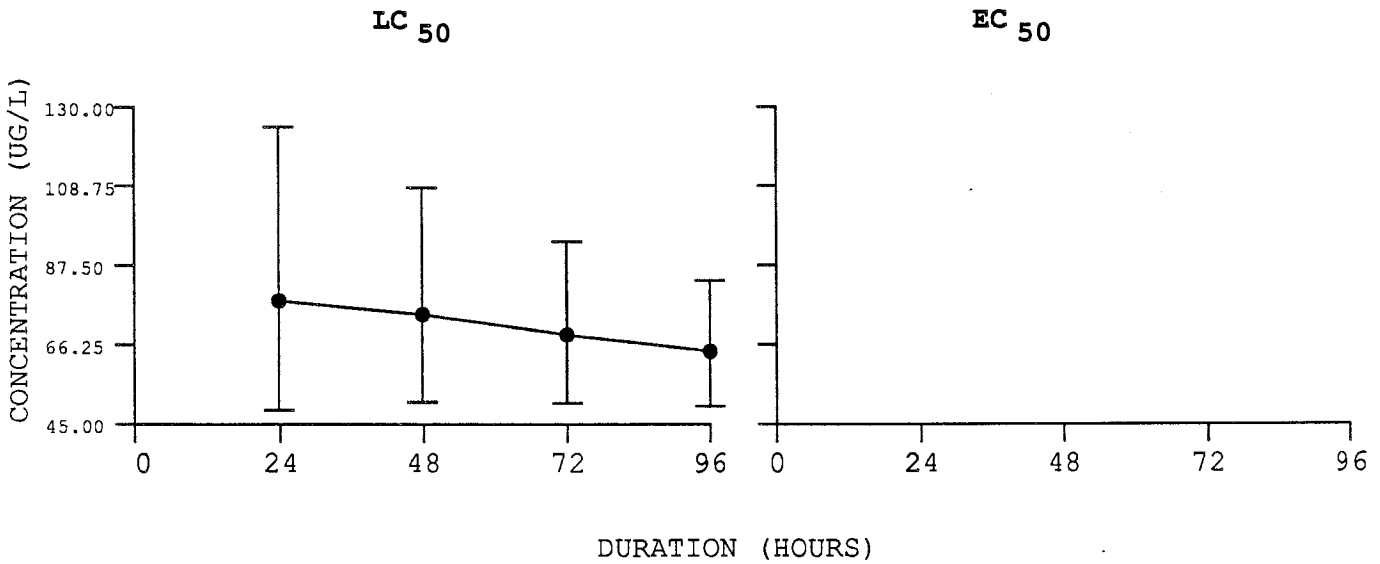
REMARKS

Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.21 g. Samples were not taken at 96 hr for determination of toxicant concentrations. The chemical was dissolved in dimethylformamide (DMF) to increase the amount in the stock solution. Affected fish lost equilibrium, were darkly colored and lethargic, and swam near the tank surface.

Azinphos-methyl

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	40	40	40	40	40	40	* * * * *
24	2	2	19	26	25		* (UG/L) *
48	2	2	20	27	26		* 96 HR LC50: 64.0 *
72	2	2	22	28	27		* CONF. LIM: *
96	2	2	24	30	27		* (50.0-83.0) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	40	40	40	40	40	40	* * * * *
24							* (UG/L) *
48							* 96 HR EC50: NOT DET. *
72							* CONF. LIM: *
96							* () *
							* * * * *



CHEMICAL: Butyl Phenyl Ether

TEST DATE: 08/16/88

CAS NUMBER: 1126790

MF: C10H14O

MWT: 150.22

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 11.0 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.2 (0.99)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.2 (0.63)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO3)	: 45.2 (0.21)	PH	: 7.5 (0.05)
ALKALINITY (MG/L CaCO3)	: 38.4 (0.17)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.96	3.02	4.65	7.15	11.0
08/16/88	<0.3	1.52	2.34	3.48	6.50	10.1
08/17/88	<0.3	1.04	2.07	3.16	6.26	7.07
08/18/88	<0.3	0.88	1.74	3.29	5.38	5.93
08/19/88	<0.3	1.04		3.02	5.72	7.71
08/20/88	<0.3	1.22	1.80	3.38	6.29	7.08
AVERAGE:	<0.30	1.14	1.99	3.27	6.03	7.58
COR AVE:	<0.29	1.09	1.91	3.13	5.79	7.27
PERCENT RECOVERY		104.2 (6.8)				
						N=5

FISH SIZES

MEAN LENGTH (mm)	: 18.9	MEAN WEIGHT (G)	: 0.097
SD LENGTH (mm)	: 1.694	SD WEIGHT (G)	: 0.0317
		LOADING (G/L/D)	: 0.1347

REMARKS

Affected fish lost schooling behavior, were hypoactive, swam near the tank bottom, were darkly colored and underreactive to external stimuli. Equilibrium loss was observed prior to death. The chemical was volatile and therefore two equilibrators were used to maintain a desired test concentration. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

Butyl Phenyl Ether

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	18	20	20	20	20	20
24		1	1	2	15	
48		1	1	3	20	
72		1	1	5	20	
96		1	1	5	20	

RESULTS

 (MG/L)
 96 HR LC50: 5.77
 CONF. LIM:
 (5.20-6.41)

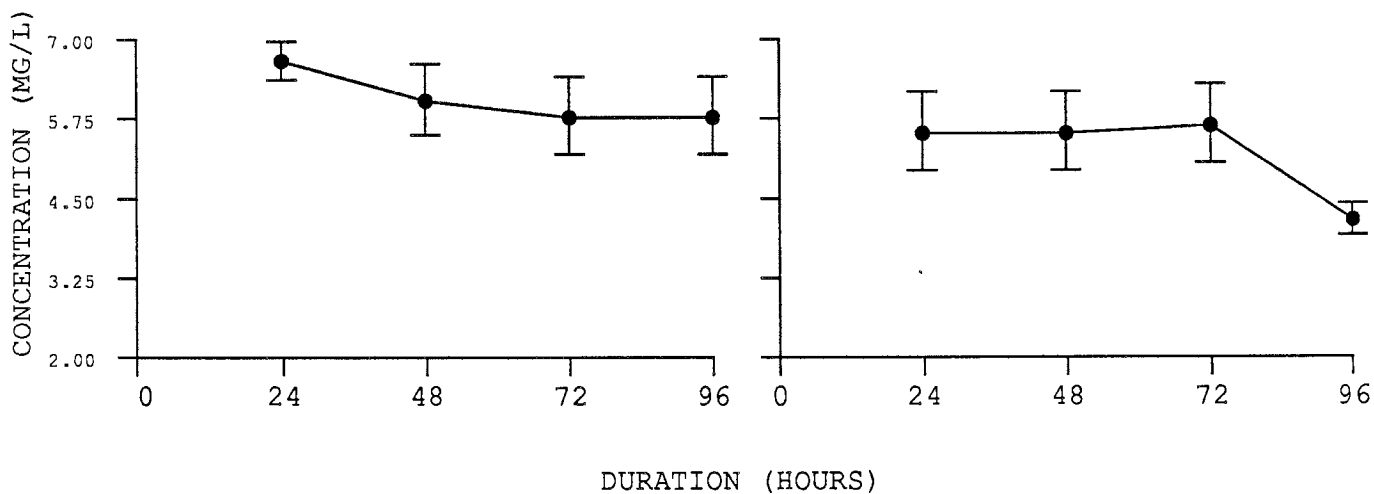
***** EFFECT *****

INITIAL	18	20	20	20	20
24		1	1	7	20
48		1	1	7	20
72		1	1	6	20
96		1	1	20	20

 (MG/L)
 96 HR EC50: 4.16
 CONF. LIM:
 (3.92-4.42)

LC 50

EC 50



CHEMICAL: (R)-(+)-Limonene

TEST DATE: 07/25/89

CAS NUMBER: 5989275

MF: C10H16

MWT: 136.24

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1810 ug/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 32 & 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (0.66)	TANK VOLUME (L)	: 0.20
DISSOLVED OXYGEN (MG/L)	: 5.9 (0.44)	ADDITIONS (V/D)	: 50.4
HARDNESS (MG/L CaCO3)	: 46.3 (0.29)	PH	: 7.6 (0.03)
ALKALINITY (MG/L CaCO3)	: 39.5 (0.71)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	372	744	1120	1490	1860
07/25/89	<29	154	326	500	679	714
07/26/89	<29	200	397	685	1110	1220
07/27/89	<29	178	429	601	962	1140
07/28/89	<29	190	410	590	972	1260
07/29/89	<29	178	385	631	962	1230
AVERAGE: < 29		180	389	601	937	1113
COR AVE: <28.7		178	386	595	928	1102
PERCENT RECOVERY	101.0 (2.6)	N=6				

FISH SIZES

MEAN LENGTH (mm)	: 21.8	MEAN WEIGHT (G)	: 0.177
SD LENGTH (mm)	: 3.938	SD WEIGHT (G)	: 0.0840
		LOADING (G/L/D)	: 0.1756

REMARKS

Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution. During the first 48 hr of exposure, the fish were hyperactive, swam sporadically and were over-reactive to external stimuli. At approximately 72 hr, the fish became hypoactive and underreactive to external stimuli. Affected fish also exhibited hemorrhaging and lost equilibrium prior to death. Measured concentrations were lower than nominal concentrations due to volatility.

(R)-(+)-Limonene

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24				2	9	6
48				2	9	8
72				2	9	10
96				2	9	10

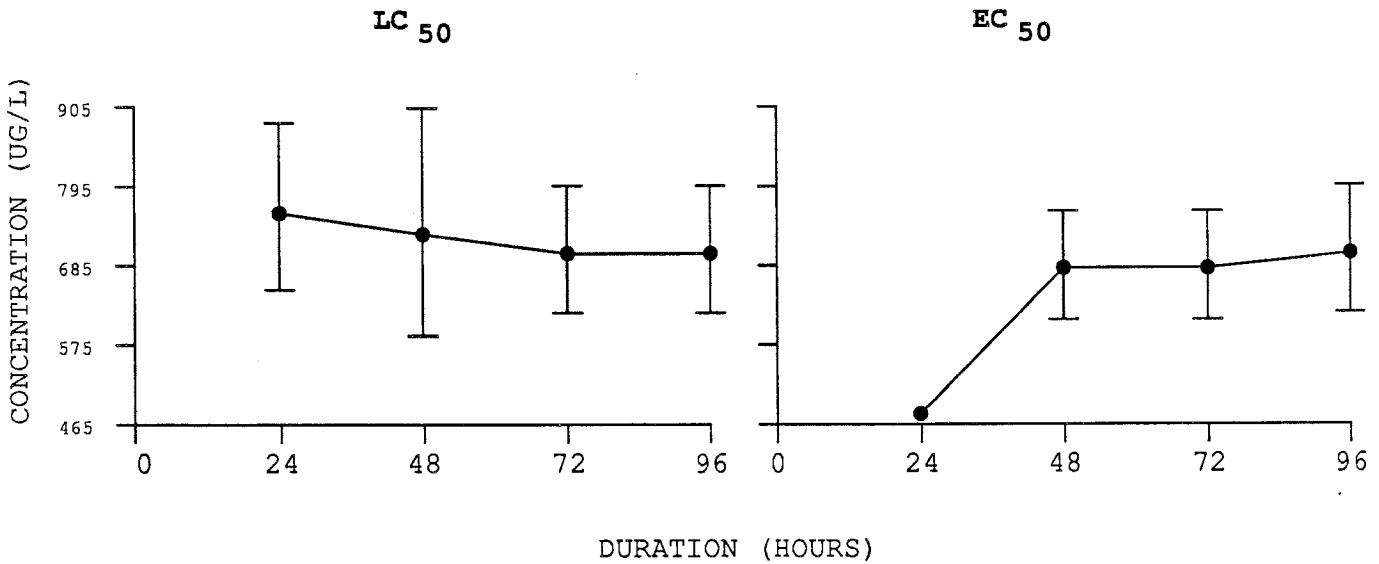
RESULTS

 (UG/L)
 96 HR LC50: 702
 CONF. LIM:
 (619- 796)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24				10	10	10
48				2	10	10
72				2	10	10
96				2	9	10

 (UG/L)
 96 HR EC50: 702
 CONF. LIM:
 (619- 796)



CHEMICAL: (1S)-(-)-Camphor

TEST DATE: 11/17/86

CAS NUMBER: 464482

MF: C10H16O

MWT: 152.24

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 101 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.0 (0.48)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.19)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 44.6 (0.64)	PH	: 7.6 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 44.3 (0.24)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	7.86	12.1	18.6	28.6	44.0
11/17/86	<0.5	6.82	10.1	15.4	23.5	36.6
11/18/86	<0.5	7.11	10.8	16.8	25.8	40.8
11/19/86	<0.5	7.62	11.0	16.2	23.8	37.7
11/20/86	<0.5	7.50	10.9	16.2	24.7	36.7
11/21/86	<0.5	7.42	10.6	16.2	24.4	37.3
AVERAGE:	<0.50	7.29	10.7	16.2	24.4	37.8
COR AVE:	<0.47	6.90	10.1	15.3	23.1	35.8
PERCENT RECOVERY		105.7 (5.8)	N=6			

FISH SIZES

MEAN LENGTH (mm) : 21.1
SD LENGTH (mm) : 1.268

MEAN WEIGHT (G) : 0.137
SD WEIGHT (G) : 0.0271
LOADING (G/L/D) : 0.1903

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had increased respiration. Equilibrium loss was observed prior to death.

(1S)-(-)-Camphor

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1	9	13	20	
48		1	9	14	20	
72		1	9	15	20	
96		1	9	15	20	

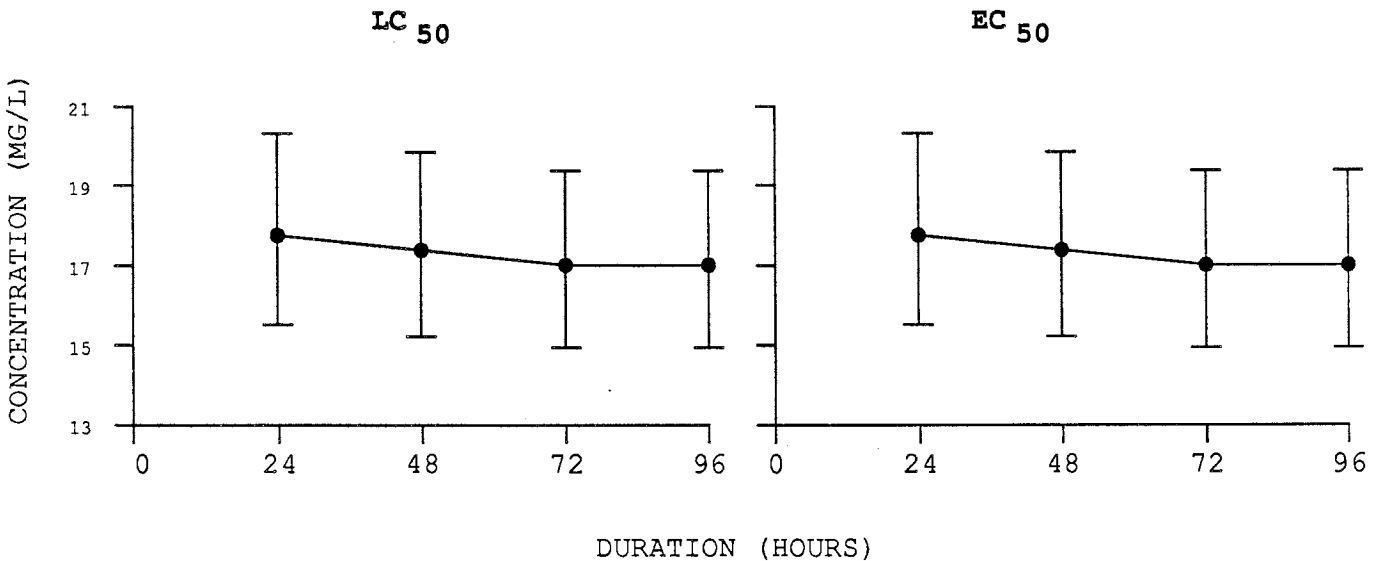
RESULTS

 (MG/L)
 96 HR LC50: 17.0
 CONF. LIM:
 (15.0-19.4)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24		1	9	13	20	
48		1	9	14	20	
72		1	9	15	20	
96		1	9	15	20	

 (MG/L)
 96 HR EC50: 17.0
 CONF. LIM:
 (15.0-19.4)



CHEMICAL: 1,4-Bis(3-aminopropyl)piperazine

TEST DATE: 08/24/87

CAS NUMBER: 7209383

MF: C10H24N4

MWT: 200.33

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 9.1 g/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 29 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.4 (1.26)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.39)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.9 (0.95)	PH	: 7.9 (0.14)
ALKALINITY (MG/L CaCO3)	: 241. (214.)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	656	1010	1560	2400	3700
08/24/87	<60	692	986	1530	2400	3700
08/25/87	<60	634	947	1600	2630	4020
08/26/87	<60	691	1010	1600	2510	3930
08/27/87	<60	716	1060	1600	2450	3930
08/28/87	<60	820	1200	1740	2490	3810
AVERAGE: < 60		711	1041	1614	2496	3878
COR AVE: <59.1		699	1024	1589	2457	3817
PERCENT RECOVERY	101.6	(6.8)	N=12			

FISH SIZES

MEAN LENGTH (mm):	21.2	MEAN WEIGHT (G):	0.142
SD LENGTH (mm):	2.648	SD WEIGHT (G):	0.0567
		LOADING (G/L/D):	0.0789

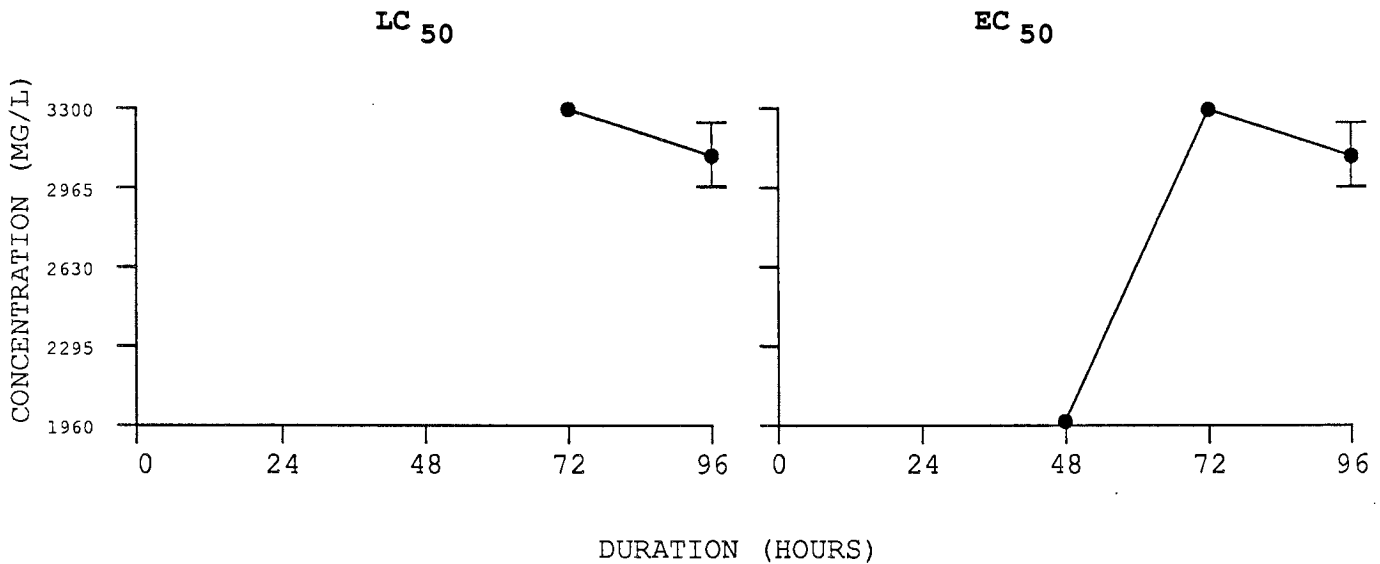
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, swam near the tank bottom and were darkly colored. Equilibrium loss was not observed prior to death. The pH of the stock solution was adjusted to that of lake water using HCl. Increased alkalinity values were due to a reaction between the titrant and toxicant.

1,4-Bis(3-aminopropyl)piperazine

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
48					6		* * * * *
72					15		(MG/L)
96				1	18		96 HR LC50: 3100
							CONF. LIM: (2970-3240)
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
48				20	20		* * * * *
72				0	15		(MG/L)
96				1	18		96 HR EC50: 3100
							CONF. LIM: (2970-3240)
							* * * * *



CHEMICAL: Aminocarb

TEST DATE: 06/26/86

CAS NUMBER: 2032599

MF: C11H16N2O2

MWT: 208.29

CHEMICAL SOURCE: Chem Service Inc.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 50 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.3 (0.55)	TANK VOLUME (L)	: 1.2
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.38)	ADDITIONS (V/D)	: 12
HARDNESS (MG/L CaCO ₃)	: 50.4 (2.97)	PH	: 7.2 (0.01)
ALKALINITY (MG/L CaCO ₃)	: 42.8 (0.40)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.11	1.72	2.64	4.06	6.25
06/26/86	<.08	1.22	1.50	1.88	2.40	3.47
06/27/86	<.08	1.41	1.81	2.38	3.00	4.00
06/28/86	<.08	1.52	1.79	2.36	3.12	4.28
06/29/86	<.08	1.59	1.82	2.35	3.17	4.44
06/30/86	<.08	1.71	1.91	2.49	3.36	4.73
AVERAGE:	<0.08	1.49	1.77	2.29	3.01	4.18
COR AVE:	<0.08	1.42	1.69	2.19	2.87	4.00
PERCENT RECOVERY		104.7 (2.7)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 19.1
SD LENGTH (mm) : 3.076

MEAN WEIGHT (G) : 0.089
SD WEIGHT (G) : 0.0398
LOADING (G/L/D) : 0.1236

REMARKS

Behavioral data were not recorded.

Aminocarb

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					6	
48				2	19	
72			9	19	20	
96	1	1	18	20	20	

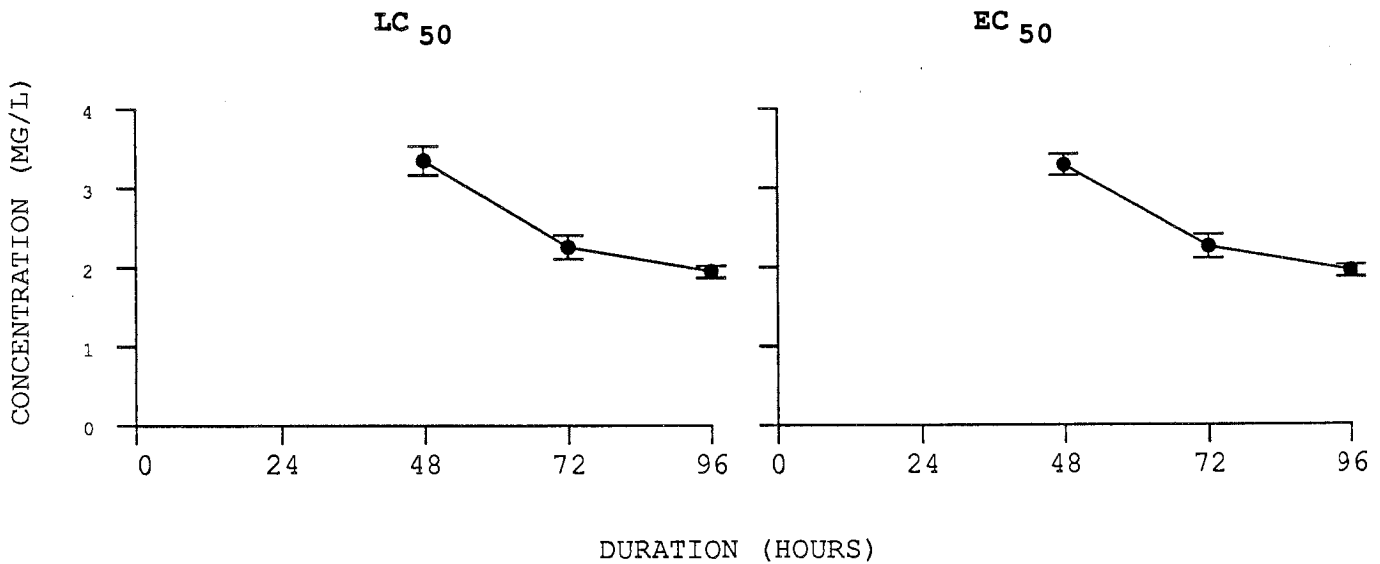
RESULTS

 (MG/L)
 96 HR LC50: 1.95
 CONF. LIM:
 (1.87-2.02)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					6	
48				2	20	
72			9	19	20	
96	1	1	18	20	20	

 (MG/L)
 96 HR EC50: 1.95
 CONF. LIM:
 (1.87-2.02)



CHEMICAL: Undecylamine

TEST DATE: 06/01/87

CAS NUMBER: 7307553

MF: C11H25N

MWT: 171.33

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 9.2 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 32 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.4 (0.17)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.40)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 44.6 (0.63)	PH	: 7.7 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 41.4 (0.63)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.33	0.51	0.79	1.22	1.88
06/01/87	<.11	0.22	0.36	0.50	0.82	1.24
06/02/87	<.11	0.25	0.32	0.38	0.84	1.15
06/03/87	<.10	0.14	0.23	0.42	0.76	1.25
06/04/87	<.10	0.12	0.21	0.39	0.69	1.20
06/05/87	<.10	0.15	0.24	0.40	0.72	0.93
AVERAGE:	<0.10	0.18	0.27	0.42	0.77	1.15
COR AVE:	<0.10	0.18	0.27	0.42	0.77	1.16
PERCENT RECOVERY	99.7	(9.1)	N=5			

FISH SIZES

MEAN LENGTH (mm):	18.4	MEAN WEIGHT (G):	0.081
SD LENGTH (mm):	2.254	SD WEIGHT (G):	0.0305
		LOADING (G/L/D):	0.0450

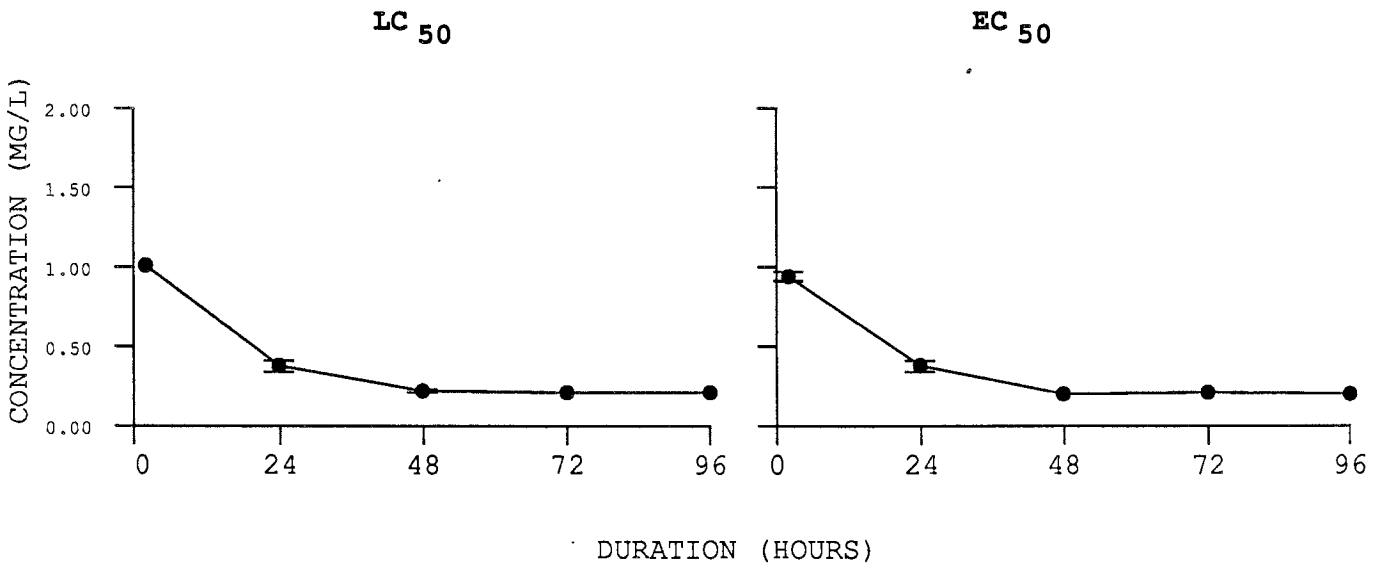
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, were darkly colored and lost equilibrium prior to death. The pH of the stock solution was adjusted to that of lake water using HCl. Nominal concentrations varied from the measured concentrations because the chemical was adherent to glassware.

Undecylamine

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
2						15	* * * * *
24			16	20	20		(MG/L)
48	1	19	20	20	20		96 HR LC50: 0.21
72	3	20	20	20	20		
96	4	20	20	20	20		
							CONF. LIM: (NOT REL.)

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
2					1	19	* * * * *
24			16	20	20		(MG/L)
48	5	20	20	20	20		96 HR EC50: 0.21
72	3	20	20	20	20		
96	5	20	20	20	20		
							CONF. LIM: (NOT REL.)



CHEMICAL: 4-Chlorophenyl Sulfoxide

TEST DATE: 10/05/87

CAS NUMBER: 3085425

MF: C12H8Cl2OS

MWT: 271.17

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 2.32 mg/l Glass Wool Column

ORGANISM: Fathead Minnow

AGE: 33 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.7 (0.11)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.1 (0.50)	ADDITIONS (V/D)	: 28.8
HARDNESS (MG/L CaCO3)	: 45.8 (0.00)	PH	: 7.6 (0.00)
ALKALINITY (MG/L CaCO3)	: 42.5 (0.00)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
10/05/87						2.32
10/06/87						2.26
10/07/87						2.20
10/08/87						2.25
10/09/87						2.21
AVERAGE: <						2.25
COR AVE: <0.00						2.22
PERCENT RECOVERY 101.1 (2.7) N=5						

FISH SIZES

MEAN LENGTH (mm) : 19.2	MEAN WEIGHT (G) : 0.113
SD LENGTH (mm) : 3.962	SD WEIGHT (G) : 0.0919
	LOADING (G/L/D) : 0.0785

REMARKS

This test was run using the single-cell toxicity screening system and a near saturated solution of the chemical. No mortalities occurred nor were the fish stressed during the test.

4-Chlorophenyl Sulfoxide

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL					5	
24					0	
48					0	
72					0	
96					0	

RESULTS

```

* * * * *
*
*           (MG/L)
*
*   96 HR LC50: NOT CAL.
*
*
*   CONF. LIM:
*   (           )
*
*
* * * * *

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***** EFFECT *****

INITIAL					5
24					0
48					0
72					0
96					0

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* * * * *
*
*           (MG/L)
*
*   96 HR EC50: NOT CAL.
*
*
*   CONF. LIM:
*   (           )
*
*
* * * * *

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CHEMICAL: Phenyl Sulfoxide

TEST DATE: 08/17/87

CAS NUMBER: 945517

MF: C12H10OS

MWT: 202.28

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 371 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.0 (0.36)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.5 (0.15)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.0 (0.00)	PH	: 7.6 (0.07)
ALKALINITY (MG/L CaCO ₃)	: 40.0 (0.56)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	26.3	40.4	62.1	95.6	147
08/17/87	<0.5	24.0	36.6	61.9	91.4	142
08/18/87	<0.5	27.8	40.8	65.4	91.2	136
08/19/87	<0.5	23.8	36.9	64.8	99.5	154
08/20/87	<1.0	25.5	39.0	65.2	98.8	150
08/21/87	<1.0	24.8	37.9	64.4	103	154
AVERAGE:	<0.70	25.2	38.2	64.3	96.8	147
COR AVE:	<0.71	25.6	38.9	65.5	98.6	150
PERCENT RECOVERY	98.2	(5.4)	N=7			

FISH SIZES

MEAN LENGTH (mm) :	18.1	MEAN WEIGHT (G) :	0.086
SD LENGTH (mm) :	1.755	SD WEIGHT (G) :	0.0257
		LOADING (G/L/D) :	0.0956

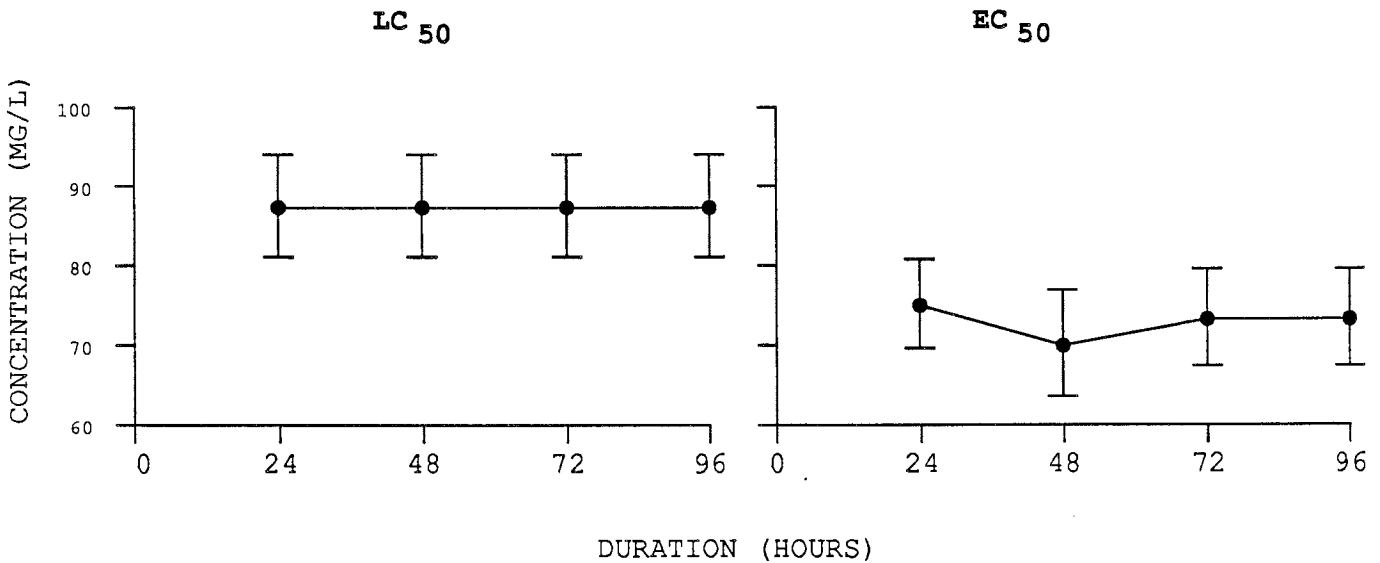
REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, and had rigid musculature. Equilibrium loss was observed prior to death.

Phenyl Sulfoxide

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				16	20		* (MG/L) *
48				16	20		* 96 HR LC50: 87.3 *
72				16	20		* CONF. LIM: *
96				16	20		* (81.1-94.0) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24			3	20	20		* (MG/L) *
48			6	20	20		* 96 HR EC50: 73.2 *
72			4	20	20		* CONF. LIM: *
96			4	20	20		* (67.4-79.6) *
							* * * * *



CHEMICAL: Diphenylamine

TEST DATE: 03/14/88

CAS NUMBER: 122394

MF: C12H11N

MWT: 169.23

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 13.6 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.9 (0.26)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 7.3 (0.22)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 48.0 (0.28)	PH	: 7.8 (0.01)
ALKALINITY (MG/L CaCO ₃)	: 43.1 (1.56)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.10	1.65	2.50	3.90	6.00
03/14/88						
03/15/88	<.02	0.94	1.67	2.48	3.78	6.17
03/16/88	<.10	0.90	1.42	2.13	2.92	4.92
03/17/88	<.02	1.16	1.68	2.56	3.73	5.86
03/18/88	<.02	1.03	1.60	2.42	3.42	5.53
AVERAGE:	<0.04	1.01	1.59	2.40	3.46	5.62
COR AVE:	<0.04	0.98	1.56	2.34	3.38	5.49
PERCENT RECOVERY		102.3 (5.0)	N=5			

FISH SIZES

MEAN LENGTH (mm) :	18.6	MEAN WEIGHT (G) :	0.090
SD LENGTH (mm) :	1.188	SD WEIGHT (G) :	0.0217
		LOADING (G/L/D) :	0.1250

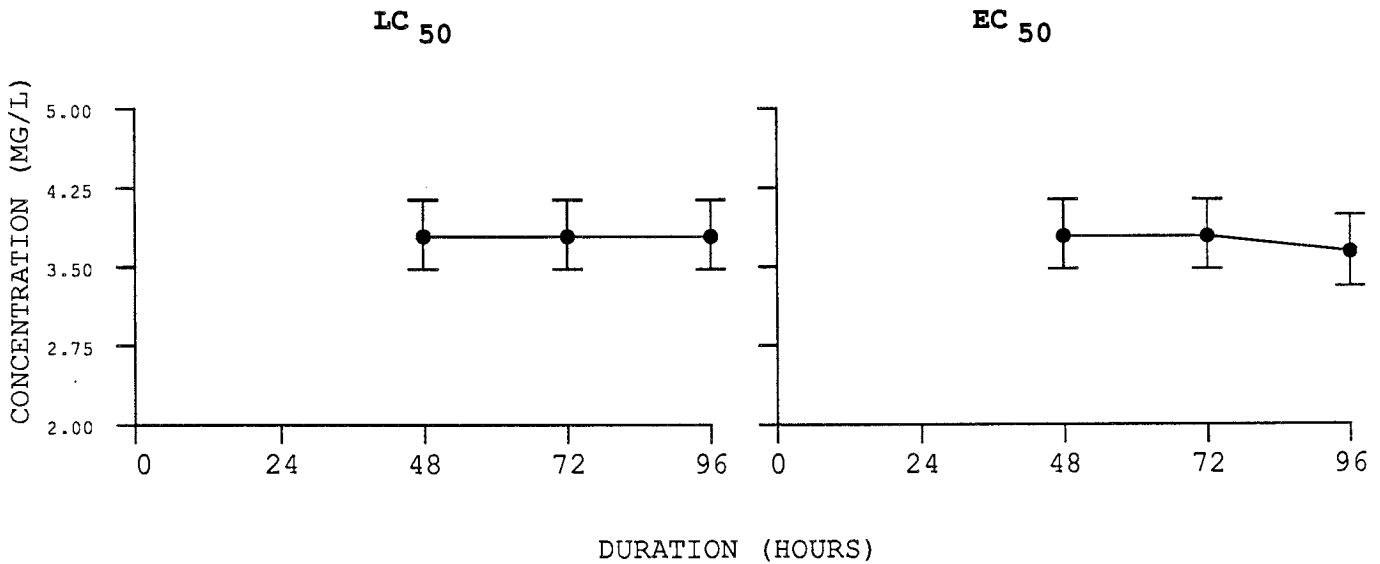
REMARKS

Affected fish lost schooling behavior, were hypoactive, swam near the tank bottom and were darkly colored. Equilibrium loss was not observed prior to death. The 0-hr samples were omitted due to early sampling of the tanks, resulting in unusually low measurements. The test water was very turbid.

Diphenylamine

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24					1		* * * * *
48				6	20		(MG/L)
72				6	20		* * * * *
96				6	20		96 HR LC50: 3.79
							* * * * *
							CONF. LIM:
							(3.47-4.14)
							* * * * *

***** EFFECT *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24					7		* * * * *
48				6	20		(MG/L)
72				6	20		* * * * *
96				8	20		96 HR EC50: 3.63
							* * * * *
							CONF. LIM:
							(3.31-3.99)
							* * * * *



CHEMICAL: Carbofuran

TEST DATE: 08/18/86

CAS NUMBER: 1563662

MF: C12H15NO3

MWT: 221.28

CHEMICAL SOURCE: Chem Service Inc.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 25 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.4 (0.71)	TANK VOLUME (L)	: 1.2
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.62)	ADDITIONS (V/D)	: 12
HARDNESS (MG/L CaCO3)	: 53.8 (0.93)	PH	: 7.4 (0.09)
ALKALINITY (MG/L CaCO3)	: 43.8 (0.40)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	560	683	836	1250	1650
08/18/86	<136	552	650	863	1350	1890
08/19/86	<136	579	639	790	1110	1340
08/20/86	<136	540	702	832	1260	
08/21/86	<136	500	642	852	1210	
08/22/86	<136	561	733	900	1200	
AVERAGE: < 136		546	673	847	1226	1615
COR AVE: < 139		558	688	866	1252	1650
PERCENT RECOVERY	97.9	(4.3)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 16.6
SD LENGTH (mm) : 3.202

MEAN WEIGHT (G) : 0.067
SD WEIGHT (G) : 0.0399
LOADING (G/L/D) : 0.0931

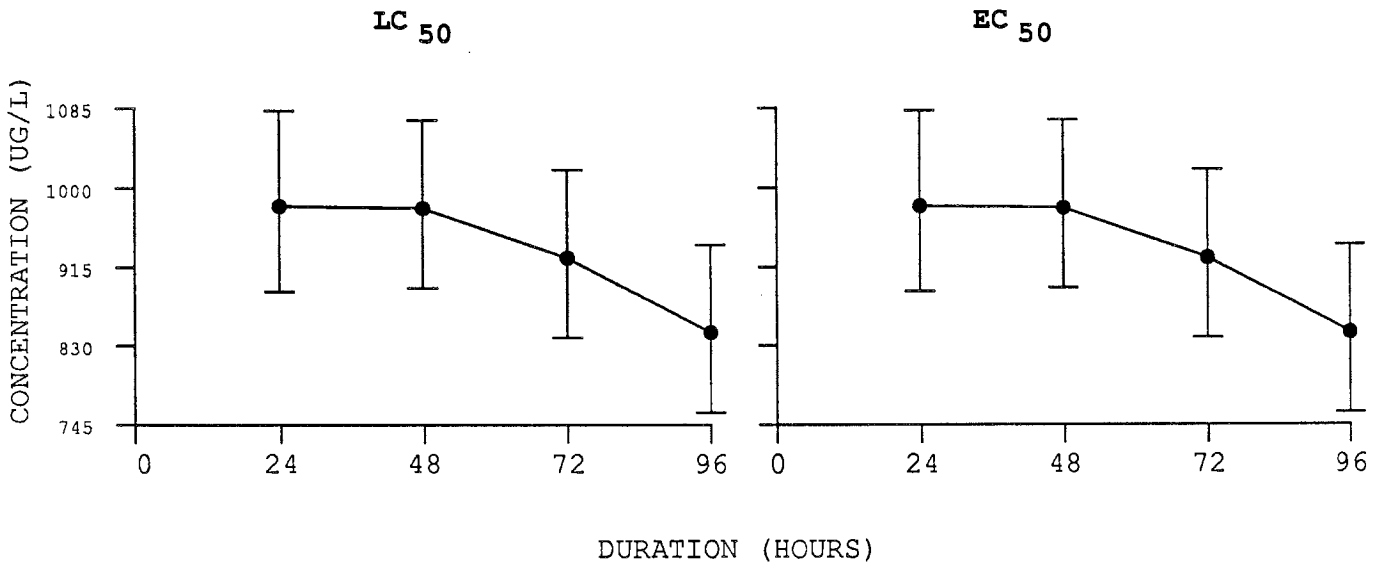
REMARKS

Equilibrium loss was not observed prior to death.

Carbofuran

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	1		8	16	19		* * * * *
48	1		8	16	20		(UG/L)
72	1	1	11	16	20		* * * * *
96	3	2	14	16	20		96 HR LC50: 844
							CONF. LIM: (758- 939)

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	1		8	16	19		* * * * *
48	1		8	16	20		(UG/L)
72	1	1	11	16	20		* * * * *
96	3	2	14	16	20		96 HR EC50: 844
							CONF. LIM: (758- 939)



CHEMICAL: Dibutyl Fumarate (Test 4)

TEST DATE: 05/29/84

CAS NUMBER: 105759

MF: C12H20O4

MWT: 228.29

CHEMICAL SOURCE: Alfred Bader Library of Rare Chemicals

PURITY: 99+%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: Emulsified

ORGANISM: Fathead Minnow

AGE: 44-48.D

TEST CONDITIONS

TEMPERATURE (C)	: 16.9 (0.00)	TANK VOLUME (L)	: 34.0
DISSOLVED OXYGEN (MG/L)	: 10.0 (0.11)	ADDITIONS (V/D)	: 14.1
HARDNESS (MG/L CaCO ₃)	: 43.6 (0.00)	PH	: 7.6 (0.07)
ALKALINITY (MG/L CaCO ₃)	: 42.7 (0.00)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E					
NOMINAL:	0	120	239	478	955	1910					
05/29/84	<25	206	310	683	1050	1780					
05/30/84	<25	195	288	652	1030	1870					
05/31/84	<25	190	308	712	1050	1760					
06/01/84	<25	167	289	721	1010	1700					
06/02/84											
AVERAGE:	< 25 < 25	201	179	299	299	668	717	1040	1030	1825	1730
COR AVE:	<24.8 <24.8	199	177	296	296	662	710	1031	1021	1809	1715
PERCENT RECOVERY	100.9	(2.0)	N=4								

FISH SIZES

MEAN LENGTH (mm): 0.0
SD LENGTH (mm): 0.000

MEAN WEIGHT (G): 0.000
SD WEIGHT (G): 0.0000
LOADING (G/L/D): 0.0000

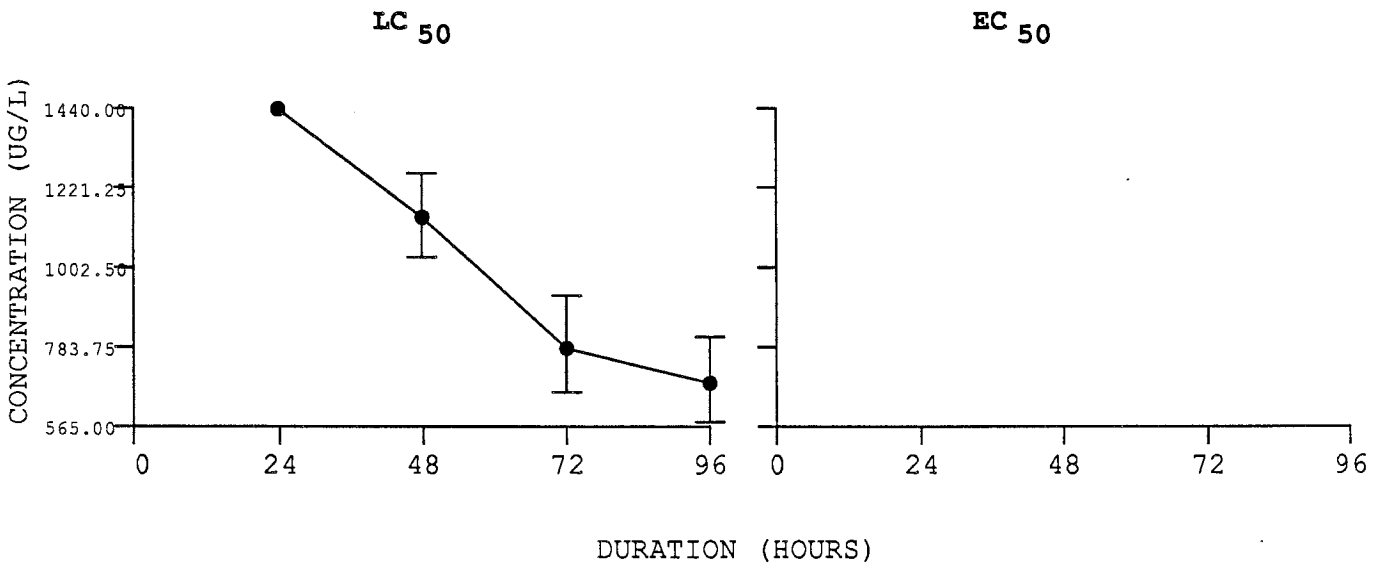
REMARKS

Affected fish swam erratically and lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.23 g. Analytical determinations of the toxicant were not made at 96 hr.

Dibutyl Fumarate (Test 4)

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24						16	* * * * *
48					7	20	(UG/L)
72		3	3	15	20		* * * * *
96		3	5	18	20		96 HR LC50: 684
							CONF. LIM:
							(577- 812)

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24							* * * * *
48							(UG/L)
72							* * * * *
96							96 HR EC50: NOT DET.
							CONF. LIM:
							()



CHEMICAL: Dicyclohexyl

TEST DATE: 09/08/86

CAS NUMBER: 92513

MF: C12H22

MWT: 166.31

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 178 ug/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.3 (0.29)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.9 (0.26)	ADDITIONS (V/D)	: 28.8
HARDNESS (MG/L CaCO3)	: 44.7 (0.00)	PH	: 7.8 (0.00)
ALKALINITY (MG/L CaCO3)	: 45.5 (0.00)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
09/08/86						42.0
09/09/86						170
09/10/86						82.8
09/11/86						85.1
09/12/86						73.6
AVERAGE: <						90.7
COR AVE: <0.00						103
PERCENT RECOVERY 88.1 (8.8) N=12						

FISH SIZES

MEAN LENGTH (mm): 19.0	MEAN WEIGHT (G) : 0.108
SD LENGTH (mm) : 1.581	SD WEIGHT (G) : 0.0313
	LOADING (G/L/D) : 0.0750

REMARKS

This test was run using the single-cell toxicity screening system and an approximately 58% saturated solution (103 ug/l) of the chemical. No mortalities occurred nor were the fish stressed during the test.

CHEMICAL: Dodecylamine

TEST DATE: 11/30/87

CAS NUMBER: 124221

MF: C12H27N

MWT: 185.36

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 18.5 mg/l Glass Wool Column

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.2 (0.19)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.1 (0.12)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 45.6 (0.15)	PH	: 7.7 (0.05)
ALKALINITY (MG/L CaCO3)	: 40.2 (0.24)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	75.0	116	179	276	424
11/30/87	<10	60.1	89.3	121	213	352
12/01/87	<10	66.3	84.8	171	300	485
12/02/87	<10	59.5	70.8	120	275	434
12/03/87	<10	48.4	70.8	198	323	538
12/04/87	<10	39.0	68.7	136	263	464
AVERAGE: < 10		54.7	76.9	149	275	455
COR AVE: <9.88		54.0	76.0	147	272	449
PERCENT RECOVERY	101.2	(8.9)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 20.0
SD LENGTH (mm) : 1.654

MEAN WEIGHT (G) : 0.117
SD WEIGHT (G) : 0.0255
LOADING (G/L/D) : 0.0650

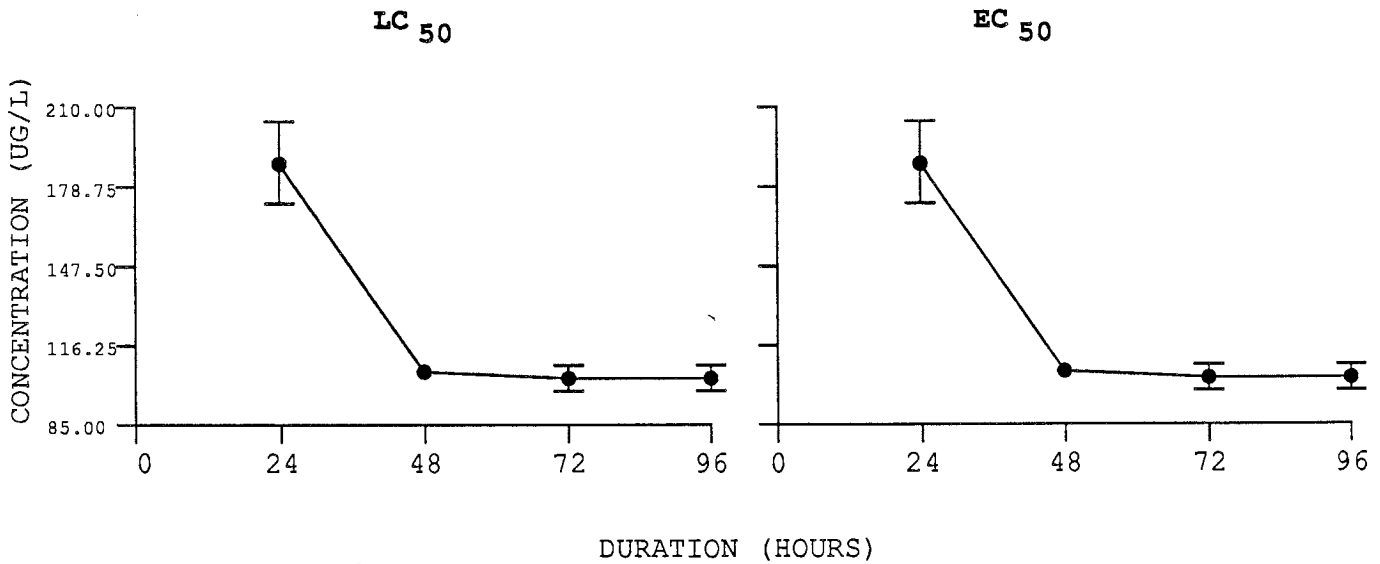
REMARKS

Affected fish lost schooling behavior, had increased respiration, convulsions and edema. Equilibrium loss was also observed prior to death. Necrosis was noted in the tail regions of the fish.

Dodecylamine

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	20	20	* * * * *
48				20	20	20	(UG/L)
72		1		20	20	20	* * * * *
96		1		20	20	20	96 HR LC50: 103
							CONF. LIM:
							(98.2- 108)
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				2	20	20	* * * * *
48				20	20	20	(UG/L)
72		1		20	20	20	* * * * *
96		1		20	20	20	96 HR EC50: 103
							CONF. LIM:
							(98.2- 108)
							* * * * *



CHEMICAL: Flucythrinate

TEST DATE: 02/02/81

CAS NUMBER: 70124775

MF: C13H19N3O4

MWT: 281.35

CHEMICAL SOURCE: American Cyanamid Co.

PURITY: 80.6%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 11.4 ug/l Liq-sol Equil

ORGANISM: Fathead Minnow

AGE: 53 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.1 (0.00)	TANK VOLUME (L)	: 0.6
DISSOLVED OXYGEN (MG/L)	: 7.4 (0.16)	ADDITIONS (V/D)	: 30
HARDNESS (MG/L CaCO ₃)	: 43.5 (0.71)	PH	: 7.8 (0.21)
ALKALINITY (MG/L CaCO ₃)	: 43.0 (0.00)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
02/02/81	<.01	0.05	0.11	0.14	0.34	0.46
02/03/81	<.01	0.03	0.09	0.13	0.31	0.45
02/04/81	<.01	0.02	0.08	0.17	0.27	0.55
02/05/81	<.01		0.08	0.11	0.24	0.58
02/06/81						
AVERAGE:	<0.01	0.03	0.09	0.14	0.29	0.51
COR AVE:	<0.01	0.03	0.08	0.12	0.26	0.46
PERCENT RECOVERY	112	(4.6)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 0.0	MEAN WEIGHT (G)	: 0.000
SD LENGTH (mm)	: 0.000	SD WEIGHT (G)	: 0.0000
		LOADING (G/L/D)	: 0.0000

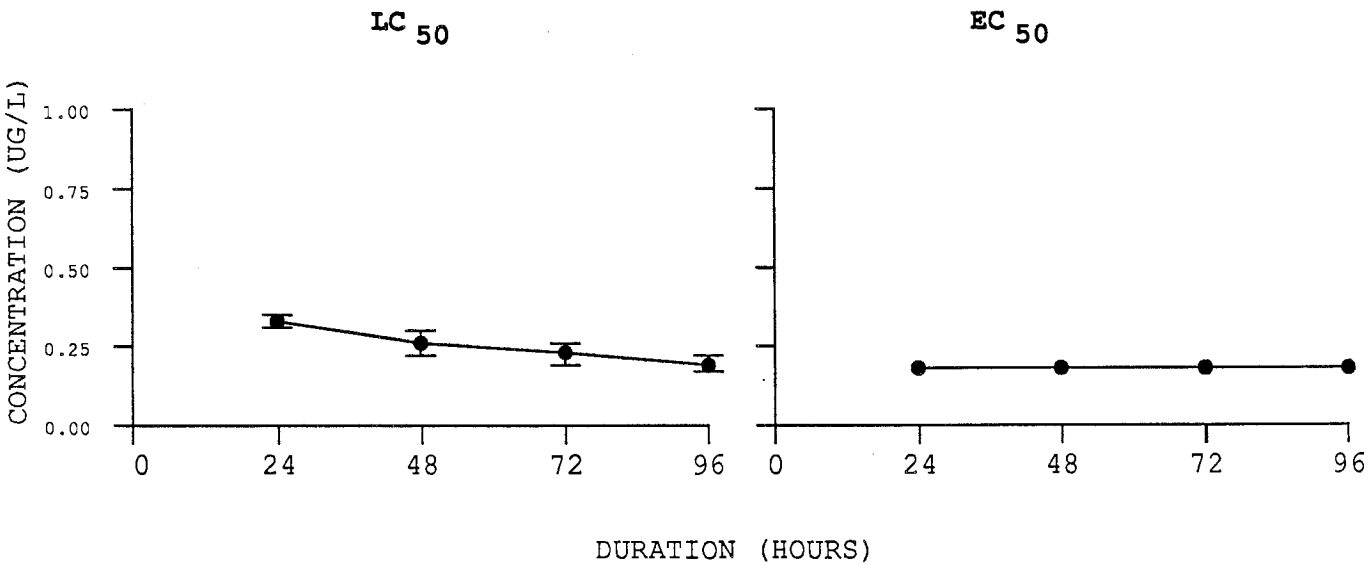
REMARKS

Individual lengths and weights of the test fish were not recorded; however, the measured mean weight was 0.35-0.40 g and the loading factor was 0.4 g/l/day. Samples were not taken at 96 hr for determination of toxicant concentrations. Affected fish had spinal column deformities and lost equilibrium prior to death. The equilibrators consisted of a 2.8-L flask filled with dilution water and 300 g of sand (containing approximately 2% of the chemical) connected to a reservoir filled with 11 L of water.

Flucythrinate

***** MORTALITIES *****							RESULTS	
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24					1	20	*	*
48			1	8	20			(UG/L)
72			1	12	20			
96			1	17	20			96 HR LC50: 0.19
								CONF. LIM:
								(0.17-0.22)

***** EFFECT *****								
HOUR	CON	A	B	C	D	E		
INITIAL	20	20	20	20	20	20	*	*
24				20	20		*	*
48				20	20		*	(UG/L)
72				20	20		*	
96				20	20		*	96 HR EC50: 0.18
							*	
							*	CONF. LIM:
							*	(NOT REL.)
							*	
							*	
							*	
							*	
							*	
							*	



CHEMICAL: Tridecylamine

TEST DATE: 11/02/87

CAS NUMBER: 2869343

MF: C13H29N

MWT: 199.38

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 5.93 mg/l Glass Wool Column

ORGANISM: Fathead Minnow AGE: 28 & 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.6 (0.18)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.0 (0.36)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.6 (0.33)	PH	: 7.7 (0.03)
ALKALINITY (MG/L CaCO ₃)	: 40.9 (0.25)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	70.0	108	166	255	392
11/02/87	<14	15.4	34.5	55.9	121	242
11/03/87	<14	14.8	37.8	61.4	126	252
11/04/87	<14	28.5	41.0	62.7	146	306
11/05/87	<14	23.8	31.2	52.5	169	318
11/06/87	<14	18.8		48.2	132	265
AVERAGE: < 14		20.3	36.1	56.1	139	277
COR AVE: <14.5		21.0	37.4	58.2	144	287
PERCENT RECOVERY	96.5	(8.7)	N=8			

FISH SIZES

MEAN LENGTH (mm)	: 21.0	MEAN WEIGHT (G)	: 0.138
SD LENGTH (mm)	: 1.638	SD WEIGHT (G)	: 0.0297
		LOADING (G/L/D)	: 0.0767

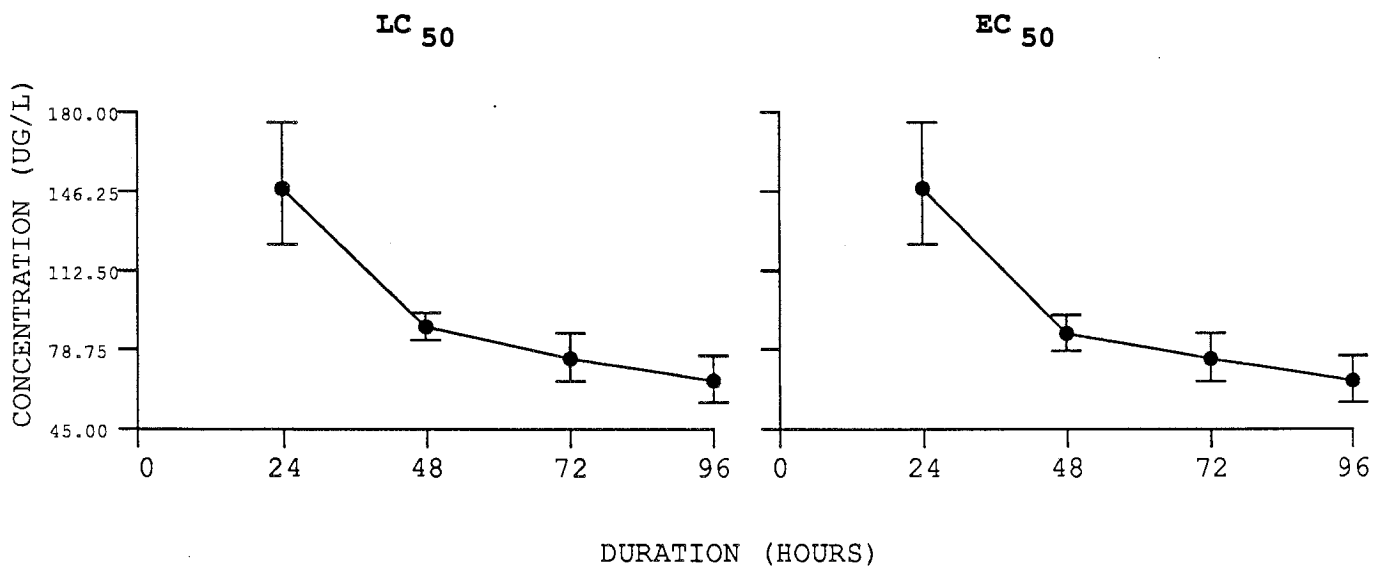
REMARKS

Affected fish lost schooling behavior, had increased respiration, convulsions, rigid musculature and edema. Equilibrium loss was not observed prior to death. Necrosis occurred in the tail regions of some fish. Nominal concentrations varied from the measured concentrations because the chemical was adherent to glassware. The stated LC50 value and confidence limits appeared inconsistent with measured concentrations and mortalities; however, the Spearman-Kärber method computes this estimate with this set of data.

Tridecylamine

***** MORTALITIES *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				8	20	20	* * * * *
48			1	20	20	20	* * * * *
72			6	20	20	20	* * * * *
96			10	20	20	20	* * * * *
							(UG/L)
							96 HR LC50: 65.4
							CONF. LIM: (56.2-76.0)

***** EFFECT *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				8	20	20	* * * * *
48			2	20	20	20	* * * * *
72			6	20	20	20	* * * * *
96			10	20	20	20	* * * * *
							(UG/L)
							96 HR EC50: 65.4
							CONF. LIM: (56.2-76.0)



CHEMICAL: O-Ethyl-O (p-nitrophenylphenyl)phosphonothioate TEST DATE: 03/11/86

CAS NUMBER: 2104645 MF: C14H14NO4PS MWT: 323.32
 CHEMICAL SOURCE: The Foxboro Co. PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 1 mg/l Diluted (Stirred)
 ORGANISM: Fathead Minnow AGE: 30 D

***** TEST CONDITIONS *****

TEMPERATURE (C)	: 24.4 (0.49)	TANK VOLUME (L)	: 1.2
DISSOLVED OXYGEN (MG/L)	: 6.7 (0.44)	ADDITIONS (V/D)	: 12
HARDNESS (MG/L CaCO ₃)	: 44.3 (4.08)	PH	: 6.9 (0.04)
ALKALINITY (MG/L CaCO ₃)	: 44.5 (3.00)		

***** TOXICANT CONCENTRATIONS (UG/L) *****

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	180	270	422	650	1000
03/11/86	<11	52	73	113	184	290
03/12/86	<11	74	91	162	242	552
03/13/86		91	134	244	338	702
03/14/86						
03/15/86	<11	99	163	295		
AVERAGE: < 11		79	115	204	255	515
COR AVE: <9.99		71.8	105	185	231	467
PERCENT RECOVERY	110.1	(8.0)	N=4			

***** FISH SIZES *****

MEAN LENGTH (mm) :	18.9	MEAN WEIGHT (G) :	0.125
SD LENGTH (mm) :	1.268	SD WEIGHT (G) :	0.0098
		LOADING (G/L/D) :	0.1736

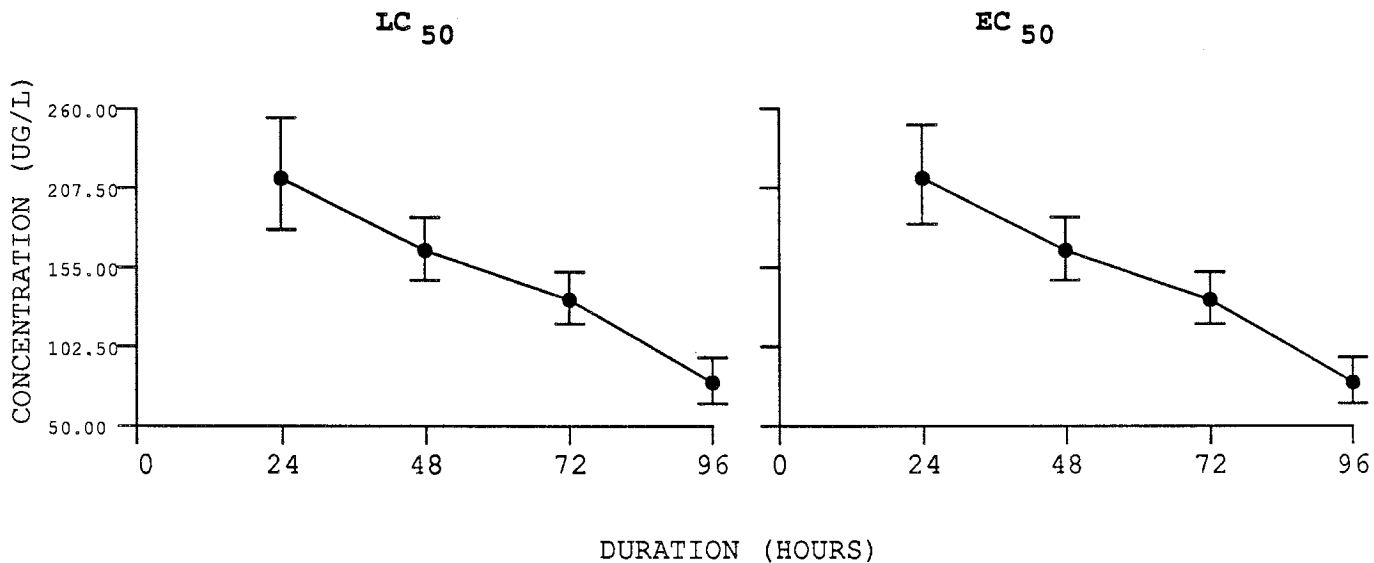
***** REMARKS *****

Affected fish lost equilibrium prior to death. Acetone was used as a solvent to increase the amount of chemical in the water. The 72-hr data were omitted due to sample contaminations. Measured concentrations were from 36 to 47% of nominal concentrations due to bioaccumulation of the chemical by the test fish.

O-Ethyl-O(p-nitrophenylphenyl)phosphonothioate

***** MORTALITIES *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				5	15	17	* (UG/L) *
48		2	11	18	20	20	* 96 HR LC50: 78.6 *
72		6	16	19	20	20	* CONF. LIM: *
96	8	15	20	20	20	20	* (64.8-95.3) *

***** EFFECT *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24				5	15	18	* (UG/L) *
48		2	11	18	20	20	* 96 HR EC50: 78.6 *
72		6	16	19	20	20	* CONF. LIM: *
96	8	15	20	20	20	20	* (64.8-95.3) *



CHEMICAL: Benzyl Sulfoxide

TEST DATE: 08/11/87

CAS NUMBER: 621089

MF: C14H14OS

MWT: 230.33

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 130 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 23.5 (0.50)	TANK VOLUME (L)	: 1.0
DISSOLVED OXYGEN (MG/L)	: 6.9 (0.28)	ADDITIONS (V/D)	: 14.4
HARDNESS (MG/L CaCO ₃)	: 44.6 (0.25)	PH	: 7.5 (0.16)
ALKALINITY (MG/L CaCO ₃)	: 40.1 (0.25)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	20.3	31.3	48.2	74.1	114
08/11/87	<1.0	16.9	23.8	30.5	57.0	88.2
08/12/87	<1.0	22.4	32.8	45.4	77.6	121
08/13/87	<1.0	22.6	34.6	48.7	76.0	123
08/14/87	<1.0	23.1	33.0	50.2	78.7	119
08/15/87						
AVERAGE:	<1.00	21.3	31.0	43.7	72.3	113
COR AVE:	<0.97	20.7	30.3	42.6	70.5	110
PERCENT RECOVERY		102.6 (3.5)	N=5			

FISH SIZES

MEAN LENGTH (mm) : 18.7
SD LENGTH (mm) : 3.097

MEAN WEIGHT (G) : 0.097
SD WEIGHT (G) : 0.0457
LOADING (G/L/D) : 0.1347

REMARKS

Affected fish were hypoactive, swam near the tank bottom and were underreactive to external stimuli. They also had convulsions, rigid musculature and lost equilibrium prior to death.

Benzyl Sulfoxide

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24					19	
48					20	
72					20	
96				4	20	

RESULTS

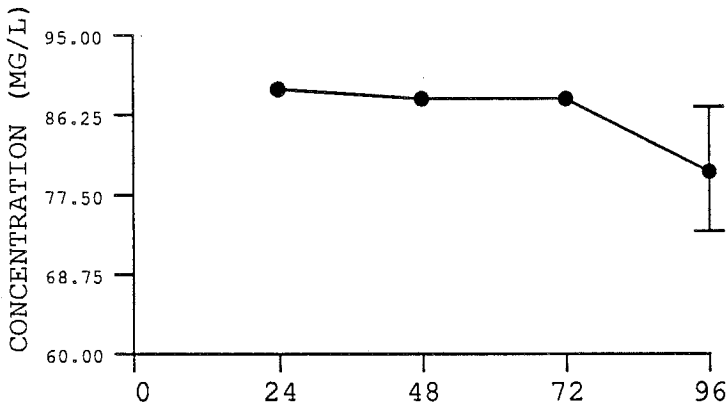
 (MG/L)
 96 HR LC50: 80.1
 CONF. LIM:
 (73.6-87.2)

***** EFFECT *****

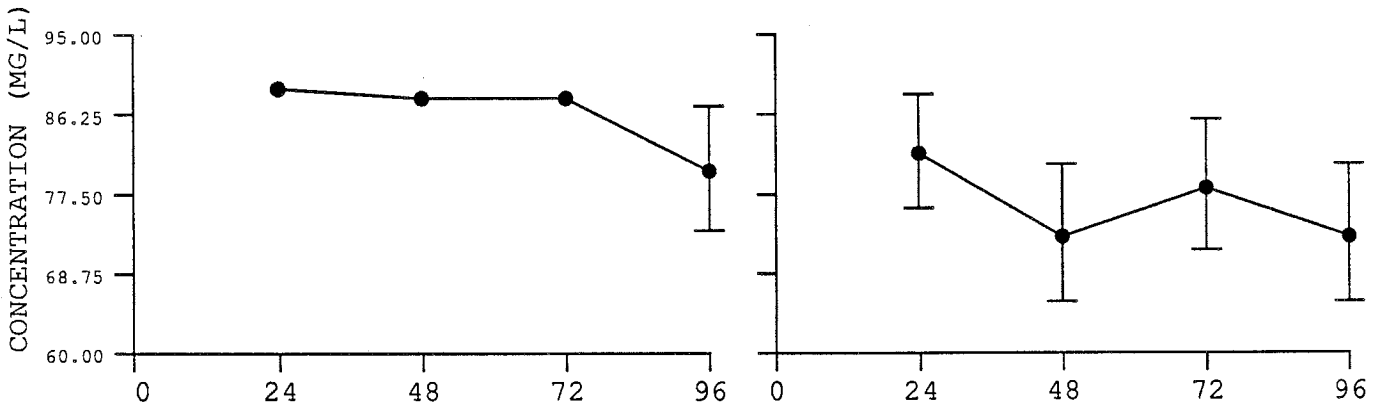
INITIAL	20	20	20	20	20
24				3	20
48				8	20
72				5	20
96				8	20

 (MG/L)
 96 HR EC50: 72.8
 CONF. LIM:
 (65.6-80.8)

LC 50



EC 50



DURATION (HOURS)

CHEMICAL: Tetrabutyltin

TEST DATE: 01/26/87

CAS NUMBER: 1461252

MF: C16H36Sn

MWT: 347.15

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 96%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 98 ug/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.3 (0.21)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.8 (0.29)	ADDITIONS (V/D)	: 40.3
HARDNESS (MG/L CaCO ₃)	: 44.3 (0.65)	PH	: 7.7 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 44.1 (2.17)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	20.0	39.0	59.0	78.0	98.0
01/26/87	<2.0	19	30	41	65	98
01/27/87	<2.0	19	37	40	78	130
01/28/87	<2.0	16	38	44	59	82
01/29/87	<3.1	19	42	54	72	99
01/30/87	<2.4	25	31	35	73	
AVERAGE:	<2.30	20	36	43	69	102
COR AVE:	<2.49	21.2	38.6	46.4	75.2	111
PERCENT RECOVERY	92.3	(3.83)	N=4			

FISH SIZES

MEAN LENGTH (mm)	: 19.7	MEAN WEIGHT (G)	: 0.109
SD LENGTH (mm)	: 0.823	SD WEIGHT (G)	: 0.0157
		LOADING (G/L/D)	: 0.1082

REMARKS

Affected fish were hyperactive, had increased respiration and lost equilibrium prior to death. Fish were exposed to 0%, 20%, 40%, 60%, 80% and 100% of the stock solution.

Tetrabutyltin

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					8	
48				10	10	
72			2	10	10	
96			8	10	10	

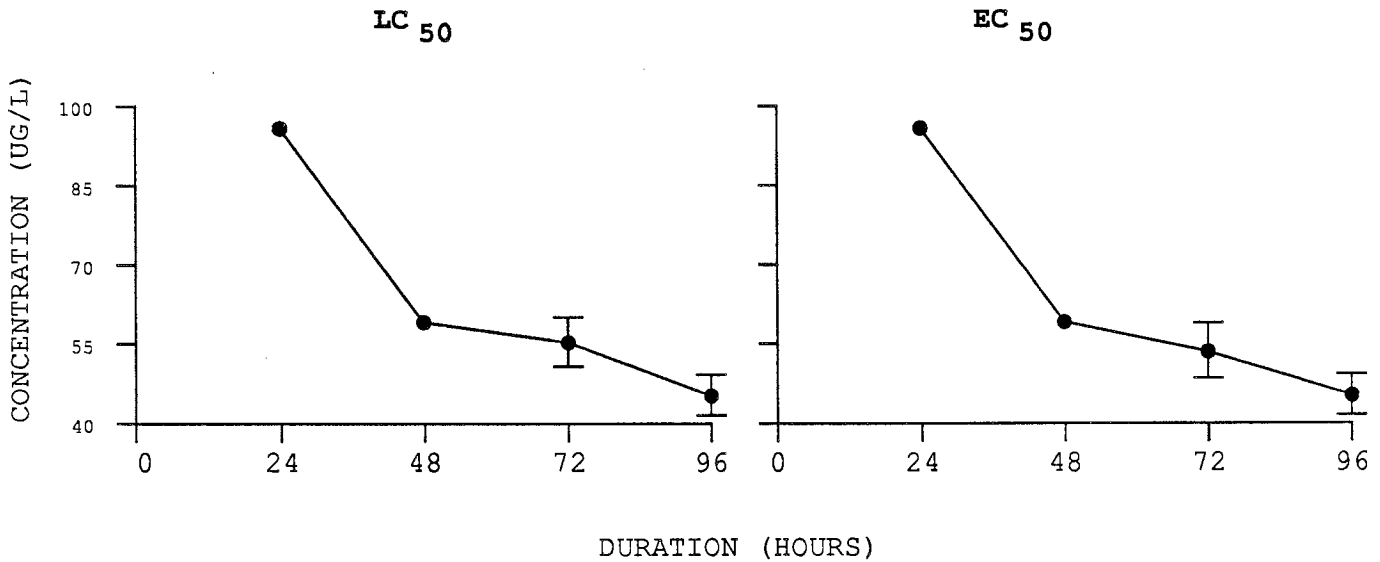
RESULTS

 (UG/L)
 96 HR LC50: 45.2
 CONF. LIM:
 (41.6-49.2)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	10	10	10	10	10	10
24					8	
48				10	10	
72			3	10	10	
96			8	10	10	

 (UG/L)
 96 HR EC50: 45.2
 CONF. LIM:
 (41.6-49.2)



CHEMICAL: 2,4,6-Tri-tert-butylphenol

TEST DATE: 09/21/87

CAS NUMBER: 732263

MF: C18H30O

MWT: 262.44

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 85 ug/l Glass Wool Column

ORGANISM: Fathead Minnow

AGE: 30-31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.3 (0.14)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 6.5 (0.40)	ADDITIONS (V/D)	: 40
HARDNESS (MG/L CaCO3)	: 45.1 (0.75)	PH	: 7.5 (0.12)
ALKALINITY (MG/L CaCO3)	: 39.6 (0.54)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	28.0	56.0	85.0		
09/21/87		15.0	29.0	75.0		
09/22/87		16.0	32.0	72.0		
09/23/87		16.0	39.0	64.0		
09/24/87	<6.0	27.0	38.0	74.0		
09/25/87	<6.0	18.0	38.0	66.0		
AVERAGE:	<6.00	18.4	35.2	70.2		
COR AVE:	<6.34	19.5	37.2	74.2		
PERCENT RECOVERY	94.6	(4.6)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 18.4	MEAN WEIGHT (G)	: 0.086
SD LENGTH (mm)	: 2.271	SD WEIGHT (G)	: 0.0335
		LOADING (G/L/D)	: 0.0860

REMARKS

Fish were exposed to 0%, 33%, 66% and 100% of the stock solution. Behavioral data were not recorded.

2,4,6-Tri-tert-butylphenol

***** MORTALITIES *****

CON	A	B	C	D	E
INITIAL 10	10	10	10		
48			6		
72			7		
96			7		

RESULTS

```

* * * * *
*
*           (UG/L)
*
*   96 HR LC50: 60.9
*
*
*   CONF. LIM:
*   (NOT REL.)
*
*
* * * * *
    
```

***** EFFECT *****

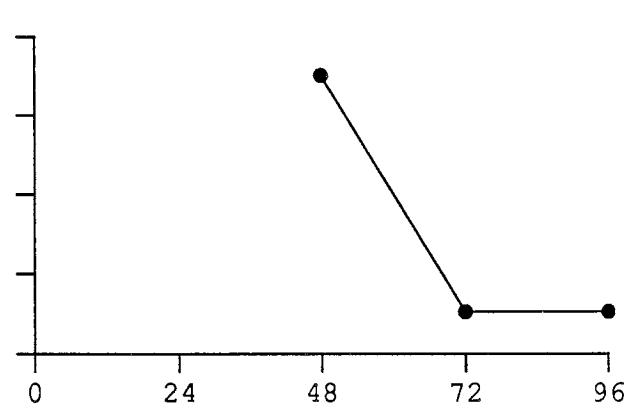
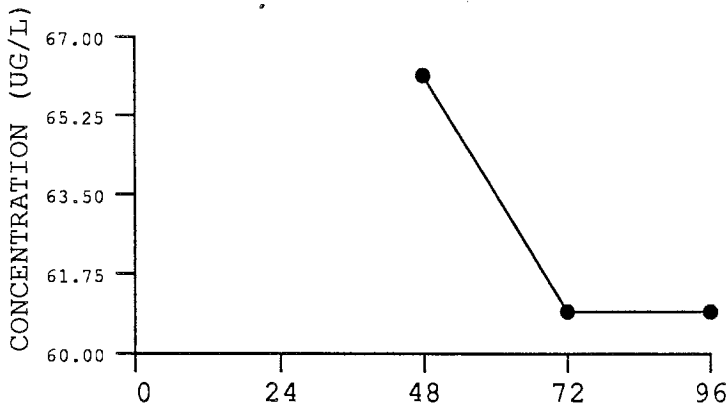
CON	A	B	C
INITIAL 10	10	10	10
48			6
72			7
96			7

```

* * * * *
*
*           (UG/L)
*
*   96 HR EC50: 60.9
*
*
*   CONF. LIM:
*   (NOT REL.)
*
*
* * * * *
    
```

LC 50

EC 50



DURATION (HOURS)

CHEMICAL: Dicumarol

TEST DATE: 03/09/87

CAS NUMBER: 66762

MF: C19H12O6

MWT: 336.30

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 37.4 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	:	24.5 (0.39)	TANK VOLUME (L)	:	2.0
DISSOLVED OXYGEN (MG/L)	:	7.2 (0.22)	ADDITIONS (V/D)	:	18
HARDNESS (MG/L CaCO ₃)	:	44.3 (0.65)	PH	:	7.8 (0.04)
ALKALINITY (MG/L CaCO ₃)	:	44.0 (0.41)			

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.33	2.05	3.15	4.85	7.46
03/09/87	<.05	1.80	2.01	2.81	4.51	7.44
03/10/87	<.05	1.67	2.10	3.04	4.57	7.51
03/11/87	<.05	1.89	2.31	3.24	4.84	7.47
03/12/87						
03/13/87	<.05	1.64	2.17	3.03	4.98	8.06
AVERAGE:	<0.05	1.75	2.15	3.03	4.73	7.62
COR AVE:	<0.05	1.73	2.13	3.00	4.68	7.54
PERCENT RECOVERY		101.0 (3.3)	N=4			

FISH SIZES

MEAN LENGTH (mm)	:	21.6	MEAN WEIGHT (G)	:	0.151
SD LENGTH (mm)	:	2.476	SD WEIGHT (G)	:	0.0422
			LOADING (G/L/D)	:	0.0671

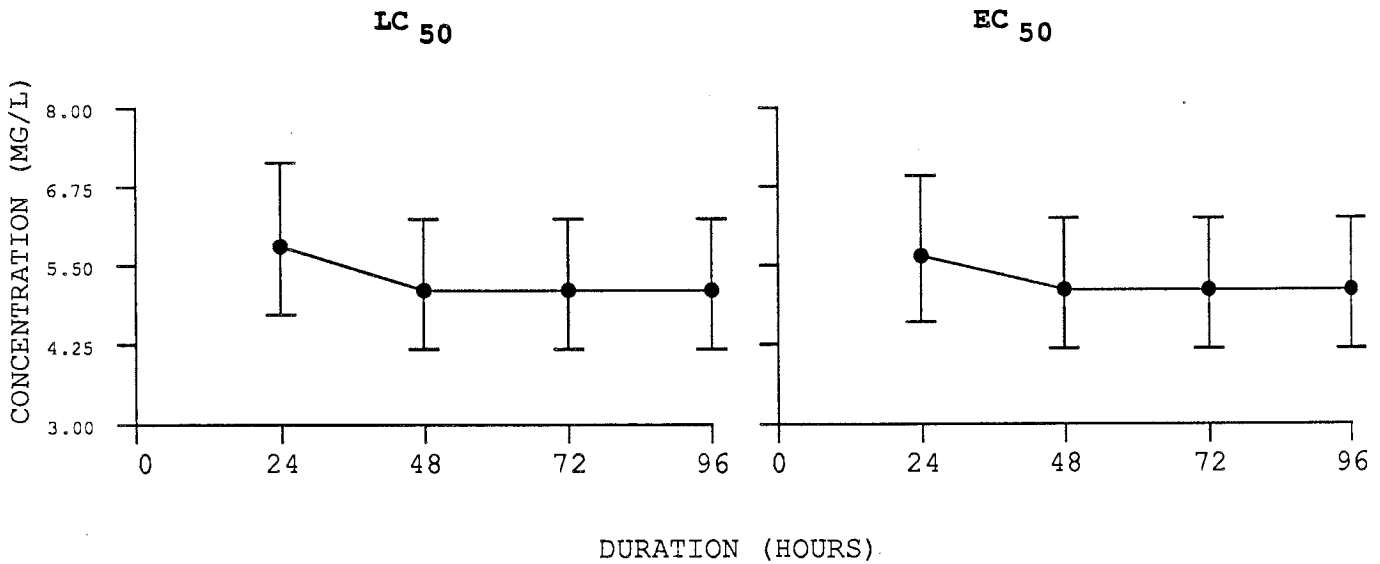
REMARKS

Affected fish lost schooling behavior, were hypoactive and overreactive to external stimuli and had increased respiration. Equilibrium loss was observed prior to death. A 20% NaOH solution was used to increase the solubility of the chemical. The pH of the stock solution was then adjusted to that of lake water using HCl. The 72-hr data were not used because the analytical standards were erroneous.

Dicumarol

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20		* * * * *
24				5	16		* * * * *
48				9	16		(MG/L)
72				9	16		* * * * *
96				9	16		96 HR LC50: 5.11
							* * * * *
							CONF. LIM:
							(4.18-6.24)
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20		* * * * *
24				6	16		* * * * *
48				9	16		(MG/L)
72				9	16		* * * * *
96				9	16		96 HR EC50: 5.11
							* * * * *
							CONF. LIM:
							(4.18-6.24)
							* * * * *



CHEMICAL: Nicotine Sulfate (Test 2)

TEST DATE: 12/09/85

CAS NUMBER: 65305

MF: C20H26N4O4S

MWT: 418.56

CHEMICAL SOURCE: Sigma Chemical Co.

PURITY:

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 40.5 g/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 48-50 D

TEST CONDITIONS

TEMPERATURE (C)	: 17.4 (0.00)	TANK VOLUME (L)	: 41
DISSOLVED OXYGEN (MG/L)	: 8.9 (1.61)	ADDITIONS (V/D)	: 7.0
HARDNESS (MG/L CaCO ₃)	: 44.3 (0.25)	PH	: 7.2 (0.16)
ALKALINITY (MG/L CaCO ₃)	: 42.3 (0.86)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E						
NOMINAL:	0	1.88	3.75	7.50	15.0	30.0						
12/09/85	<1.0	2.06	3.33	6.19	14.5	36.1						
12/10/85	<1.0	2.18	2.84	5.20	13.5	48.1						
12/11/85	<1.0	2.02	2.71	5.47	14.4	40.6						
12/12/85												
12/13/85	<1.0	2.46	3.74	6.64	12.8	27.9						
AVERAGE:	<1.00	<1.00	2.32	2.04	3.29	3.02	5.92	5.83	13.2	14.4	38.0	38.3
COR AVE:	<0.79	<0.79	1.84	1.62	2.61	2.40	4.70	4.63	10.4	11.5	30.2	30.4
PERCENT RECOVERY		126.0	(9.0)	N=8								

FISH SIZES

MEAN LENGTH (mm) : 0.0
SD LENGTH (mm) : 0.000

MEAN WEIGHT (G) : 0.000
SD WEIGHT (G) : 0.0000
LOADING (G/L/D) : 0.0000

REMARKS

Analysis performed by the Sigma Chemical Company in 1978 on this lot number (38C0395) of nicotine sulfate produced the following purity results: 45% nicotine base and 58% nicotine sulfate. In 1988, the nicotine base purity found by the company was 22%. Since the test was conducted in 1985, the nicotine base purity was between 45% and 22%. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.17 g. Analytical determinations were not made at 72 hr. The tank volume ranged from 40-42 L.

CHEMICAL: Strychnine Hemisulphate Salt

TEST DATE: 06/15/87

CAS NUMBER: 60413

MF: See remarks

MWT: 383.50

CHEMICAL SOURCE: Sigma Chemical Co.

PURITY: 89%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 18.1 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.0 (0.24)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.2 (0.22)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 44.9 (0.25)	PH	: 7.4 (0.02)
ALKALINITY (MG/L CaCO ₃)	: 45.1 (0.48)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.57	0.87	1.34	2.07	3.20
06/15/87	<.04	0.43	0.62	0.83	1.15	1.64
06/16/87	<.09	0.43	0.58	0.91	1.29	1.82
06/17/87	<.05	0.49	0.64	0.91	1.25	1.81
06/18/87	<.04	0.44	0.63	0.88	1.17	1.80
06/19/87	<.09	0.52	0.69	0.99	1.34	1.91
AVERAGE:	<0.06	0.46	0.63	0.90	1.24	1.80
COR AVE:	<0.06	0.48	0.66	0.94	1.29	1.86
PERCENT RECOVERY	96.4	(15.0)	N=10			

FISH SIZES

MEAN LENGTH (mm)	: 16.9	MEAN WEIGHT (G)	: 0.077
SD LENGTH (mm)	: 3.575	SD WEIGHT (G)	: 0.0587
		LOADING (G/L/D)	: 0.0428

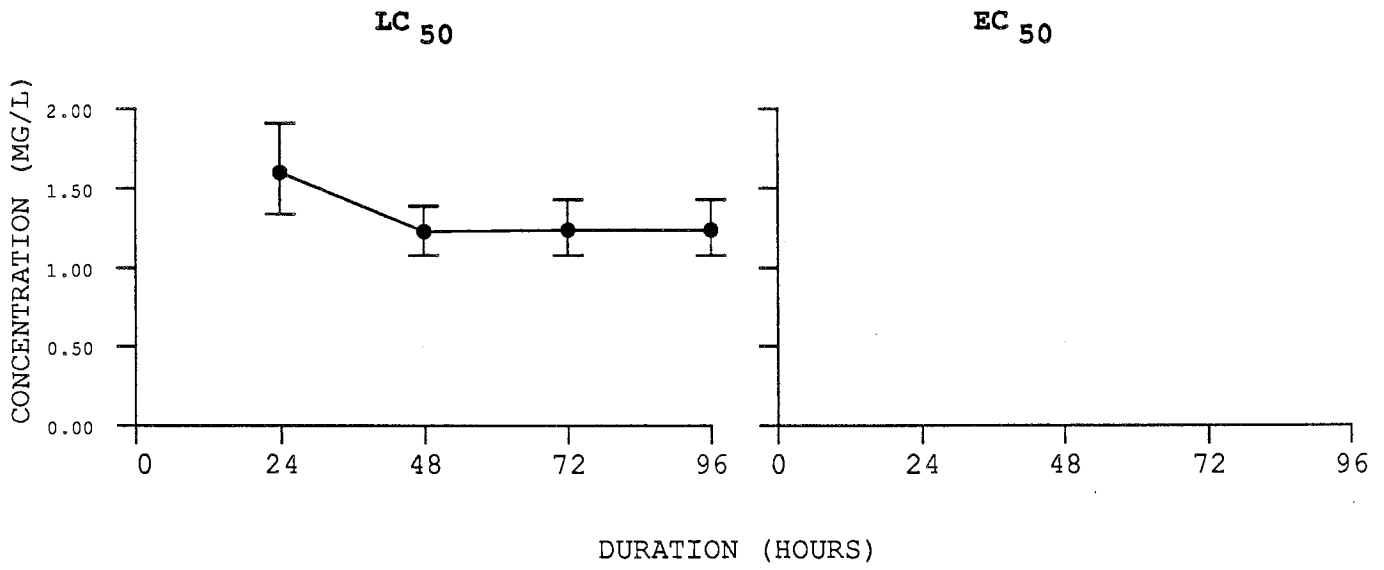
REMARKS

Affected fish lost schooling behavior, were hypoactive, had increased respiration and convulsions. They were also hemorrhaging, had spinal deformities and lost equilibrium prior to death. An EC50 value could not be calculated due to an effect at all concentrations for all observation periods. The reduced purity was caused by waters of hydration. Molecular formula is: C₂₁H₂₂N₂O₂ · 1/2 (H₂SO₄).

Strychnine Hemisulphate Salt

***** MORTALITIES *****							RESULTS
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24		3	3	8	15		* (MG/L) *
48	1	5	3	13	20		* 96 HR LC50: 1.11 *
72	2	5	3	13	20		* CONF. LIM: *
96	2	5	3	13	20		* (0.96-1.27) *

***** EFFECT *****							
HR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24	13	20	20	20	20	20	* (MG/L) *
48	16	20	20	20	20	20	* 96 HR EC50: <0.48 *
72	20	20	20	20	20	20	* CONF. LIM: *
96	20	20	20	20	20	20	* (NOT REL.) *



CHEMICAL: Resmethrin

TEST DATE: 07/13/87

CAS NUMBER: 10453868

MF: C22H26O3

MWT: 338.48

CHEMICAL SOURCE: Fairfield American Corp.

PURITY: 88.8%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 26.2 ug/l Glass Wool Column

ORGANISM: Fathead Minnow

AGE: 31 D

TEST CONDITIONS

TEMPERATURE (C)	:	23.8 (0.42)	TANK VOLUME (L)	:	2.0
DISSOLVED OXYGEN (MG/L)	:	7.1 (0.23)	ADDITIONS (V/D)	:	18
HARDNESS (MG/L CaCO ₃)	:	44.9 (0.25)	PH	:	7.5 (0.04)
ALKALINITY (MG/L CaCO ₃)	:	41.3 (0.64)			

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	3.43	5.28	8.12	12.5	19.2
07/13/87	<.04	1.56	1.93	3.69	6.83	10.4
07/14/87	<.06	1.80	2.79	4.56	7.74	12.0
07/15/87	<.07	2.01	2.83	5.09	8.57	13.4
07/16/87	<0.2	2.11	3.26	5.47	8.53	13.7
07/17/87	<0.2	2.04	3.16	5.51	9.12	14.5
AVERAGE:	<0.11	1.90	2.79	4.86	8.16	12.8
COR AVE:	<0.12	2.05	3.00	5.23	8.77	13.8
PERCENT RECOVERY	93.0	(4.1)	N=5			

FISH SIZES

MEAN LENGTH (mm)	:	17.0	MEAN WEIGHT (G)	:	0.075
SD LENGTH (mm)	:	3.034	SD WEIGHT (G)	:	0.0451
			LOADING (G/L/D)	:	0.0417

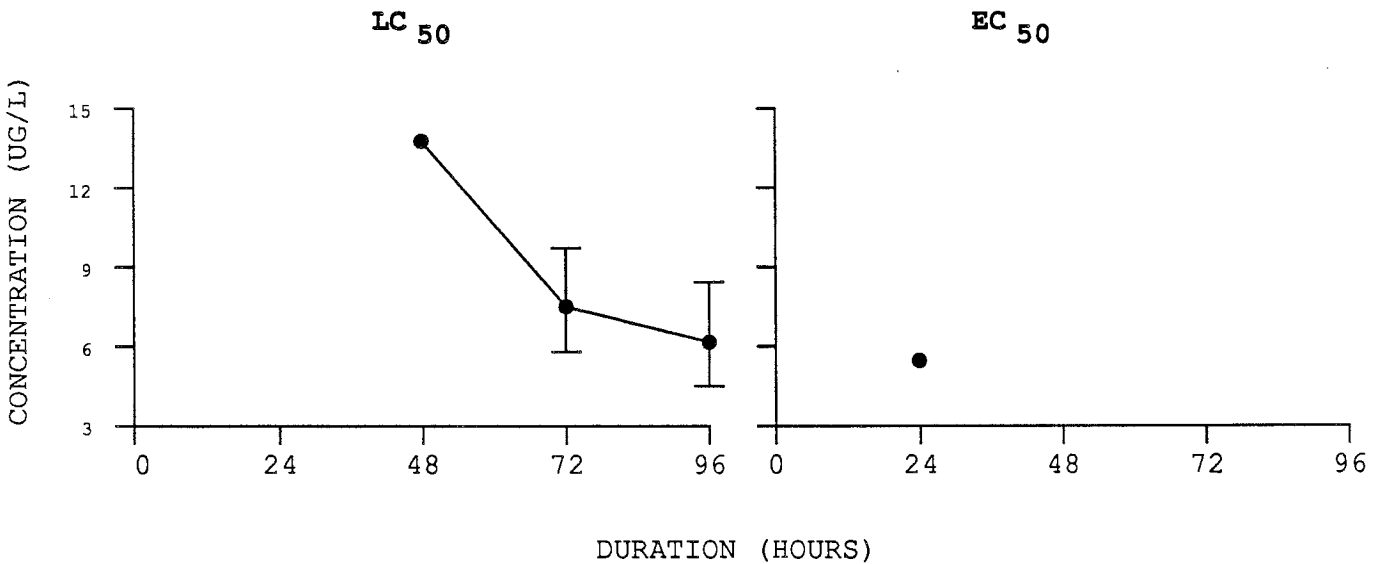
REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, swam near the tank surface and had rigid musculature. They also had edema, spinal deformities and were darkly colored. Equilibrium loss was observed prior to death. An EC50 value could not be calculated due to an effect in all concentrations for all observation periods. Nominal concentrations varied from the measured concentrations because the chemical was adherent to glassware.

Resmethrin

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	15	20	20	20	20	* * * * *
24		1	5	5	7	9	* * * * *
48		2	5	5	7	10	* (UG/L) *
72		2	5	5	10	17	* * * * *
96		4	5	8	13	19	* 96 HR LC50: 6.16 *
							* CONF. LIM: *
							* (4.50-8.43) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	15	20	20	20	20	* * * * *
24		15	5	5	20	20	* (UG/L) *
48		15	20	20	7	10	* * * * *
72		15	20	20	20	20	* 96 HR EC50: <2.05 *
96		15	20	20	20	20	* CONF. LIM: *
							* (NOT REL.) *
							* * * * *



CHEMICAL: Rotenone (Test 2)

TEST DATE: 03/24/86

CAS NUMBER: 83794

MF: C23H22O6

MWT: 394.42

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: High Performance Liquid Chromatography

TOXICANT STOCK: 388 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 35-45 D

TEST CONDITIONS

TEMPERATURE (C)	: 17.3 (0.07)	TANK VOLUME (L)	: 41
DISSOLVED OXYGEN (MG/L)	: 9.2 (0.63)	ADDITIONS (V/D)	: 7.0
HARDNESS (MG/L CaCO ₃)	: 44.7 (0.01)	PH	: 7.5 (0.19)
ALKALINITY (MG/L CaCO ₃)	: 42.5 (0.25)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E						
NOMINAL:	0	3.1	6.2	12.5	25.0	50.0						
03/24/86												
03/25/86	<1.0	2.5	4.2	9.9	20.5	42.1						
03/26/86	<1.0	2.5	4.2	8.3	19.3	38.8						
03/27/86	<1.0	2.5	4.1	10.3	21.1	38.2						
03/28/86	<1.0	2.4	4.6	9.2	17.5	41.9						
AVERAGE:	<1.00	<1.00	2.50	2.45	4.15	4.40	10.1	8.75	20.8	18.4	40.2	40.4
COR AVE:	<0.93	<0.93	2.31	2.27	3.84	4.07	9.34	8.09	19.2	17.0	37.1	37.3
PERCENT RECOVERY	108.1	(3.0)	N=4									

FISH SIZES

MEAN LENGTH (mm) : 0.0
SD LENGTH (mm) : 0.000

MEAN WEIGHT (G) : 0.000
SD WEIGHT (G) : 0.0000
LOADING (G/L/D) : 0.0000

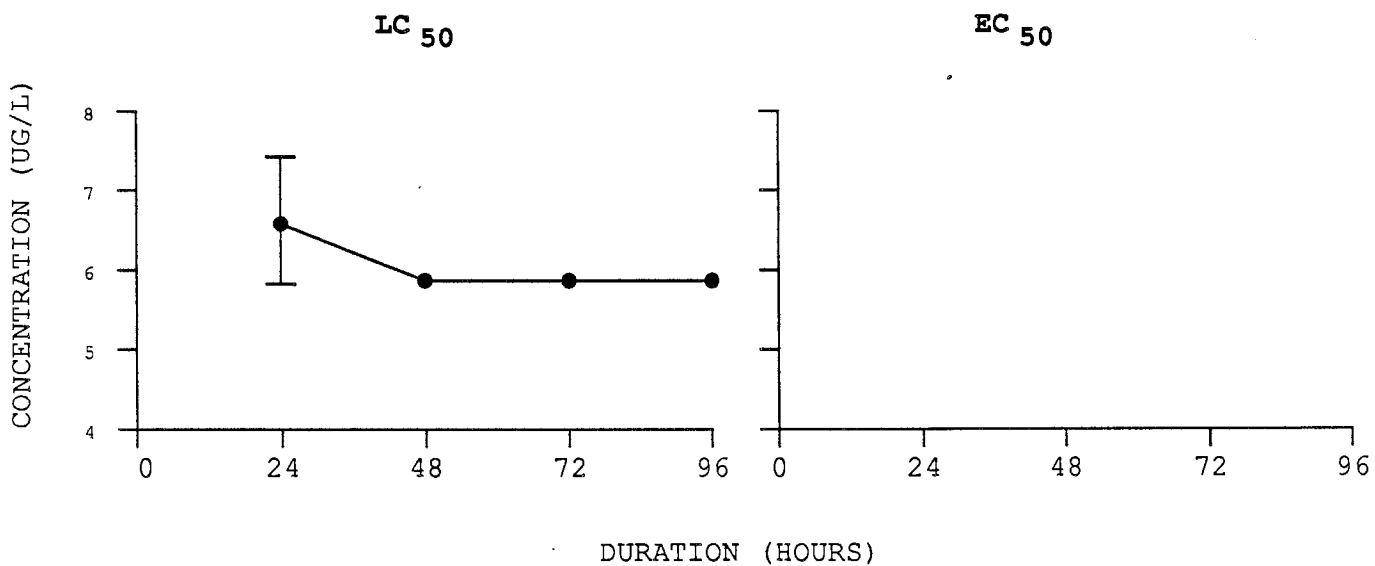
REMARKS

Affected fish lost equilibrium prior to death. Effect data were not recorded. Individual lengths and weights of the test fish were not recorded; however, the calculated mean weight was 0.18 g. Samples were not taken at 0 hr for determination of toxicant concentrations. The chemical was dissolved in dimethylformamide (DMF) to increase the amount of test chemical in the stock solution. The tank volume ranged from 40-42 L.

Rotenone (Test 2)

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24			17	20	20		* * * * *
48			20	20	20		* (UG/L) *
72			20	20	20		* * * * *
96			20	20	20		* 96 HR LC50: 6.0 *
							* CONF. LIM: *
							* (NOT REL.) *
							* * * * *

***** EFFECT *****							
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24							* * * * *
48							* (UG/L) *
72							* * * * *
96							* 96 HR EC50: NOT DET. *
							* CONF. LIM: *
							* () *
							* * * * *



CHEMICAL: Tetraphenyltin

TEST DATE: 03/23/87

CAS NUMBER: 595904

MF: C24H20Sn

MWT: 427.11

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 97%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 2.87 ug/l Glass Wool Column

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.6 (0.11)	TANK VOLUME (L)	: 0.25
DISSOLVED OXYGEN (MG/L)	: 7.7 (0.21)	ADDITIONS (V/D)	: 28.8
HARDNESS (MG/L CaCO3)	: 45.0 (0.00)	PH	: 7.8 (0.00)
ALKALINITY (MG/L CaCO3)	: 44.0 (0.00)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:						
03/23/87						3.68
03/24/87						2.37
03/25/87						3.05
03/26/87						3.21
03/27/87						2.04
AVERAGE:	<					2.87
COR AVE:	<0.00					3.07
PERCENT RECOVERY	93.4	(0.6)	N=3			

FISH SIZES

MEAN LENGTH (mm)	: 19.2	MEAN WEIGHT (G)	: 0.104
SD LENGTH (mm)	: 0.837	SD WEIGHT (G)	: 0.0146
		LOADING (G/L/D)	: 0.0722

REMARKS

This test was run using the single-cell toxicity screening system at a mean concentration of 3.07 ug/l. No mortalities occurred nor were the fish stressed during the test.

Tetraphenyltin

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL					5	
24					0	
48					0	
72					0	
96					0	

RESULTS

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* * * * *
*
*           (UG/L)
*
*   96 HR LC50: NOT CAL.
*
*
*   CONF. LIM:
*   (           )
*
*
* * * * *

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***** EFFECT *****

INITIAL	5
24	0
48	0
72	0
96	0

```

* * * * *
*
*           (UG/L)
*
*   96 HR EC50: NOT CAL.
*
*
*   CONF. LIM:
*   (           )
*
*
* * * * *

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CHEMICAL: Dioctyl Phthalate

TEST DATE: 08/18/83

CAS NUMBER: 117817

MF: C24H38O4

MWT: 390.56

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 98%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 0.38 mg/l Liq-liq Equil

ORGANISM: Fathead Minnow

AGE: 34 D

TEST CONDITIONS

TEMPERATURE (C)	: 25.0 (0.20)	TANK VOLUME (L)	: 0.20
DISSOLVED OXYGEN (MG/L)	: 6.3 (0.29)	ADDITIONS (V/D)	: 50
HARDNESS (MG/L CaCO ₃)	: 44.0 (0.00)	PH	: 7.4 (0.00)
ALKALINITY (MG/L CaCO ₃)	: 49.5 (0.00)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
------	---------	---	---	---	---	---

NOMINAL:

08/18/83						.212
08/19/83						.584
08/20/83						.184
08/21/83						
08/22/83						

AVERAGE: <

0.33

COR AVE: <0.00

0.39

PERCENT RECOVERY 84.8 (16.6) N=3

FISH SIZES

MEAN LENGTH (mm)	: 17.0	MEAN WEIGHT (G)	: 0.055
SD LENGTH (mm)	: 1.275	SD WEIGHT (G)	: 0.0157
		LOADING (G/L/D)	: 0.0275

REMARKS

The test was run using the single-cell toxicity screening system and a near saturated (0.385 mg/l) solution of the chemical. No mortalities occurred nor were the fish stressed during the test.

CHEMICAL: Bis(tributyltin) Oxide

TEST DATE: 06/30/86

CAS NUMBER: 56359

MF: C24H54OSn2

MWT: 596.08

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 96%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 3.7 mg/l Diluted (Stirred)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.0 (0.87)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.5 (0.14)	ADDITIONS (V/D)	: 14.0
HARDNESS (MG/L CaCO3)	: 51.5 (0.71)	PH	: 7.5 (0.05)
ALKALINITY (MG/L CaCO3)	: 41.1 (0.74)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	1.4	2.9	5.8	11.6	23.1
06/30/86	1.1 <0.5	1.8 1.7	2.3 2.3	3.0 4.0	6.4 6.5	11.6 11.3
07/01/86						
07/02/86	<0.5 <0.5	1.8 2.0	2.7 2.9	4.1 4.8	8.5 9.8	15.6 16.8
07/03/86	<0.5 <0.5	1.6	2.5	4.6	9.5	17.6
07/04/86	<0.5 <0.5	1.4 1.5	2.5 2.4	4.2 4.7	8.9 10.9	16.5 18.2
AVERAGE:	<0.70 <0.50	1.65 1.73	2.50 2.53	3.77 4.53	7.93 9.18	14.6 16.0
COR AVE:	<0.65 <0.47	1.53 1.61	2.33 2.35	3.50 4.21	7.38 8.53	13.6 14.9
PERCENT RECOVERY	107.5	(23.6)	N=7			

FISH SIZES

MEAN LENGTH (mm)	: 16.1	MEAN WEIGHT (G)	: 0.065
SD LENGTH (mm)	: 2.852	SD WEIGHT (G)	: 0.0446
		LOADING (G/L/D)	: 0.0464

REMARKS

The 24-hr samples were not analyzed due to instrument problems. Behavioral observations were not recorded.

Bis(tributyltin) Oxide

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24	20	20	20	20	20	20
48	2	2	5	11	20	20
72	2	3	6	18	20	20
96	3	4	6	20	20	20

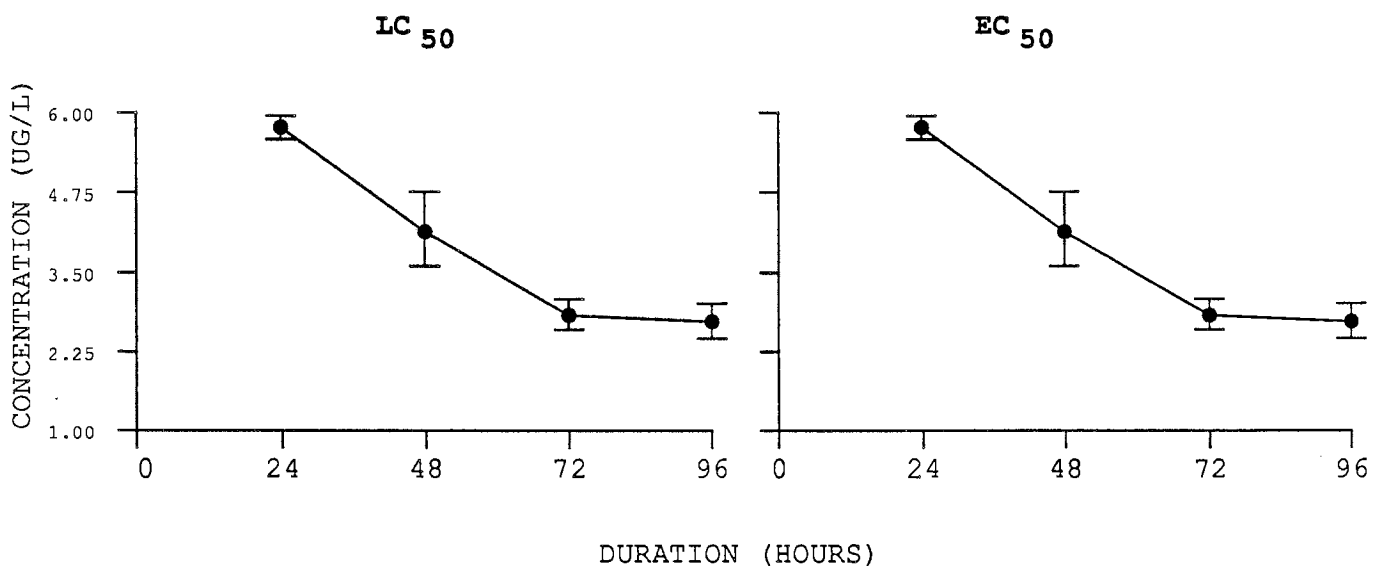
RESULTS

 (UG/L)
 96 HR LC50: 2.7
 CONF. LIM:
 (2.4- 3.0)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24	20	20	20	20	20	20
48	2	2	5	11	20	20
72	2	3	6	18	20	20
96	3	4	6	20	20	20

 (UG/L)
 96 HR EC50: 2.7
 CONF. LIM:
 (2.4- 3.0)



CHEMICAL: Fenvalerate (Test 2)

TEST DATE: 07/27/87

CAS NUMBER: 51630581

MF: C25H22ClNO3

MWT: 419.93

CHEMICAL SOURCE: Shell Development Co.

PURITY: 93.5%

METHOD OF CHEMICAL ANALYSIS: Gas-Liquid Chromatography

TOXICANT STOCK: 4.67 ug/l Glass Wool Column

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.5 (0.26)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 7.3 (0.14)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO3)	: 44.8 (0.54)	PH	: 7.8 (0.01)
ALKALINITY (MG/L CaCO3)	: 40.9 (0.30)		

TOXICANT CONCENTRATIONS (UG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	0.20	0.31	0.48	0.73	1.13
07/27/87	<.01	.184	.251	.402	.525	.742
07/28/87	<.01	.157	.240	.327	.538	.900
07/29/87	<.06	.186	.251	.366	.657	.884
07/30/87	<.08	.186	.268	.423	.674	.930
07/31/87	<.05	.226	.293	.491	.770	1.16
AVERAGE:	<0.04	0.19	0.26	0.40	0.63	0.92
COR AVE:	<0.04	0.18	0.25	0.39	0.61	0.89
PERCENT RECOVERY	104	(8.7)	N=5			

FISH SIZES

MEAN LENGTH (mm)	: 20.1	MEAN WEIGHT (G)	: 0.121
SD LENGTH (mm)	: 2.198	SD WEIGHT (G)	: 0.0438
		LOADING (G/L/D)	: 0.0672

REMARKS

Affected fish lost schooling behavior, were hyperactive and overreactive to external stimuli, had increased respiration and rigid musculature. They also had convulsions and lost equilibrium prior to death.

Fenvalerate (Test 2)

***** MORTALITIES *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				6	16	
48			1	17	20	
72			2	20	20	
96			6	20	20	

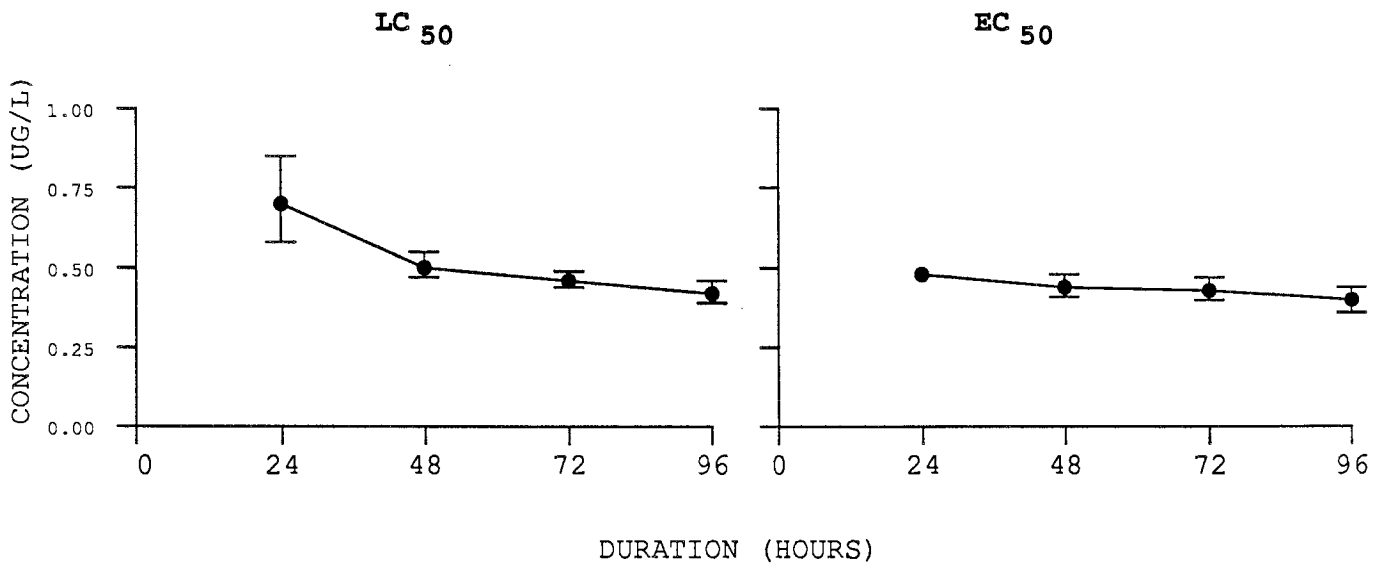
RESULTS

 (UG/L)
 96 HR LC50: 0.42
 CONF. LIM:
 (0.39-0.46)

***** EFFECT *****

HOUR	CON	A	B	C	D	E
INITIAL	20	20	20	20	20	20
24				20	20	
48			4	20	20	
72			5	20	20	
96		1	8	20	20	

 (UG/L)
 96 HR EC50: 0.40
 CONF. LIM:
 (0.36-0.44)



CHEMICAL: Sodium Azide

TEST DATE: 06/29/87

CAS NUMBER: 26628228

MF: NaN₃

MWT: 65.01

CHEMICAL SOURCE: Aldrich Chemical Co.

PURITY: 99%

METHOD OF CHEMICAL ANALYSIS: Analytical Method Not Developed

TOXICANT STOCK: 103 mg/l Diluted (Blended)

ORGANISM: Fathead Minnow

AGE: 30 D

TEST CONDITIONS

TEMPERATURE (C)	: 24.2 (0.15)	TANK VOLUME (L)	: 2.0
DISSOLVED OXYGEN (MG/L)	: 6.7 (0.38)	ADDITIONS (V/D)	: 18
HARDNESS (MG/L CaCO ₃)	: 45.0 (0.41)	PH	: 7.5 (0.00)
ALKALINITY (MG/L CaCO ₃)	: 51.3 (4.66)		

TOXICANT CONCENTRATIONS (MG/L)

DATE	CONTROL	A	B	C	D	E
NOMINAL:	0	2.80	4.31	6.63	10.2	15.7
06/29/87	0	2.80	4.31	6.63	10.2	15.7
06/30/87						
07/01/87						
07/02/87						
07/03/87						
AVERAGE: <0.00		2.80	4.31	6.63	10.2	15.7
COR AVE: <0.00		2.80	4.31	6.63	10.2	15.7
PERCENT RECOVERY	100	(0.0)	N=0			

FISH SIZES

MEAN LENGTH (mm) : 18.8
SD LENGTH (mm) : 1.743

MEAN WEIGHT (G) : 0.098
SD WEIGHT (G) : 0.0303
LOADING (G/L/D) : 0.0544

REMARKS

Affected fish lost schooling behavior, were hypoactive and underreactive to external stimuli, had increased respiration and lost equilibrium prior to death. An analytical method was not developed for this chemical; therefore, nominal concentrations were used. Increased alkalinity values were due to a reaction between the titrant and toxicant.

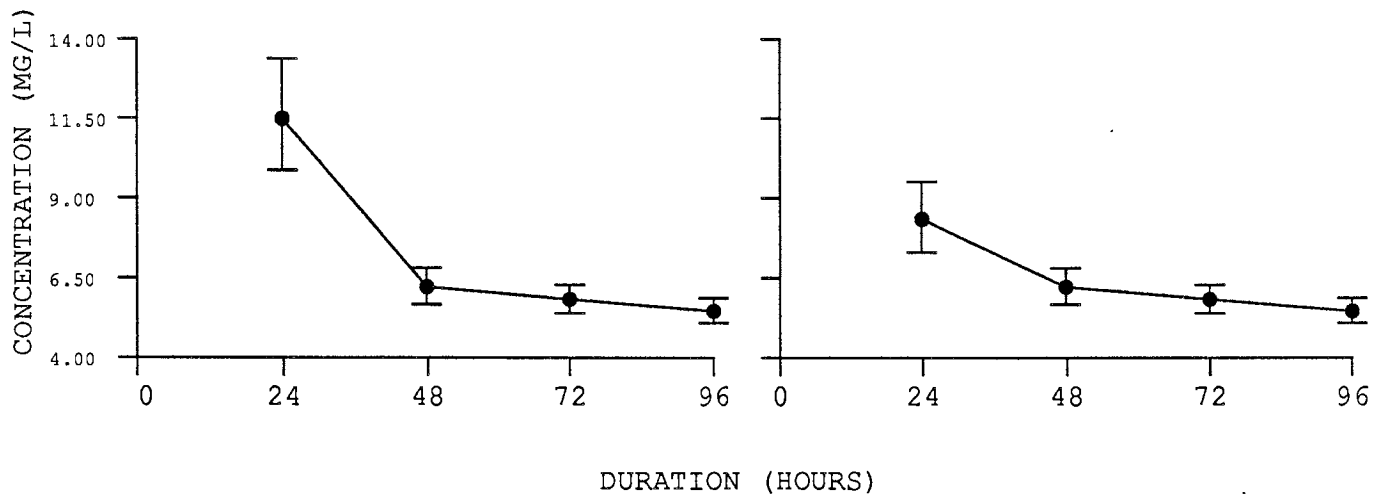
Sodium Azide

***** MORTALITIES *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24					7	17	* * * * *
48				13	20	20	(MG/L)
72				16	20	20	* * * * *
96		1	18	20	20	20	96 HR LC50: 5.46
							CONF. LIM: (5.09-5.87)
							* * * * *

***** EFFECT *****							RESULTS
HOUR	CON	A	B	C	D	E	
INITIAL	20	20	20	20	20	20	* * * * *
24			4	16	18		* * * * *
48			13	20	20		(MG/L)
72			16	20	20		* * * * *
96		1	18	20	20		96 HR EC50: 5.46
							CONF. LIM: (5.09-5.87)
							* * * * *

LC 50

EC 50



APPENDICES

ALPHABETICAL INDEX TO CONTENTS OF VOLUMES 1, 2, 3, 4 AND 5

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
* ABIETIC ACID	2	319
ACENAPHTHENE	2	253
* ACETALDOXIME	5	35
2-ACETAMIDOPHENOL #1	1	285
2-ACETAMIDOPHENOL #2	1	287
3-ACETAMIDOPHENOL	1	289
4-ACETAMIDOPHENOL	1	291
ACETONE #1	1	51
ACETONE #2	1	53
ACETONE #3	1	55
ACETONE OXIME	5	57
ACETONITRILE	1	27
ACETOPHENONE	1	271
2-ACETYL-1-METHYLPYRROLE	1	237
* 4-ACETYL PYRIDINE	3	159
* ACROLEIN #1	4	41
* ACROLEIN #2	5	47
ACRYLAMIDE	5	53
* 1-ADAMANTANAMINE	3	251
ADAMANTANE	3	249
* 2-ADAMANTANONE	3	241
ALACHLOR	3	291
* ALDICARB	5	177
ALLYL ALCOHOL	5	55
N-ALLYLANILINE	1	335
ALLYL CYANIDE	1	87
ALLYL ISOTHIOCYANATE	5	65
* ALLYL METHACRYLATE	3	171
2-ALLYLPHENOL	2	201
3'-AMINOACETOPHENONE	1	283
(also: M-AMINOACETOPHENONE)		
* 2-AMINO-5-BROMOPYRIDINE	3	77
AMINOCARB	5	231
2-AMINO-5-CHLOROBENZONITRILE	1	205
* 2-AMINO-4'-CHLOROBENZOPHENONE	2	281
* 2-AMINO-4-CHLORO-6-METHYLPYRIMIDINE #1	3	83
* 2-AMINO-4-CHLORO-6-METHYLPYRIMIDINE #2	3	85
* 3-AMINO-5,6-DIMETHYL-1,2,4-TRIAZINE	3	87
* 2-AMINOETHANOL	5	39
* 1-(2-AMINOETHYL)PIPERAZINE	3	151

* Changes in behavior and morphology are described in Drummond and Russom (1990).

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
2-(2-AMINOETHYL)PYRIDINE	5	169
4-AMINO-2-NITROPHENOL	2	111
1-AMINO-2-PROPANOL	1	77
* 4'-AMINOPROPIOPHENONE	5	205
* AMOBARBITAL	4	253
* AMPHETAMINE SULFATE	4	321
* AMYLAMINE	3	103
AMYLBENZENE	3	259
* ANILINE #1	1	155
* ANILINE #2	5	119
* ANILINE #3	5	121
ANTHRANILAMIDE	1	235
ANTHRAQUINONE	4	297
L-ARABINOSE	5	81
AZINPHOS-METHYL	5	221
* BENZALDEHYDE #1	1	225
* BENZALDEHYDE #2	2	155
BENZAMIDE	2	161
* BENZENE #1	5	109
* BENZENE #2	5	111
* 2,3-BENZOFURAN	4	163
BENZOIC ACID, SODIUM SALT	2	139
BENZOPHENONE #1	1	391
BENZOPHENONE #2	1	393
BENZOTHIAZOLE	5	149
* 1-BENZOYLACETONE	5	217
* 4-BENZOYLPYRIDINE	3	269
* BENZYLAMINE	5	161
* BENZYL-TERT-BUTANOL	4	247
* BENZYL METHACRYLATE	3	255
3-BENZYLOXYANILINE	1	401
* 1-BENZYLPIPERAZINE	3	261
1-BENZYLPIRIDINIUM 3-SULFONATE	3	283
* BENZYL SULFOXIDE	5	255
* BENZYLTRIETHYLAMMONIUM CHLORIDE	4	293
* 1,4-BIS(3-AMINOPROPYL)PIPERAZINE	5	229
* N,N-BIS(2,2-DIETHOXYETHYL)METHYLAMINE #1	3	285
* N,N-BIS(2,2-DIETHOXYETHYL)METHYLAMINE #2	3	287
1,2-BIS(4-PYRIDYL)ETHANE	3	271
BIS(TRIBUTYLTIN) OXIDE	5	275
* [(1S)-ENDO]-(-)-BORNEOL #1	4	225
* [(1S)-ENDO]-(-)-BORNEOL #2	4	227
BROMACIL	4	201
4-BROMOANILINE	1	149
(also: P-BROMOANILINE)		
* 3-BROMOBENZAMIDE	2	145
(also: M-BROMOBENZAMIDE)		
* 1-BROMOBUTANE	4	59
* [(1R)-ENDO]-(+)-3-BROMOCAMPHOR	4	221
2-BROMO-2',5'-DIMETHOXYACETOPHENONE #1	1	357
(also: A-BROMO-2',5'-DIMETHOXYACETOPHENONE #1)		

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
2-BROMO-2',5'-DIMETHOXYACETOPHENONE #2 (also: A-BROMO-2',5'-DIMETHOXYACETOPHENONE #2)	2	217
2-BROMO-2',5'-DIMETHOXYACETOPHENONE #3 (also: A-BROMO-2',5'-DIMETHOXYACETOPHENONE #3)	4	217
4-BROMO-2',4'-DINITRODIPHENYL ETHER	2	245
1-BROMOHEPTANE	4	153
1-BROMOHEXANE	4	125
* 2-(BROMOMETHYL)TETRAHYDRO-2H-PYRAN	4	111
1-BROMOOCTANE	4	177
* 4-BROMOPHENYL 3-PYRIDYL KETONE	3	267
* 1-BROMOPROPANE	4	45
2-BROMO-3-PYRIDINOL	3	67
5-BROMOSALICYLALDEHYDE	1	203
* 3-BROMOTHIOPHENE	4	47
5-BROMOVANILLIN	1	263
BUTANAL #1	1	95
BUTANAL #2	1	97
1-BUTANOL	1	107
* (±)-2-BUTANOL	3	57
2-BUTANONE	1	99
2-BUTANONE OXIME	1	105
BUTYL ACETATE	1	175
TERT-BUTYL ACETATE	5	131
* BUTYLAMINE	3	63
* (+-)-SEC-BUTYLAMINE	5	73
* 4-BUTYLANILINE	3	243
* 4-(TERT-BUTYL)BENZAMIDE (also: P-(TERT-BUTYL)BENZAMIDE)	2	235
2-SEC-BUTYL-4,6-DINITROPHENOL #1	2	221
2-SEC-BUTYL-4,6-DINITROPHENOL #2	2	223
* TERT-BUTYL DISULFIDE (also: t-BUTYL DISULFIDE)	2	191
a,w-BUTYLENE DI-[O-(4-HYDROXYBUTOXYCARBONYL)]BENZOATE	4	337
BUTYL ETHER	4	179
TERT-BUTYL METHYL ETHER	4	75
4-TERT-BUTYLPHENOL (also: P-TERT-BUTYLPHENOL)	2	227
* 3-(4-TERT-BUTYLPHENOXY)BENZALDEHYDE	2	313
* BUTYL PHENYL ETHER	5	223
4-(TERT-BUTYL)-PHENYL-N-METHYLCARBAMATE (also: P-(TERT-BUTYL)-PHENYL-N-METHYLCARBAMATE)	1	377
* TERT-BUTYLSTYRENE (also: t-BUTYLSTYRENE)	2	269
BUTYL SULFIDE (also: N-BUTYL SULFIDE)	1	317
TERT-BUTYL SULFIDE	4	185
* 2-BUTYNE-1,4-DIOL	4	55
* 2-BUTYN-1-OL	4	53
* 3-BUTYN-1-OL	3	53
* DL-3-BUTYN-2-OL	3	55
* CAFFEINE	4	167
* (1S)-(-)-CAMPHOR	5	227

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
* CARBARYL #1	4	265
* CARBARYL #2	4	267
* CARBARYL #3	4	269
* CARBARYL #4	4	271
CARBOFURAN	5	241
CARBON TETRACHLORIDE	5	27
* 1-(CARBOXYMETHYL)PYRIDINIUM CHLORIDE	4	143
* CATECHOL	5	117
CHLOROACETONITRILE	1	21
* 2-CHLOROANILINE #1	1	151
* 2-CHLOROANILINE #2	3	121
* 4-CHLOROANILINE	4	97
4-CHLOROBENZALDEHYDE	1	207
* CHLOROBENZENE	5	105
* 4-CHLOROCATECHOL	2	101
* 3-CHLORO-2-CHLOROMETHYL-1-PROPENE	3	51
2-CHLOROETHANOL #1	1	31
2-CHLOROETHANOL #2	1	33
2-CHLOROETHANOL #3	2	43
2-CHLOROETHANOL #4	3	35
2-CHLOROETHANOL #5	3	37
* 2-CHLOROETHYL-N-CYCLOHEXYL CARBAMATE	4	207
* 1-(2-CHLOROETHYL)PYRROLIDINE.HCL	3	141
2-CHLORO-6-FLUOROBENZALDEHYDE	1	191
CHLOROFORM	5	29
3-CHLORO-O-FORMOTOLUIDIDE	1	267
5-CHLORO-2-MERCAPTOBENZOTHAZOLE	1	197
2-CHLORO-4-METHYLANILINE	1	231
2-CHLORO-6-METHYLBENZONITRILE	1	257
* 4-CHLORO-3-METHYL PHENOL #1	2	157
* 4-CHLORO-3-METHYL PHENOL #2	2	159
* 2-CHLORO-1-METHYL PYRIDINIUM IODIDE	4	99
* CHLOROMETHYL STYRENE	2	199
(also: P-CHLOROMETHYL STYRENE)		
4'-CHLORO-3'-NITROACETOPHENONE	1	259
* 2-CHLORO-4-NITROANILINE #1	1	139
* 2-CHLORO-4-NITROANILINE #2	1	141
2-CHLORO-5-NITROBENZALDEHYDE #1	1	193
2-CHLORO-5-NITROBENZALDEHYDE #2	1	195
1-CHLORO-3-NITROBENZENE	3	109
* 2-CHLOROPHENOL #1	2	99
* 2-CHLOROPHENOL #2	4	91
* 4-CHLOROPHENOL	5	107
* 4-CHLOROPHENYL-2-NITROPHENYL ETHER	2	247
(also: P-CHLOROPHENYL-2-NITROPHENYL ETHER)		
4-CHLOROPHENYL SULFOXIDE	5	235
* 6-CHLORO-2-PICOLINE	3	123
1-CHLORO-2-PROPANOL	1	61
3-CHLORO-1-PROPANOL (STATIC)	1	63
2-CHLORO-3-PYRIDINOL	3	69
* 5-CHLORO-2-PYRIDINOL	3	71
6-CHLORO-2-PYRIDINOL	3	73

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
5-CHLOROSALICYLALDEHYDE	1	209
4-CHLORO-3-TOLYL-4-NITROPHENYL ETHER (also: 4-CHLORO-M-TOLYL-P-NITROPHENYL ETHER)	2	283
CHLORPYRIFOS #1	4	195
CHLORPYRIFOS #2	4	197
* CINEOLE	4	229
* O-CRESOL	5	157
CRESOL (MIXED)	5	159
* 3-CYANO-4,6-DIMETHYL-2-HYDROXYPYRIDINE	3	187
* 2-CYANOPYRIDINE	3	117
CYCLOHEXANE	5	127
CYCLOHEXANOL	1	167
CYCLOHEXANONE #1	1	163
CYCLOHEXANONE #2	1	165
* CYCLOHEXANONE OXIME	5	125
* CYCLOHEXYL ACRYLATE	3	225
L-CYSTINE (STATIC)	2	119
* 1,9-DECADIENE	2	229
1-DECANOL	1	369
* GAMMA-DECANOLACTONE	4	233
2-DECANONE #1	1	365
2-DECANONE #2	1	367
DECYLAMINE (also: N-DECYLAMINE)	1	371
4-DECYLANILINE	4	315
* 2-DECYN-1-OL	4	231
DEHYDROABIETIC ACID	2	317
DEMETON	5	195
* 1,8-DIAMINO-P-MENTHANE	4	241
1,2-DIAMINOPROPANE	1	81
1,3-DIAMINOPROPANE	1	83
2,4-DIAMINOTOLUENE	5	171
* 1,4-DIAZABICYCLO[2,2,2]OCTANE	4	113
* DIAZINON	4	279
* DIBENZOFURAN #1	4	257
* DIBENZOFURAN #2	4	259
1,2-DIBROMOBENZENE #1	4	81
2,4-DIBROMO-5,6-DIMETHYLPHENYL-N-BUTYL CARBAMATE	4	289
3,5-DIBROMO-4-HYDROXYBENZONITRILE #1	1	187
3,5-DIBROMO-4-HYDROXYBENZONITRILE #2	4	139
* 1,3-DIBROMOPROPANE #1	1	45
* 1,3-DIBROMOPROPANE #2	3	45
2,3-DIBROMOPROPANOL	1	47
3,5-DIBROMOSALICYLALDEHYDE	1	189
DIBUTYL ADIPATE	2	299
N,N-DIBUTYLFORMAMIDE	1	351
* DIBUTYL FUMARATE #1	2	273
* DIBUTYL FUMARATE #2	2	275
* DIBUTYL FUMARATE #3	4	277
* DIBUTYL FUMARATE #4	5	243
* DIBUTYL ISOPHTHALATE (also: DI-N-BUTYLISOPHTHALATE)	2	307

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
DIBUTYL PHTHALATE #1 (also: DI-N-BUTYLORHPHTHALATE #1)	2	309
DIBUTYL PHTHALATE #2 (also: DI-N-BUTYLORHPHTHALATE #2)	2	311
DIBUTYL SUCCINATE	1	383
DI-N-BUTYLTEREPHTHALATE	4	313
* 2,2-DICHLOROACETAMIDE	1	23
2',4'-DICHLOROACETOPHENONE	1	261
* 3,4-DICHLOROANILINE #1	1	143
* 3,4-DICHLOROANILINE #2	1	145
* 3,4-DICHLOROANILINE #3	4	93
2,4-DICHLOROBENZALDEHYDE	1	199
2,4-DICHLOROBENZAMIDE	2	135
* 2,6-DICHLOROBENZAMIDE	2	137
* 1,2-DICHLOROBENZENE	3	111
* 1,3-DICHLOROBENZENE	3	113
1,4-DICHLOROBUTANE	1	93
* 3,4-DICHLORO-1-BUTENE #1	2	53
* 3,4-DICHLORO-1-BUTENE #2	4	51
* 4,5-DICHLOROCATECHOL	2	85
TRANS-1,2-DICHLOROCYCLOHEXANE	1	161
1,3-DICHLORO-4,6-DINITROBENZENE #1	1	129
1,3-DICHLORO-4,6-DINITROBENZENE #2	2	73
1,2-DICHLOROETHANE	2	41
4,5-DICHLOROGUAIACOL	2	147
3,5-DICHLORO-4-HYDROXYBENZONITRILE	5	141
DICHLOROMETHANE	3	27
1,5-DICHLOROPENTANE	1	119
2,4-DICHLOROPHENOL	2	83
3-(3,4-DICHLOROPHENOXY)BENZALDEHYDE	2	279
1,2-DICHLOROPROPANE	2	45
1,3-DICHLOROPROPANE #1	1	49
1,3-DICHLOROPROPANE #2	2	47
1,3-DICHLOROPROPENE	5	45
3,4-DICHLOROTOLUENE	1	223
A,A'-DICHLORO-P-XYLENE	1	269
DICOFOL	4	299
* DICUMAROL	5	261
1,4-DICYANOBUTANE	1	157
1,6-DICYANOHEXANE	1	305
DICYCLOHEXYL	5	245
* DIETHANOLAMINE	5	75
N,N-DIETHYLACETAMIDE	5	133
DIETHYL ADIPATE #1	1	361
DIETHYL ADIPATE #2	1	363
DIETHYLAMINE	1	111
* 4-(DIETHYLAMINO)BENZALDEHYDE	2	237
* 5-DIETHYLAMINO-2-PENTANONE	3	233
* 4-(DIETHYLAMINO)SALICYLALDEHYDE	2	239
* N,N-DIETHYLANILINE	3	245
1,3-DIETHYLBENZENE (also: M-DIETHYLBENZENE)	3	239

<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
* DIETHYL BENZYL MALONATE	2	297
* DIETHYL BENZYL PHOSPHONATE	4	251
DIETHYL CHLOROMALONATE	1	239
* N,N-DIETHYLCYCLOHEXYLAMINE	4	239
* N,N-DIETHYLETHANOLAMINE	3	149
* DIETHYL ETHER	3	59
* DIETHYL MALONATE #1	1	241
* DIETHYL MALONATE #2	2	169
* DIETHYL MALONATE #3	3	177
DIETHYL PHTHALATE	2	267
DIETHYL SEBACATE #1	1	409
DIETHYL SEBACATE #2	2	301
* 1,3-DIETHYL-2-THIOBARBITURIC ACID	4	169
N,N-DIETHYL-M-TOLUAMIDE	1	375
DIHEXYLAMINE	1	387
(also: DI-N-HEXYLAMINE)		
* 2,3-DIHYDROBENZOFURAN	4	165
2,4-DIHYDROXYBENZALDEHYDE	1	229
* 4,4'-DIHYDROXYDIPHENYL ETHER #1	2	261
* 4,4'-DIHYDROXYDIPHENYL ETHER #2	2	263
1,4-DIIODOBENZENE	4	83
3,5-DIIDO-4-HYDROXYBENZONITRILE	5	143
* 2-(DIISOPROPYLAMINO) ETHANOL	4	191
* 2,6-DIISOPROPYLANILINE #1	1	379
* 2,6-DIISOPROPYLANILINE #2	3	273
2,4-DIMETHOXYBENZALDEHYDE	1	331
1,4-DIMETHOXYBENZENE	1	293
(also: P-DIMETHOXYBENZENE)		
4,6-DIMETHOXY-2-HYDROXYBENZALDEHYDE	1	333
DIMETHOXYMETHANE	5	61
2,6-DIMETHOXYTOLUENE	4	199
4-DIMETHYLAMINOBENZALDEHYDE	1	337
(also: P-DIMETHYLAMINOBENZALDEHYDE)		
* 4-DIMETHYLAMINOCINNAMALDEHYDE	2	233
4-DIMETHYLAMINO-3-METHYL-2-BUTANONE	1	245
* 3-DIMETHYLAMINOPROPYL CHLORIDE.HCL	3	101
* 2-DIMETHYLAMINOPYRIDINE	3	169
* DIMETHYL AMINOTEREPHTHALATE	2	219
* N,N-DIMETHYLANILINE #1	1	297
* N,N-DIMETHYLANILINE #2	1	299
* N,N-DIMETHYLBENZYLAMINE	3	219
* 2,3-DIMETHYL-1,3-BUTADIENE	3	129
3,3-DIMETHYL-2-BUTANONE	1	169
3,3-DIMETHYLBUTYLAMINE (STATIC RENEWAL)	4	137
5,5-DIMETHYL-1,3-CYCLOHEXANEDIONE	4	171
* 2,5-DIMETHYLFURAN	4	101
3,3-DIMETHYLGLUTARIC ACID	5	173
* 3,6-DIMETHYL-1-HEPTYN-3-OL	4	209
* 2,5-DIMETHYL-2,4-HEXADIENE	3	201
* 5,5-DIMETHYLHYDANTOIN	4	65
* 1,1-DIMETHYLHYDRAZINE	5	41
* 2,6-DIMETHYLMORPHOLINE	3	137

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* DIMETHYL NITROTEREPHTHALATE	2	215
* 2,4-DIMETHYL-3-PENTANOL	4	155
* 3,4-DIMETHYL-1-PENTYN-3-OL	4	147
2,4-DIMETHYLPHENOL	2	185
DIMETHYL PHTHALATE	5	219
* (\pm)-1,2-DIMETHYLPROPYLAMINE	3	105
* 2,2-DIMETHYL-1-PROPYLAMINE	3	107
* N,N-DIMETHYL-P-TOLUIDINE #1	3	221
* N,N-DIMETHYL-P-TOLUIDINE #2	3	223
* 2,3-DIMETHYLVALERALDEHYDE	2	171
2,4-DINITROANILINE #1	1	147
2,4-DINITROANILINE #2	3	119
1,4-DINITROBENZENE	2	87
4,6-DINITRO-O-CRESOL #1	2	151
4,6-DINITRO-O-CRESOL #2	2	153
* 2,4-DINITRO-1-NAPHTHOL, SODIUM SALT	4	213
* 2,4-DINITROPHENOL #1	2	89
* 2,4-DINITROPHENOL #2	2	91
* 2,4-DINITROPHENOL #3	2	93
* 2,4-DINITROPHENOL #4	2	95
* 2,4-DINITROPHENOL #5	2	97
* 2,4-DINITROPHENOL #6	4	85
* 2,4-DINITROPHENOL #7	4	87
* 2,4-DINITROPHENOL #8	5	97
* 2,4-DINITROPHENOL #9	5	99
* 2,4-DINITROPHENOL #10	5	101
* 2,5-DINITROPHENOL	4	89
* 2,6-DINITROPHENOL	5	103
* 2,4-DINITROTOLUENE	5	151
DI-N-OCTYLISOPHTHALATE	4	329
DIOCTYL PHTHALATE	5	273
DI-N-OCTYLPHTHALATE	4	331
DI-N-OCTYLTEREPHTHALATE	4	333
* 1,4-DIOXANE #1	5	67
* 1,4-DIOXANE #2	5	69
* DIPHENYLAMINE	5	239
1,4-DIPHENYL-1,3-BUTADIENE	3	297
N,N-DIPHENYLFORMAMIDE #1	1	397
N,N-DIPHENYLFORMAMIDE #2	1	399
2,5-DIPHENYLFURAN #1	2	305
2,5-DIPHENYLFURAN #2	4	311
* DIPHENYL PHTHALATE	2	315
* 1,1-DIPHENYL-2-PROPYN-1-OL	4	307
2,6-DIPHENYLPYRIDINE	3	301
DISULFOTON	4	193
* 2,9-DITHIADECANE	2	193
* 3,8-DITHIADECANE	2	195
* 4,7-DITHIADECANE	2	197
* 4,9-DITHIADODECANE	2	231
* 3,6-DITHIAOCTANE	2	129
2,2'-DITHIOSALICYLIC ACID (STATIC)	2	293
DIURON	3	209

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DODECANAMIDE	2	277
* 2-DODECANONE	4	281
* DODECYLAMINE	5	247
4-DODECYLANILINE	4	323
ETHANAL #1	1	29
ETHANAL #2	5	33
ETHANOL-RHODAMINE B #1	1	35
ETHANOL #2	1	37
4-ETHOXYBENZALDEHYDE	1	325
(also: P-ETHOXYBENZALDEHYDE)		
2-(2-ETHOXYETHOXY)ETHANOL	4	129
2-ETHOXYETHYL ACETATE	2	125
* 2-ETHOXYETHYL METHACRYLATE	3	203
3-ETHOXY-4-HYDROXYBENZALDEHYDE	1	327
* 4-ETHOXY-2-NITROANILINE	3	193
ETHYL ACETATE	1	103
ETHYL ACRYLATE	5	77
* ETHYL 3-AMINOBENZOATE, METHANESULFONIC ACID SALT	4	219
* ETHYL 4-AMINOBENZOATE #1	2	207
(also: ETHYL P-AMINOBENZOATE #1)		
* ETHYL 4-AMINOBENZOATE #2	2	209
(also: ETHYL P-AMINOBENZOATE #2)		
* 2-(ETHYLAMINO)ETHANOL	1	113
* 4-ETHYLANILINE	3	197
ETHYLBENZENE #1	3	189
ETHYLBENZENE #2	5	181
ETHYL BENZOATE	5	203
* N-ETHYLBENZYLAMINE	1	339
* ETHYLENEDIAMINE	5	43
ETHYL HEXANOATE	1	311
* 2-ETHYL-1-HEXANOL	2	187
* 5-ETHYL-2-METHYLPYRIDINE	1	301
O-ETHYL-O(P-NITROPHENYLPHENYL)PHOSPHONOTHIOATE	5	253
* 4-ETHYLPHENOL	3	195
* 2-ETHYLPYRIDINE	5	163
* ETHYL SALICYLATE #1	2	203
* ETHYL SALICYLATE #2	2	205
N-ETHYL-M-TOLUIDINE	1	341
* 2-(N-ETHYL-M-TOLUIDINO)ETHANOL	3	263
ETHYL TRIFLUOROACETATE (MEASURED STATIC)	4	49
* 1-ETHYNYL-CYCLOHEXANOL	3	199
* FENVALERATE #1	4	335
* FENVALERATE #2	5	277
* FLAVONE	4	303
FLUCYTHRINATE	5	249
4-FLUOROANILINE	1	153
2-FLUOROBENZALDEHYDE	1	211
(also: O-FLUOROBENZALDEHYDE)		
* 4-FLUORO-N-METHYLANILINE	1	233
1-FLUORO-4-NITROBENZENE	1	137
* 4-FLUOROPHENYL ETHER #1	2	249
(also: P-FLUOROPHENYL ETHER #1)		

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* 4-FLUOROPHENYL ETHER #2 (also: P-FLUOROPHENYL ETHER #2)	2	251
2-FLUOROTOLUENE #1	3	155
2-FLUOROTOLUENE #2	3	157
FORMALDEHYDE	5	31
FURAN	1	85
3-FURANMETHANOL (STATIC)	1	115
* 1-HEPTANOL	3	181
* 2-HEPTANONE	3	179
HEPTYLAMINE (also: N-HEPTYLAMINE)	1	247
* 1-HEPTYN-3-OL	4	73
HEXACHLORO-1,3-BUTADIENE	2	51
HEXACHLOROETHANE #1	2	29
HEXACHLOROETHANE #2	2	31
* 2,4-HEXADIENE #1	4	103
* 2,4-HEXADIENE #2	4	105
* 1,5-HEXADIEN-3-OL	4	107
* 1,1,1,3,3,3-HEXAFLUORO-2-PROPANOL	3	41
HEXAMETHYLENETETRAMINE (ALIPHATIC)	4	115
* HEXANAL #1	2	121
* HEXANAL #2	5	129
HEXANE	5	135
HEXANOIC ACID	1	177
1-HEXANOL	1	179
* 2-HEXANONE	3	139
1-HEXEN-3-OL	4	117
* CIS-3-HEXEN-1-OL	4	119
* TRANS-3-HEXEN-1-OL	4	121
HEXYL ACETATE	1	313
* HEXYL ACRYLATE #1	3	229
* HEXYL ACRYLATE #2	4	211
* HEXYLAMINE	3	147
* 4-HEXYLOXYANILINE #1 (NOMINAL CONCENTRATIONS)	1	381
* 4-HEXYLOXYANILINE #2	3	275
4-(HEXYLOXY)-M-ANISALDEHYDE	1	407
2-HYDROXYBENZAMIDE	2	163
* 2-HYDROXYETHYL ACRYLATE	3	89
2-HYDROXYETHYL ETHER	5	71
* 2-HYDROXYETHYL METHACRYLATE	3	131
* 4-(2-HYDROXYETHYL)MORPHOLINE	3	143
* 1-(2-HYDROXYETHYL)PIPERAZINE	3	145
* 2'-HYDROXY-4'-METHOXYACETOPHENONE #1	1	329
* 2'-HYDROXY-4'-METHOXYACETOPHENONE #2	3	211
5-HYDROXY-2-NITROBENZALDEHYDE	1	221
* 3-HYDROXY-2-NITROPYRIDINE	3	75
* 2-HYDROXYPROPYL ACRYLATE #1	3	133
* 2-HYDROXYPROPYL ACRYLATE #2	3	135
* 3-HYDROXY-3,7,11-TRIMETHYL-1,6,10-DODECATRIENE	4	309
* IODOFORM	4	39
* BETA-IONONE	4	291
* ISOBUTYL ACRYLATE #1	3	173

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* ISOBUTYL ACRYLATE #2	4	151
ISOPHORONE	5	211
* ISOPIMARIC ACID	2	321
4-ISOPROPYLBENZALDEHYDE	1	359
(also: P-ISOPROPYL BENZALDEHYDE)		
* ISOPROPYLBENZENE	3	213
* ISOPROPYL DISULFIDE	2	131
* ISOPROPYL ETHER	2	127
* 4,4'-ISOPROPYLIDENE BIS(2,6-DICHLOROPHENOL)	4	305
* ISOPROPYL METHACRYLATE	3	175
* ISOVALERALDEHYDE	2	57
LAURYL ACRYLATE	3	295
(R)-(+)-LIMONENE	5	225
* MALATHION	4	235
MALONONITRILE (NOMINAL CONCENTRATIONS)	1	41
MANOOL	3	315
* (1R,2S,5R)-(-)-MENTHOL	4	237
METHANOL-RHODAMINE B	1	19
METHOMYL	4	71
* 2-METHOXYBENZAMIDE	2	183
(also: O-METHOXYBENZAMIDE)		
* 2-METHOXYETHYLAMINE	1	79
3-METHOXYPHENOL	2	165
* 4-METHOXYPHENOL	2	167
* N-(3-METHOXYPROPYL)-3,4,5-TRIMETHOXYBENZYLAMINE	3	293
3-METHOXYSALICYLALDEHYDE #1	1	275
(see also: O-VANILLIN #1)		
3-METHOXYSALICYLALDEHYDE #2	1	277
(see also: O-VANILLIN #2)		
METHYL ACETATE #1	1	57
METHYL ACETATE #2	2	49
* N-METHYLANILINE	5	165
3-METHYL-2-BUTANONE	1	121
* 2-METHYL-3-BUTYN-2-OL	4	67
* 2-METHYLBUTYRALDEHYDE	2	59
METHYL 4-CHLOROBENZOATE	2	177
(also: METHYL P-CHLOROBENZOATE)		
METHYL 4-CHLORO-2-NITROBENZOATE	2	173
METHYL 4-CYANOBENZOATE	1	323
METHYL 2,5-DICHLOROBENZOATE	2	175
METHYL 2,4-DIHYDROXYBENZOATE	2	181
2,2'-METHYLENEBIS(4-CHLOROPHENOL)	2	285
2,2'-METHYLENEBIS(3,4,6-TRICHLOROPHENOL)	1	389
6-METHYL-5-HEPTEN-2-ONE	1	307
* 1-METHYL HEPTYLAMINE #1	1	319
* 1-METHYL HEPTYLAMINE #2	1	321
5-METHYL-2-HEXANONE	1	243
* 2-METHYLIMIDAZOLE	1	91
* 3-METHYLINDOLE	5	201
METHYL METHACRYLATE	5	79
* 2-METHYL-1,4-NAPHTHOQUINONE	4	283

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METHYL 4-NITROBENZOATE (also: METHYL P-NITROBENZOATE)	2	179
* 4-METHYLOXAZOLE	3	49
2-METHYL-2,4-PENTANEDIOL	1	181
* 3-METHYL-3-PENTANOL	4	127
4-METHYL-2-PENTANONE #1	1	171
4-METHYL-2-PENTANONE #2	1	173
* 3-METHYL-1-PENTYN-3-OL	4	109
* 4-METHYLPHENOL	3	165
* 1-METHYLPIPERAZINE	3	95
* 2-METHYLPIPERAZINE	3	97
2-METHYL-1-PROPANOL	1	109
* 2-METHYL-2-PROPANOL	3	61
METHYL SULFOXIDE	5	37
* 2-METHYL-3,3,4,4-TETRAFLUORO-2-BUTANOL	4	63
* 2-METHYLVALERALDEHYDE	2	123
NAPHTHALENE	2	211
1-NAPHTHOL	2	213
* NEOABIETIC ACID #1	2	323
* NEOABIETIC ACID #2	2	325
* NICOTINE SULFATE #1	4	325
* NICOTINE SULFATE #2	5	263
* P-NITROANILINE	5	113
2-NITROBENZALDEHYDE #1 (also: O-NITROBENZALDEHYDE #1)	1	217
2-NITROBENZALDEHYDE #2 (also: O-NITROBENZALDEHYDE #2)	1	219
* 4-NITROBENZALDEHYDE	5	147
4-NITROBENZAMIDE	2	149
NITROBENZENE	2	103
2-NITROPHENOL	4	95
4-NITROPHENOL #1	2	105
4-NITROPHENOL #2	2	107
4-NITROPHENOL #3	2	109
4-NITROPHENYL PHENYL ETHER	4	261
3-NITROTOLUENE (also: M-NITROTOLUENE)	3	161
NONANOIC ACID	1	349
1-NONANOL	1	353
* 2-NONANONE	3	231
5-NONANONE	1	347
* NONYLAMINE	5	213
NONYLPHENOL	2	303
EXO-NORBORNEOL	4	149
* NORBORNYLENE	4	145
OCTACHLOROSTYRENE	3	183
CIS-OCTADECEN-1-OL	1	413
* 1-OCTANOL #1 (also: N-OCTANOL #1)	1	315
* 1-OCTANOL #2 (also: N-OCTANOL #2)	2	189

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* 1-OCTANOL #3 (also: N-OCTANOL #3)	4	181
* 1-OCTANOL #4 (also: N-OCTANOL #4)	4	183
* 1-OCTANOL #5 (also: N-OCTANOL #5)	5	191
* 1-OCTANOL #6 (also: N-OCTANOL #6)	5	193
2-OCTANONE	1	309
* OCTYLAMINE	4	187
* TERT-OCTYLAMINE	4	189
* 4-OCTYLANILINE	4	301
OCTYL CYANIDE #1 (also: N-OCTYL CYANIDE #1)	1	343
OCTYL CYANIDE #2 (also: N-OCTYL CYANIDE #2)	1	345
* 2'-(OCTYLOXY)-ACETANILIDE	3	299
* 1-OCTYN-3-OL	4	173
OXAMYL	5	175
2,3,4,5,6-PENTABROMOETHYLBENZENE	4	157
PENTABROMOPHENOL	4	77
PENTACHLOROETHANE	2	35
* PENTACHLOROPHENOL #1	2	63
* PENTACHLOROPHENOL #2	2	65
* PENTACHLOROPHENOL #3	2	67
* PENTACHLOROPHENOL #4	2	69
* PENTACHLOROPHENOL #5	2	71
* PENTACHLOROPHENOL #6	5	83
* PENTACHLOROPHENOL #7	5	85
* PENTACHLOROPHENOL #8	5	87
* PENTACHLOROPHENOL #9	5	89
* PENTACHLOROPYRIDINE	3	65
2,3,4,5,6-PENTAFLUOROANILINE	1	131
PENTAFLUOROBENZALDEHYDE	1	185
2,4-PENTANEDIONE #1	1	117
2,4-PENTANEDIONE #2	2	55
* 1-PENTANOL	3	99
* 2-PENTANONE	3	91
3-PENTANONE	1	123
* PENTOBARBITAL	4	255
PENTYL ETHER	4	243
P-TERT-PENTYLPHENOL	2	241
* (±)-4-PENTYN-2-OL	4	69
PERMETHRIN	4	327
* PHENOBARBITAL	4	273
* PHENOL #1	2	113
* PHENOL #2	2	115
* PHENOL #3	2	117
* PHENOL #4	5	115
4-PHENOXYBENZALDEHYDE (also: P-PHENOXYBENZALDEHYDE)	1	395
2-PHENOXYETHANOL	1	295

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4-PHENOXYPHENOL	2	259
(also: P-PHENOXYPHENOL)		
* PHENYL 4-AMINOSALICYLATE #1	2	289
* PHENYL 4-AMINOSALICYLATE #2	2	291
4-PHENYLAZOPHENOL	2	255
(also: P-PHENYLAZOPHENOL)		
* 2-PHENYL-3-BUTYN-2-OL	4	215
* TRANS-2-PHENYL-1-CYCLOHEXANOL	2	271
* N-PHENYLDIETHANOLAMINE	3	247
* PHENYL DISULFIDE	2	265
PHENYL ETHER	4	263
2-PHENYLPHENOL	2	257
* 4-PHENYLPYRIDINE	3	253
PHENYL SALICYLATE	2	287
* PHENYL SULFOXIDE	5	237
* PHENYLTRIMETHYLAMMONIUM IODIDE	4	203
* PHENYLTRIMETHYLAMMONIUM METHOSULFATE	4	223
* 2-PICOLINE	3	125
* 3-PICOLINE	5	123
* 4-PICOLINE	3	127
* PIPERINE (ALIPHATIC)	4	317
PROPANIL	3	205
1-PROPANOL #1	1	65
1-PROPANOL #2	1	67
2-PROPANOL #1	1	69
2-PROPANOL #2	1	71
2-PROPANOL #3	1	73
PROPIONIC ACID, SODIUM SALT	1	43
* PROPIONITRILE	5	51
PROPOXUR	4	245
PROPYL ACETATE	1	125
PROPYLAMINE	1	75
* PROPYL DISULFIDE	2	133
* 4-PROPYLPHENOL	3	217
N-PROPYL SULFIDE	1	183
* 2-PROPYN-1-OL #1	3	43
* 2-PROPYN-1-OL #2	4	43
* PYRIDINE #1	3	79
* PYRIDINE #2	3	81
* 3-PYRIDINECARBOXALDEHYDE	3	115
* 2,6-PYRIDINEDICARBOXYLIC ACID	3	153
3-(3-PYRIDYL)-1-PROPANOL	1	303
PYRROLE	1	89
* QUINOLINE	5	199
* RESMETHRIN	5	267
(-)-RIBOFLAVIN	4	319
* ROTENONE #1	3	321
* ROTENONE #2	5	269
SACCHARIN SODIUM SALT HYDRATE	4	141
SALICYLALDEHYDE	1	227
SALICYLALDOXIME	5	153
SALICYLANILIDE	3	281

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* SALICYLIC ACID NA+ #1	2	141
* SALICYLIC ACID NA+ #2	2	143
* SECOBARBITAL	4	275
* SODIUM AZIDE	5	279
SOLKETAL	4	123
* STRYCHNINE HEMISULPHATE SALT	5	265
STYRENE	5	179
TERBUFOS	5	215
A,A,A',A' -TETRABROMO-O-XYLENE	4	161
TETRABUTYLTIN	5	257
2,3,5,6-TETRACHLOROANILINE	1	133
* TETRACHLOROCATECHOL	2	77
1,1,2,2-TETRACHLOROETHANE	2	37
* TETRACHLOROETHYLENE #1	2	25
* TETRACHLOROETHYLENE #2	2	27
2,3,4,5-TETRACHLOROPHENOL	2	75
* 2,3,4,6-TETRACHLOROPHENOL	5	139
A,A-2,6-TETRACHLOROTOLUENE	1	201
TETRADECANAL	1	411
TETRAETHYLTIN	5	197
* A,A,A-4-TETRAFLUORO-O-TOLUIDINE	1	215
A,A,A-4-TETRAFLUORO-M-TOLUIDINE	1	213
TETRAHYDROFURAN	1	101
* TETRAHYDROFURFURYL METHACRYLATE	3	227
* TETRAMETHYLAMMONIUM CHLORIDE (NOMINAL CONCENTRATIONS)	4	61
* 2,2,5,5-TETRAMETHYLTETRAHYDROFURAN	4	175
TETRAPHENYLTIN	5	271
* THIOPENTAL, SODIUM SALT	4	249
* TOLAZOLINE HYDROCHLORIDE	3	237
2-TOLUALDEHYDE	1	273
(also: O-TOLUALDEHYDE)		
* TOLUENE #1	3	163
* TOLUENE #2	5	155
1-(P-TOLUENESULFONYL)IMIDAZOLE	1	355
* 4-TOLUIDINE #1	3	167
* 4-TOLUIDINE #2	5	167
2-TOLUNITRILE	1	265
(also: O-TOLUNITRILE)		
P-TOLYL DISULFIDE	2	295
2,4,5-TRIBROMOIMIDAZOLE #1 (NOMINAL CONCENTRATIONS)	1	39
2,4,5-TRIBROMOIMIDAZOLE #2	3	39
* 2,4,6-TRIBROMOPHENOL	2	79
2,4,6-TRI-TERT-BUTYLPHENOL	5	259
* TRIBUTYL PHOSPHATE #1	3	277
* TRIBUTYL PHOSPHATE #2	3	279
2',3',4' -TRICHLOROACETOPHENONE	1	253
2,3,4-TRICHLOROANILINE	1	135
1,2,4-TRICHLOROBENZENE	5	91
1,3,5-TRICHLORO-2,4-DINITROBENZENE	1	127
* 1,1,1-TRICHLOROETHANE #1	3	29
* 1,1,1-TRICHLOROETHANE #2	3	31
1,1,2-TRICHLOROETHANE	2	39

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2,2,2-TRICHLOROETHANOL	1	25
TRICHLOROETHYLENE	2	33
* 1,1,1-TRICHLORO-2-METHYL-2-PROPANOL HYDRATE	4	57
* 2,4,6-TRICHLOROPHENOL #1	2	81
* 2,4,6-TRICHLOROPHENOL #2	4	79
* 2,4,6-TRICHLOROPHENOL #3	5	93
2,4,5-TRICHLOROPHENYL DISULFIDE	2	243
* 1,2,3-TRICHLOROPROPANE	5	49
1-TRIDECANOL	1	405
2-TRIDECANONE	4	295
7-TRIDECANONE	1	403
* TRIDECYLAMINE	5	251
* TRIETHANOLAMINE	5	137
TRIETHYLENE GLYCOL #1	4	131
TRIETHYLENE GLYCOL #2	4	133
TRIETHYLENE GLYCOL #3	4	135
* TRIETHYL NITRILOTRICARBOXYLATE	4	205
* 2,2,2-TRIFLUOROETHANOL	3	33
* 3-TRIFLUOROMETHYL-4-NITROPHENOL	5	145
A,A,A-TRIFLUORO-M-TOLUALDEHYDE #1	1	255
A,A,A-TRIFLUORO-M-TOLUALDEHYDE #2	3	185
A,A,A-TRIFLUORO-M-TOLUALDEHYDE #3	4	159
* A,A,A-TRIFLUORO-O-TOLUNITRILE	1	251
A,A,A-TRIFLUORO-M-TOLUNITRILE	1	249
* 2,4,6-TRIIODOPHENOL	5	95
* 2',3',4'-TRIMETHOXYACETOPHENONE #1	1	373
* 2',3',4'-TRIMETHOXYACETOPHENONE #2	3	257
2,4,5-TRIMETHOXYBENZALDEHYDE	2	225
1,2,4-TRIMETHYLBENZENE	3	215
* 2,4,5-TRIMETHYLOXAZOLE	1	159
2,3,6-TRIMETHYLPHENOL	5	207
* 2,4,6-TRIMETHYLPHENOL	5	209
TRIMETHYL PHOSPHATE	5	63
S-TRIOXANE	1	59
TRIPHENYLAMINE	3	307
2,4,5-TRIPHENYLIMIDAZOLE	3	317
* TRIPHENYL PHOSPHATE	3	311
* TRIPHENYLPHOSPHINE OXIDE	3	309
* TRIPROPARGYLAMINE	3	207
* TRIPROPYLAMINE	3	235
* TRIS(2-BUTOXYETHYL) PHOSPHATE	3	313
TRIS(2,6-DICHLOROPHENYL) PHOSPHATE	3	303
TRIS(P-DIMETHYLAMINOPHENYL) PHOSPHINE OXIDE	3	327
TRIS(2,3-DIMETHYLPHENYL) PHOSPHATE	3	323
TRIS(3,4-DIMETHYLPHENYL) PHOSPHATE	3	325
TRIS(5-METHYL-2-NITROPHENYL) PHOSPHATE	3	319
TRIS(M-NITROPHENYL) PHOSPHINE OXIDE	3	305
* 2-UNDECANONE	3	265
* UNDECYLAMINE	5	233
UNDECYL CYANIDE	1	385
(also: N-UNDECYL CYANIDE)		
URACIL	3	47

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* URETHANE	5	59
* VALERALDEHYDE #1	2	61
* VALERALDEHYDE #2	3	93
VANILLIN #1	1	279
VANILLIN #2	1	281
O-VANILLIN #1	1	275
(see also: 3-METHOXYSALICYLALDEHYDE #1)		
O-VANILLIN #2	1	277
(see also: 3-METHOXYSALICYLALDEHYDE #2)		
* N-VINYLCARBAZOLE	3	289
* XANTHONE #1	4	285
* XANTHONE #2	4	287
O-XYLENE #1	5	183
O-XYLENE #2	5	185
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(also: P-XYLENE)		
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* Changes in behavior and morphology are described in Drummond and Russom (1990).

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CHCL ₃	67663	CHLOROFORM	5	29
CHI ₃	75478	IODOFORM	4	39
CH ₂ CL ₂	75092	DICHLOROMETHANE	3	27
CH ₂ O	50000	FORMALDEHYDE	5	31
CH ₄ O	67561	METHANOL-RHODAMINE B	1	19
C ₂ CL ₄	127184	TETRACHLOROETHYLENE #1	2	25
C ₂ CL ₄	127184	TETRACHLOROETHYLENE #2	2	27
C ₂ CL ₆	67721	HEXACHLOROETHANE #1	2	29
C ₂ CL ₆	67721	HEXACHLOROETHANE #2	2	31
C ₂ HCL ₃	79016	TRICHLOROETHYLENE	2	33
C ₂ HCL ₅	76017	PENTACHLOROETHANE	2	35
C ₂ H ₂ CLN	107142	CHLOROACETONITRILE	1	21
C ₂ H ₂ CL ₄	79345	1,1,2,2-TETRACHLOROETHANE	2	37
C ₂ H ₃ CL ₂ NO	683727	2,2-DICHLOROACETAMIDE	1	23
C ₂ H ₃ CL ₃	71556	1,1,1-TRICHLOROETHANE #1	3	29
C ₂ H ₃ CL ₃	71556	1,1,1-TRICHLOROETHANE #2	3	31
C ₂ H ₃ CL ₃	79005	1,1,2-TRICHLOROETHANE	2	39
C ₂ H ₃ CL ₃ O	115208	2,2,2-TRICHLOROETHANOL	1	25
C ₂ H ₃ F ₃ O	75898	2,2,2-TRIFLUOROETHANOL	3	33
C ₂ H ₃ N	75058	ACETONITRILE	1	27
C ₂ H ₄ CL ₂	107062	1,2-DICHLOROETHANE	2	41
C ₂ H ₄ O	75070	ETHANAL #1	1	29
C ₂ H ₄ O	75070	ETHANAL #2	5	33
C ₂ H ₅ CLO	107073	2-CHLOROETHANOL #1	1	31
C ₂ H ₅ CLO	107073	2-CHLOROETHANOL #2	1	33
C ₂ H ₅ CLO	107073	2-CHLOROETHANOL #3	2	43
C ₂ H ₅ CLO	107073	2-CHLOROETHANOL #4	3	35
C ₂ H ₅ CLO	107073	2-CHLOROETHANOL #5	3	37
C ₂ H ₅ NO	107299	ACETALDOXIME	5	35
C ₂ H ₆ O	64175	ETHANOL-RHODAMINE B #1	1	35
C ₂ H ₆ O	64175	ETHANOL #2	1	37
C ₂ H ₆ OS	67685	METHYL SULFOXIDE	5	37
C ₂ H ₇ NO	141435	2-AMINOETHANOL	5	39
C ₂ H ₈ N ₂	57147	1,1-DIMETHYLHYDRAZINE	5	41
C ₂ H ₈ N ₂	107153	ETHYLENEDIAMINE	5	43
C ₃ HBr ₃ N ₂	2034222	2,4,5-TRIBROMOIMIDAZOLE #1 (NOMINAL CONCENTRATIONS)	1	39
C ₃ HBr ₃ N ₂	2034222	2,4,5-TRIBROMOIMIDAZOLE #2	3	39
C ₃ H ₂ F ₆ O	920661	1,1,1,3,3,3-HEXAFLUORO-2-PROPANOL	3	41
C ₃ H ₂ N ₂	109773	MALONONITRILE (NOMINAL CONCENTRATIONS)	1	41
C ₃ H ₄ CL ₂	542756	1,3-DICHLOROPROPENE	5	45
C ₃ H ₄ O	107028	ACROLEIN #1	4	41
C ₃ H ₄ O	107028	ACROLEIN #2	5	47
C ₃ H ₄ O	107197	2-PROPYN-1-OL #1	3	43
C ₃ H ₄ O	107197	2-PROPYN-1-OL #2	4	43

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C ₃ H ₅ CL ₃	96184	1,2,3-TRICHLOROPROPANE	5	49
C ₃ H ₅ N	107120	PROPIONITRILE	5	51
C ₃ H ₅ NO	79061	ACRYLAMIDE	5	53
C ₃ H ₅ NaO ₂	137406	PROPIONIC ACID, SODIUM SALT	1	43
C ₃ H ₆ Br ₂	109648	1,3-DIBROMOPROPANE #1	1	45
C ₃ H ₆ Br ₂	109648	1,3-DIBROMOPROPANE #2	3	45
C ₃ H ₆ Br ₂ O	96139	2,3-DIBROMOPROPANOL	1	47
C ₃ H ₆ CL ₂	78875	1,2-DICHLOROPROPANE	2	45
C ₃ H ₆ CL ₂	142289	1,3-DICHLOROPROPANE #1	1	49
C ₃ H ₆ CL ₂	142289	1,3-DICHLOROPROPANE #2	2	47
C ₃ H ₆ O	67641	ACETONE #1	1	51
C ₃ H ₆ O	67641	ACETONE #2	1	53
C ₃ H ₆ O	67641	ACETONE #3	1	55
C ₃ H ₆ O	107186	ALLYL ALCOHOL	5	55
C ₃ H ₆ O ₂	79209	METHYL ACETATE #1	1	57
C ₃ H ₆ O ₂	79209	METHYL ACETATE #2	2	49
C ₃ H ₆ O ₃	110883	S-TRIOXANE	1	59
C ₃ H ₇ Br	106945	1-BROMOPROPANE	4	45
C ₃ H ₇ CLO	127004	1-CHLORO-2-PROPANOL	1	61
C ₃ H ₇ CLO	627305	3-CHLORO-1-PROPANOL (STATIC)	1	63
C ₃ H ₇ NO	127060	ACETONE OXIME	5	57
C ₃ H ₇ NO ₂	51796	URETHANE	5	59
C ₃ H ₈ O	71238	1-PROPANOL #1	1	65
C ₃ H ₈ O	71238	1-PROPANOL #2	1	67
C ₃ H ₈ O	67630	2-PROPANOL #1	1	69
C ₃ H ₈ O	67630	2-PROPANOL #2	1	71
C ₃ H ₈ O	67630	2-PROPANOL #3	1	73
C ₃ H ₈ O ₂	109875	DIMETHOXYMETHANE	5	61
C ₃ H ₉ N	107108	PROPYLAMINE	1	75
C ₃ H ₉ NO	78966	1-AMINO-2-PROPANOL	1	77
C ₃ H ₉ NO	109853	2-METHOXYETHYLAMINE	1	79
C ₃ H ₉ O ₄ P	512561	TRIMETHYL PHOSPHATE	5	63
C ₃ H ₁₀ N ₂	78900	1,2-DIAMINOPROPANE	1	81
C ₃ H ₁₀ N ₂	109762	1,3-DIAMINOPROPANE	1	83
C ₄ CL ₆	87683	HEXACHLORO-1,3-BUTADIENE	2	51
C ₄ H ₃ BrS	872311	3-BROMOTHIOPHENE	4	47
C ₄ H ₄ N ₂ O ₂	66228	URACIL	3	47
C ₄ H ₄ O	110009	FURAN	1	85
C ₄ H ₅ F ₃ O ₂	383631	ETHYL TRIFLUOROACETATE (MEASURED STATIC)	4	49
C ₄ H ₅ N	109751	ALLYL CYANIDE	1	87
C ₄ H ₅ N	109977	PYRROLE	1	89
C ₄ H ₅ NO	693936	4-METHYLOXAZOLE	3	49
C ₄ H ₅ NS	57067	ALLYL ISOTHIOCYANATE	5	65
C ₄ H ₆ CL ₂	1871574	3-CHLORO-2-CHLOROMETHYL-1-PROPENE	3	51
C ₄ H ₆ CL ₂	760236	3,4-DICHLORO-1-BUTENE #1	2	53
C ₄ H ₆ CL ₂	760236	3,4-DICHLORO-1-BUTENE #2	4	51
C ₄ H ₆ N ₂	693981	2-METHYLIMIDAZOLE	1	91
C ₄ H ₆ O	764012	2-BUTYN-1-OL	4	53
C ₄ H ₆ O	927742	3-BUTYN-1-OL	3	53

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C ₄ H ₆ O ₂	110656	2-BUTYNE-1,4-DIOL	4	55
C ₄ H ₇ CL ₃ O	6001645	1,1,1-TRICHLORO-2-METHYL-2-PROPANOL HYDRATE	4	57
C ₄ H ₈ CL ₂	110565	1,4-DICHLOROBUTANE	1	93
C ₄ H ₈ O	123728	BUTANAL #1	1	95
C ₄ H ₈ O	123728	BUTANAL #2	1	97
C ₄ H ₈ O	78933	2-BUTANONE	1	99
C ₄ H ₈ O	109999	TETRAHYDROFURAN	1	101
C ₄ H ₈ O ₂	123911	1,4-DIOXANE #1	5	67
C ₄ H ₈ O ₂	123911	1,4-DIOXANE #2	5	69
C ₄ H ₈ O ₂	141786	ETHYL ACETATE	1	103
C ₄ H ₉ Br	109659	1-BROMOBUTANE	4	59
C ₄ H ₉ NO	96297	2-BUTANONE OXIME	1	105
C ₄ H ₁₀ O	71363	1-BUTANOL	1	107
C ₄ H ₁₀ O	78922	(±)-2-BUTANOL	3	57
C ₄ H ₁₀ O	60297	DIETHYL ETHER	3	59
C ₄ H ₁₀ O	78831	2-METHYL-1-PROPANOL	1	109
C ₄ H ₁₀ O	75650	2-METHYL-2-PROPANOL	3	61
C ₄ H ₁₀ O ₃	111466	2-HYDROXYETHYL ETHER	5	71
C ₄ H ₁₁ N	109739	BUTYLAMINE	3	63
C ₄ H ₁₁ N	13952846	(+-)-SEC-BUTYLAMINE	5	73
C ₄ H ₁₁ N	109897	DIETHYLAMINE	1	111
C ₄ H ₁₁ NO	110736	2-(ETHYLAMINO)ETHANOL	1	113
C ₄ H ₁₁ NO ₂	111422	DIETHANOLAMINE	5	75
C ₄ H ₁₂ CLN	75570	TETRAMETHYLAMMONIUM CHLORIDE (NOMINAL CONCENTRATIONS)	4	61
C ₅ CL ₅ N	2176627	PENTACHLOROPYRIDINE	3	65
C ₅ H ₄ BrNO	6602320	2-BROMO-3-PYRIDINOL	3	67
C ₅ H ₄ CLNO	6636788	2-CHLORO-3-PYRIDINOL	3	69
C ₅ H ₄ CLNO	4214793	5-CHLORO-2-PYRIDINOL	3	71
C ₅ H ₄ CLNO	16879020	6-CHLORO-2-PYRIDINOL	3	73
C ₅ H ₄ N ₂ O ₃	15128822	3-HYDROXY-2-NITROPYRIDINE	3	75
C ₅ H ₅ BrN ₂	1072975	2-AMINO-5-BROMOPYRIDINE	3	77
C ₅ H ₅ N	110861	PYRIDINE #1	3	79
C ₅ H ₅ N	110861	PYRIDINE #2	3	81
C ₅ H ₆ CLN ₃	5600215	2-AMINO-4-CHLORO-6-METHYLPYRIMIDINE #1	3	83
C ₅ H ₆ CLN ₃	5600215	2-AMINO-4-CHLORO-6-METHYLPYRIMIDINE #2	3	85
C ₅ H ₆ O ₂	4412913	3-FURANMETHANOL (STATIC)	1	115
C ₅ H ₈ F ₄ O	29553262	2-METHYL-3,3,4,4-TETRAFLUORO-2-BUTANOL	4	63
C ₅ H ₈ N ₂ O ₂	77714	5,5-DIMETHYLHYDANTOIN	4	65
C ₅ H ₈ N ₄	17584122	3-AMINO-5,6-DIMETHYL-1,2,4-TRIAZINE	3	87
C ₅ H ₈ O	115195	2-METHYL-3-BUTYN-2-OL	4	67
C ₅ H ₈ O	2117115	(±)-4-PENTYN-2-OL	4	69
C ₅ H ₈ O ₂	140885	ETHYL ACRYLATE	5	77
C ₅ H ₈ O ₂	80626	METHYL METHACRYLATE	5	79
C ₅ H ₈ O ₂	123546	2,4-PENTANEDIONE #1	1	117
C ₅ H ₈ O ₂	123546	2,4-PENTANEDIONE #2	2	55
C ₅ H ₈ O ₃	818611	2-HYDROXYETHYL ACRYLATE	3	89
C ₅ H ₁₀ CL ₂	628762	1,5-DICHLOROPENTANE	1	119

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C ₅ H ₁₀ O	590863	ISOVALERALDEHYDE	2	57
C ₅ H ₁₀ O	563804	3-METHYL-2-BUTANONE	1	121
C ₅ H ₁₀ O	96173	2-METHYLBUTYRALDEHYDE	2	59
C ₅ H ₁₀ O	107879	2-PENTANONE	3	91
C ₅ H ₁₀ O	96220	3-PENTANONE	1	123
C ₅ H ₁₀ O	110623	VALERALDEHYDE #1	2	61
C ₅ H ₁₀ O	110623	VALERALDEHYDE #2	3	93
C ₅ H ₁₀ O ₂	109604	PROPYL ACETATE	1	125
C ₅ H ₁₀ O ₅	87729	L-ARABINOSE	5	81
C ₅ H ₁₂ N ₂	109013	1-METHYLPIPERAZINE	3	95
C ₅ H ₁₂ N ₂	109079	2-METHYLPIPERAZINE	3	97
C ₅ H ₁₂ O	1634044	TERT-BUTYL METHYL ETHER	4	75
C ₅ H ₁₂ O	71410	1-PENTANOL	3	99
C ₅ H ₁₃ CL ₂ N	5407045	3-DIMETHYLAMINOPROPYL CHLORIDE.HCL	3	101
C ₅ H ₁₃ N	110587	AMYLAMINE	3	103
C ₅ H ₁₃ N	598743	(±)-1,2-DIMETHYLPROPYLAMINE	3	105
C ₅ H ₁₃ N	5813649	2,2-DIMETHYL-1-PROPYLAMINE	3	107
C ₆ HBr ₅ O	608719	PENTABROMOPHENOL	4	77
C ₆ HCL ₃ N ₂ O ₄	628483	1,3,5-TRICHLORO-2,4-DINITROBENZENE	1	127
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #1	2	63
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #2	2	65
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #3	2	67
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #4	2	69
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #5	2	71
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #6	5	83
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #7	5	85
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #8	5	87
C ₆ HCL ₅ O	87865	PENTACHLOROPHENOL #9	5	89
C ₆ H ₂ CL ₂ N ₂ O ₄	3698837	1,3-DICHLORO-4,6-DINITROBENZENE #1	1	129
C ₆ H ₂ CL ₂ N ₂ O ₄	3698837	1,3-DICHLORO-4,6-DINITROBENZENE #2	2	73
C ₆ H ₂ CL ₄ O	4901513	2,3,4,5-TETRACHLOROPHENOL	2	75
C ₆ H ₂ CL ₄ O	58902	2,3,4,6-TETRACHLOROPHENOL	5	139
C ₆ H ₂ CL ₄ O ₂	1198556	TETRACHLOROCATECHOL	2	77
C ₆ H ₂ F ₅ N	771608	2,3,4,5,6-PENTAFLUOROANILINE	1	131
C ₆ H ₃ Br ₃ O	118796	2,4,6-TRIBROMOPHENOL	2	79
C ₆ H ₃ CL ₃	120821	1,2,4-TRICHLOROBENZENE	5	91
C ₆ H ₃ CL ₃ O	88062	2,4,6-TRICHLOROPHENOL #1	2	81
C ₆ H ₃ CL ₃ O	88062	2,4,6-TRICHLOROPHENOL #2	4	79
C ₆ H ₃ CL ₃ O	88062	2,4,6-TRICHLOROPHENOL #3	5	93
C ₆ H ₃ CL ₄ N	3481207	2,3,5,6-TETRACHLOROANILINE	1	133
C ₆ H ₃ I ₃ O	609234	2,4,6-TRIIODOPHENOL	5	95
C ₆ H ₄ Br ₂	583539	1,2-DIBROMOBENZENE	4	81
C ₆ H ₄ CLNO ₂	121733	1-CHLORO-3-NITROBENZENE	3	109
C ₆ H ₄ CL ₂	95501	1,2-DICHLOROBENZENE	3	111
C ₆ H ₄ CL ₂	541731	1,3-DICHLOROBENZENE	3	113
C ₆ H ₄ CL ₂ O	120832	2,4-DICHLOROPHENOL	2	83
C ₆ H ₄ CL ₂ O ₂	3428248	4,5-DICHLOROCATECHOL	2	85
C ₆ H ₄ CL ₃ N	634673	2,3,4-TRICHLOROANILINE	1	135

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C ₆ H ₄ FNO ₂	350469	1-FLUORO-4-NITROBENZENE	1	137
C ₆ H ₄ I ₂	624384	1,4-DIIODOBENZENE	4	83
C ₆ H ₄ N ₂ O ₄	100254	1,4-DINITROBENZENE	2	87
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #1	2	89
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #2	2	91
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #3	2	93
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #4	2	95
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #5	2	97
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #6	4	85
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #7	4	87
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #8	5	97
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #9	5	99
C ₆ H ₄ N ₂ O ₅	51285	2,4-DINITROPHENOL #10	5	101
C ₆ H ₄ N ₂ O ₅	329715	2,5-DINITROPHENOL	4	89
C ₆ H ₄ N ₂ O ₅	73568	2,6-DINITROPHENOL	5	103
C ₆ H ₅ CL	108907	CHLOROBENZENE	5	105
C ₆ H ₅ CLN ₂ O ₂	121879	2-CHLORO-4-NITROANILINE #1	1	139
C ₆ H ₅ CLN ₂ O ₂	121879	2-CHLORO-4-NITROANILINE #2	1	141
C ₆ H ₅ CLO	95578	2-CHLOROPHENOL #1	2	99
C ₆ H ₅ CLO	95578	2-CHLOROPHENOL #2	4	91
C ₆ H ₅ CLO	106489	4-CHLOROPHENOL	5	107
C ₆ H ₅ CLO ₂	2138229	4-CHLOROCATECHOL	2	101
C ₆ H ₅ CL ₂ N	95761	3,4-DICHLOROANILINE #1	1	143
C ₆ H ₅ CL ₂ N	95761	3,4-DICHLOROANILINE #2	1	145
C ₆ H ₅ CL ₂ N	95761	3,4-DICHLOROANILINE #3	4	93
C ₆ H ₅ NO	500221	3-PYRIDINECARBOXALDEHYDE	3	115
C ₆ H ₅ NO ₂	98953	NITROBENZENE	2	103
C ₆ H ₅ NO ₃	88755	2-NITROPHENOL	4	95
C ₆ H ₅ NO ₃	100027	4-NITROPHENOL #1	2	105
C ₆ H ₅ NO ₃	100027	4-NITROPHENOL #2	2	107
C ₆ H ₅ NO ₃	100027	4-NITROPHENOL #3	2	109
C ₆ H ₅ N ₂	100709	2-CYANOPYRIDINE	3	117
C ₆ H ₅ N ₃ O ₄	97029	2,4-DINITROANILINE #1	1	147
C ₆ H ₅ N ₃ O ₄	97029	2,4-DINITROANILINE #2	3	119
C ₆ H ₆	71432	BENZENE #1	5	109
C ₆ H ₆	71432	BENZENE #2	5	111
C ₆ H ₆ BrN	106401	4-BROMOANILINE (also: P-BROMOANILINE)	1	149
C ₆ H ₆ CLN	95512	2-CHLOROANILINE #1	1	151
C ₆ H ₆ CLN	95512	2-CHLOROANILINE #2	3	121
C ₆ H ₆ CLN	106478	4-CHLOROANILINE	4	97
C ₆ H ₆ CLN	18368633	6-CHLORO-2-PICOLINE	3	123
C ₆ H ₆ FN	371404	4-FLUOROANILINE	1	153
C ₆ H ₆ N ₂ O ₂	100016	P-NITROANILINE	5	113
C ₆ H ₆ N ₂ O ₃	119346	4-AMINO-2-NITROPHENOL	2	111
C ₆ H ₆ O	108952	PHENOL #1	2	113
C ₆ H ₆ O	108952	PHENOL #2	2	115
C ₆ H ₆ O	108952	PHENOL #3	2	117
C ₆ H ₆ O	108952	PHENOL #4	5	115

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C ₆ H ₆ O ₂	120809	CATECHOL	5	117
C ₆ H ₇ CLIN	14338320	2-CHLORO-1-METHYL PYRIDINIUM IODIDE	4	99
C ₆ H ₇ N	62533	ANILINE #1	1	155
C ₆ H ₇ N	62533	ANILINE #2	5	119
C ₆ H ₇ N	62533	ANILINE #3	5	121
C ₆ H ₇ N	109068	2-PICOLINE	3	125
C ₆ H ₇ N	108996	3-PICOLINE	5	123
C ₆ H ₇ N	108894	4-PICOLINE	3	127
C ₆ H ₈ N ₂	111693	1,4-DICYANOBUTANE	1	157
C ₆ H ₈ O	625865	2,5-DIMETHYLFURAN	4	101
C ₆ H ₉ NO	20662844	2,4,5-TRIMETHYLOXAZOLE	1	159
C ₆ H ₁₀	513815	2,3-DIMETHYL-1,3-BUTADIENE	3	129
C ₆ H ₁₀	592461	2,4-HEXADIENE #1	4	103
C ₆ H ₁₀	592461	2,4-HEXADIENE #2	4	105
C ₆ H ₁₀ CL ₂	822866	TRANS-1,2-DICHLOROCYCLOHEXANE	1	161
C ₆ H ₁₀ O	108941	CYCLOHEXANONE #1	1	163
C ₆ H ₁₀ O	108941	CYCLOHEXANONE #2	1	165
C ₆ H ₁₀ O	924414	1,5-HEXADIEN-3-OL	4	107
C ₆ H ₁₀ O	77758	3-METHYL-1-PENTYN-3-OL	4	109
C ₆ H ₁₀ O ₃	868779	2-HYDROXYETHYL METHACRYLATE	3	131
C ₆ H ₁₀ O ₃	999611	2-HYDROXYPROPYL ACRYLATE #1	3	133
C ₆ H ₁₀ O ₃	999611	2-HYDROXYPROPYL ACRYLATE #2	3	135
C ₆ H ₁₁ BrO	34723825	2-(BROMOMETHYL)TETRAHYDRO-2H-PYRAN	4	111
C ₆ H ₁₁ NO	100641	CYCLOHEXANONE OXIME	5	125
C ₆ H ₁₁ NO	141913	2,6-DIMETHYLMORPHOLINE	3	137
C ₆ H ₁₂	110827	CYCLOHEXANE	5	127
C ₆ H ₁₂ N ₂	280579	1,4-DIAZABICYCLO[2,2,2]OCTANE	4	113
C ₆ H ₁₂ N ₂ O ₄ S ₂	56893	L-CYSTINE (STATIC)	2	119
C ₆ H ₁₂ N ₄	100970	HEXAMETHYLENETETRAMINE (ALIPHATIC)	4	115
C ₆ H ₁₂ O	108930	CYCLOHEXANOL	1	167
C ₆ H ₁₂ O	75978	3,3-DIMETHYL-2-BUTANONE	1	169
C ₆ H ₁₂ O	66251	HEXANAL #1	2	121
C ₆ H ₁₂ O	66251	HEXANAL #2	5	129
C ₆ H ₁₂ O	591786	2-HEXANONE	3	139
C ₆ H ₁₂ O	4798441	1-HEXEN-3-OL	4	117
C ₆ H ₁₂ O	928961	CIS-3-HEXEN-1-OL	4	119
C ₆ H ₁₂ O	928972	TRANS-3-HEXEN-1-OL	4	121
C ₆ H ₁₂ O	108101	4-METHYL-2-PENTANONE #1	1	171
C ₆ H ₁₂ O	108101	4-METHYL-2-PENTANONE #2	1	173
C ₆ H ₁₂ O	123159	2-METHYLVALERALDEHYDE	2	123
C ₆ H ₁₂ O ₂	123864	BUTYL ACETATE	1	175
C ₆ H ₁₂ O ₂	540885	TERT-BUTYL ACETATE	5	131
C ₆ H ₁₂ O ₂	142621	HEXANOIC ACID	1	177
C ₆ H ₁₂ O ₃	111159	2-ETHOXYETHYL ACETATE	2	125
C ₆ H ₁₂ O ₃	100798	SOLKETAL	4	123
C ₆ H ₁₃ Br	111251	1-BROMOHEXANE	4	125
C ₆ H ₁₃ CL ₂ N	7250671	1-(2-CHLOROETHYL)PYRROLIDINE.HCL	3	141
C ₆ H ₁₃ NO	685916	N,N-DIETHYLACETAMIDE	5	133
C ₆ H ₁₃ NO	622402	4-(2-HYDROXYETHYL)MORPHOLINE	3	143

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C ₆ H ₁₄	110543	HEXANE	5	135
C ₆ H ₁₄ NO ₂	103764	1-(2-HYDROXYETHYL)PIPERAZINE	3	145
C ₆ H ₁₄ O	111273	1-HEXANOL	1	179
C ₆ H ₁₄ O	108203	ISOPROPYL ETHER	2	127
C ₆ H ₁₄ O	77747	3-METHYL-3-PENTANOL	4	127
C ₆ H ₁₄ O ₂	107415	2-METHYL-2,4-PENTANEDIOL	1	181
C ₆ H ₁₄ O ₃	111900	2-(2-ETHOXYETHOXY)ETHANOL	4	129
C ₆ H ₁₄ O ₄	112276	TRIETHYLENE GLYCOL #1	4	131
C ₆ H ₁₄ O ₄	112276	TRIETHYLENE GLYCOL #2	4	133
C ₆ H ₁₄ O ₄	112276	TRIETHYLENE GLYCOL #3	4	135
C ₆ H ₁₄ S	111477	N-PROPYL SULFIDE	1	183
C ₆ H ₁₄ S ₂	5395755	3,6-DITHIAOCTANE	2	129
C ₆ H ₁₄ S ₂	4253898	ISOPROPYL DISULFIDE	2	131
C ₆ H ₁₄ S ₂	629196	PROPYL DISULFIDE	2	133
C ₆ H ₁₅ N	15673004	3,3-DIMETHYLBUTYLAMINE (STATIC RENEWAL)	4	137
C ₆ H ₁₅ N	111262	HEXYLAMINE	3	147
C ₆ H ₁₅ NO	100378	N,N-DIETHYLETHANOLAMINE	3	149
C ₆ H ₁₅ NO ₃	102716	TRIETHANOLAMINE	5	137
C ₆ H ₁₅ N ₃	140318	1-(2-AMINOETHYL)PIPERAZINE	3	151
C ₇ H ₇ F ₅ O	653372	PENTAFLUOROBENZALDEHYDE	1	185
C ₇ H ₃ Br ₂ NO	1689845	3,5-DIBROMO-4-HYDROXYBENZONITRILE #1	1	187
C ₇ H ₃ Br ₂ NO	1689845	3,5-DIBROMO-4-HYDROXYBENZONITRILE #2	4	139
C ₇ H ₃ Cl ₂ NO	1891958	3,5-DICHLORO-4-HYDROXYBENZONITRILE	5	141
C ₇ H ₃ I ₂ NO	1689834	3,5-DIIODO-4-HYDROXYBENZONITRILE	5	143
C ₇ H ₄ Br ₂ O ₂	90595	3,5-DIBROMOSALICYLALDEHYDE	1	189
C ₇ H ₄ ClFO	387451	2-CHLORO-6-FLUOROBENZALDEHYDE	1	191
C ₇ H ₄ ClNO ₃	6361213	2-CHLORO-5-NITROBENZALDEHYDE #1	1	193
C ₇ H ₄ ClNO ₃	6361213	2-CHLORO-5-NITROBENZALDEHYDE #2	1	195
C ₇ H ₄ ClNS ₂	5331919	5-CHLORO-2-MERCAPTOBENZOTHIAZOLE	1	197
C ₇ H ₄ Cl ₂ O	874420	2,4-DICHLOROBENZALDEHYDE	1	199
C ₇ H ₄ Cl ₄	8119	A,A-2,6-TETRACHLOROTOLUENE	1	201
C ₇ H ₄ F ₃ NO ₃	88302	3-TRIFLUOROMETHYL-4-NITROPHENOL	5	145
C ₇ H ₄ NaNO ₃ S	82385420	SACCHARIN SODIUM SALT HYDRATE	4	141
C ₇ H ₅ BrO ₂	1761611	5-BROMOSALICYLALDEHYDE	1	203
C ₇ H ₅ ClN ₂	5922601	2-AMINO-5-CHLOROBENZONITRILE	1	205
C ₇ H ₅ ClO	104881	4-CHLOROBENZALDEHYDE	1	207
C ₇ H ₅ ClO ₂	635938	5-CHLOROSALICYLALDEHYDE	1	209
C ₇ H ₅ Cl ₂ NO	2447792	2,4-DICHLOROBENZAMIDE	2	135
C ₇ H ₅ Cl ₂ NO	2008584	2,6-DICHLOROBENZAMIDE	2	137
C ₇ H ₅ FO	446526	2-FLUOROBENZALDEHYDE (also: o-FLUOROBENZALDEHYDE)	1	211
C ₇ H ₅ F ₄ N	393395	A,A,A-4-TETRAFLUORO-O-TOLUIDINE	1	215
C ₇ H ₅ F ₄ N	2357473	A,A,A-4-TETRAFLUORO-M-TOLUIDINE	1	213
C ₇ H ₅ NO ₃	552896	2-NITROBENZALDEHYDE #1 (also: o-NITROBENZALDEHYDE #1)	1	217
C ₇ H ₅ NO ₃	552896	2-NITROBENZALDEHYDE #2 (also: o-NITROBENZALDEHYDE #2)	1	219
C ₇ H ₅ NO ₃	555168	4-NITROBENZALDEHYDE	5	147
C ₇ H ₅ NO ₄	499832	2,6-PYRIDINEDICARBOXYLIC ACID	3	153

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C ₇ H ₅ NO ₄	42454068	5-HYDROXY-2-NITROBENZALDEHYDE	1	221
C ₇ H ₅ NS	95169	BENZOTHIAZOLE	5	149
C ₇ H ₅ NaO ₂	532321	BENZOIC ACID, SODIUM SALT	2	139
C ₇ H ₅ NaO ₃	54217	SALICYLIC ACID NA+ #1	2	141
C ₇ H ₅ NaO ₃	54217	SALICYLIC ACID NA+ #2	2	143
C ₇ H ₆ BrNO	722726007	3-BROMOBENZAMIDE (also: M-BROMOBENZAMIDE)	2	145
C ₇ H ₆ CL ₂	95750	3,4-DICHLOROTOLUENE	1	223
C ₇ H ₆ CL ₂ O ₂	2460493	4,5-DICHLOROGUAIACOL	2	147
C ₇ H ₆ N ₂ O ₃	619807	4-NITROBENZAMIDE	2	149
C ₇ H ₆ N ₂ O ₄	121142	2,4-DINITROTOLUENE	5	151
C ₇ H ₆ N ₂ O ₅	534521	4,6-DINITRO-O-CRESOL #1	2	151
C ₇ H ₆ N ₂ O ₅	534521	4,6-DINITRO-O-CRESOL #2	2	153
C ₇ H ₆ O	100527	BENZALDEHYDE #1	1	225
C ₇ H ₆ O	100527	BENZALDEHYDE #2	2	155
C ₇ H ₆ O ₂	90028	SALICYLALDEHYDE	1	227
C ₇ H ₆ O ₃	95012	2,4-DIHYDROXYBENZALDEHYDE	1	229
C ₇ H ₇ ClO	59507	4-CHLORO-3-METHYL PHENOL #1	2	157
C ₇ H ₇ ClO	59507	4-CHLORO-3-METHYL PHENOL #2	2	159
C ₇ H ₇ F	95523	2-FLUOROTOLUENE #1	3	155
C ₇ H ₇ F	95523	2-FLUOROTOLUENE #2	3	157
C ₇ H ₇ NO	1122549	4-ACETILPYRIDINE	3	159
C ₇ H ₇ NO	55210	BENZAMIDE	2	161
C ₇ H ₇ NO ₂	65452	2-HYDROXYBENZAMIDE	2	163
C ₇ H ₇ NO ₂	99081	3-NITROTOLUENE (also: M-NITROTOLUENE)	3	161
C ₇ H ₇ NO ₂	94677	SALICYLALDOXIME	5	153
C ₇ H ₈	108883	TOLUENE #1	3	163
C ₇ H ₈	108883	TOLUENE #2	5	155
C ₇ H ₈ CLN	615656	2-CHLORO-4-METHYLANILINE	1	231
C ₇ H ₈ CLNO ₂	6266235	1-(CARBOXYMETHYL)PYRIDINIUM CHLORIDE	4	143
C ₇ H ₈ FN	459596	4-FLUORO-N-METHYLANILINE	1	233
C ₇ H ₈ N ₂ O	88686	ANTHRANILAMIDE	1	235
C ₇ H ₈ O	1319773	CRESOL (MIXED)	5	159
C ₇ H ₈ O	95487	o-CRESOL	5	157
C ₇ H ₈ O	106445	4-METHYLPHENOL	3	165
C ₇ H ₈ O ₂	150196	3-METHOXYPHENOL	2	165
C ₇ H ₈ O ₂	150765	4-METHOXYPHENOL	2	167
C ₇ H ₉ N	100469	BENZYLAMINE	5	161
C ₇ H ₉ N	100710	2-ETHYLPYRIDINE	5	163
C ₇ H ₉ N	100618	N-METHYLANILINE	5	165
C ₇ H ₉ N	106490	4-TOLUIDINE #1	3	167
C ₇ H ₉ N	106490	4-TOLUIDINE #2	5	167
C ₇ H ₉ NO	932161	2-ACETYL-1-METHYLPYRROLE	1	237
C ₇ H ₁₀	498668	NORBORNYLENE	4	145
C ₇ H ₁₀ N ₂	2706561	2-(2-AMINOETHYL)PYRIDINE	5	169
C ₇ H ₁₀ N ₂	95807	2,4-DIAMINOTOLUENE	5	171
C ₇ H ₁₀ N ₂	5683330	2-DIMETHYLAMINOPYRIDINE	3	169
C ₇ H ₁₀ O ₂	96059	ALLYL METHACRYLATE	3	171

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C ₇ H ₁₁ ClO ₄	14064109	DIETHYL CHLOROMALONATE	1	239
C ₇ H ₁₁ O		3,4-DIMETHYL-1-PENTYN-3-OL	4	147
C ₇ H ₁₂ O	7383199	1-HEPTYN-3-OL	4	73
C ₇ H ₁₂ O	497370	EXO-NORBORNEOL	4	149
C ₇ H ₁₂ O ₂	106638	ISOBUTYL ACRYLATE #1	3	173
C ₇ H ₁₂ O ₂	106638	ISOBUTYL ACRYLATE #2	4	151
C ₇ H ₁₂ O ₂	4655349	ISOPROPYL METHACRYLATE	3	175
C ₇ H ₁₂ O ₄	105533	DIETHYL MALONATE #1	1	241
C ₇ H ₁₂ O ₄	105533	DIETHYL MALONATE #2	2	169
C ₇ H ₁₂ O ₄	105533	DIETHYL MALONATE #3	3	177
C ₇ H ₁₂ O ₄	4839467	3,3-DIMETHYLGLUTARIC ACID	5	173
C ₇ H ₁₃ N ₃ O ₃ S	23135220	OXAMYL	5	175
C ₇ H ₁₄ N ₂ O ₂ S	116063	ALDICARB	5	177
C ₇ H ₁₄ O	3944761	2,3-DIMETHYLVALERALDEHYDE	2	171
C ₇ H ₁₄ O	110430	2-HEPTANONE	3	179
C ₇ H ₁₄ O	110123	5-METHYL-2-HEXANONE	1	243
C ₇ H ₁₅ Br	629049	1-BROMOHEPTANE	4	153
C ₇ H ₁₅ NO	22104627	4-DIMETHYLAMINO-3-METHYL-2-BUTANONE	1	245
C ₇ H ₁₆ O	600362	2,4-DIMETHYL-3-PENTANOL	4	155
C ₇ H ₁₆ O	111706	1-HEPTANOL	3	181
C ₇ H ₁₇ N	111682	HEPTYLAMINE	1	247
		(also: N-HEPTYLAMINE)		
C ₈ Cl ₈	29082744	OCTACHLOROSTYRENE	3	183
C ₈ H ₂ OSn	597648	TETRAETHYL TIN	5	197
C ₈ H ₄ F ₃ N	447609	A,A,A-TRIFLUORO-O-TOLUNITRILE	1	251
C ₈ H ₄ F ₃ N	368774	A,A,A-TRIFLUORO-M-TOLUNITRILE	1	249
C ₈ H ₅ Br ₅	85223	2,3,4,5,6-PENTABROMOETHYL BENZENE	4	157
C ₈ H ₅ Cl ₃ O	13608872	2',3',4'-TRICHLOROACETOPHENONE	1	253
C ₈ H ₅ F ₃ O	454897	A,A,A-TRIFLUORO-M-TOLUALDEHYDE #1	1	255
C ₈ H ₅ F ₃ O	454897	A,A,A-TRIFLUORO-M-TOLUALDEHYDE #2	3	185
C ₈ H ₅ F ₃ O	454897	A,A,A-TRIFLUORO-M-TOLUALDEHYDE #3	4	159
C ₈ H ₆ Br ₄	13209159	A,A,A',A'-TETRABROMO-O-XYLENE	4	161
C ₈ H ₆ CLN	6575093	2-CHLORO-6-METHYLBENZONITRILE	1	257
C ₈ H ₆ CLNO ₃	5465656	4'-CHLORO-3'-NITROACETOPHENONE	1	259
C ₈ H ₆ CLNO ₄	42087809	METHYL 4-CHLORO-2-NITROBENZOATE	2	173
C ₈ H ₆ CL ₂ O	2234164	2',4'-DICHLOROACETOPHENONE	1	261
C ₈ H ₆ CL ₂ O ₂	2905693	METHYL 2,5-DICHLOROBENZOATE	2	175
C ₈ H ₆ O	271896	2,3-BENZOFURAN	4	163
C ₈ H ₇ BrO ₃	2973764	5-BROMOVANILLIN	1	263
C ₈ H ₇ ClO ₂	1126461	METHYL 4-CHLOROBENZOATE	2	177
		(also: METHYL P-CHLOROBENZOATE)		
C ₈ H ₇ N	529191	2-TOLUNITRILE	1	265
		(also: o-TOLUNITRILE)		
C ₈ H ₇ NO ₄	619501	METHYL 4-NITROBENZOATE	2	179
		(also: METHYL P-NITROBENZOATE)		
C ₈ H ₈	100425	STYRENE	5	179
C ₈ H ₈ CLNO		3-CHLORO-O-FORMOTOLUIDIDE	1	267
C ₈ H ₈ CL ₂	623256	A,A'-DICHLORO-P-XYLENE	1	269
C ₈ H ₈ N ₂ O	769288	3-CYANO-4,6-DIMETHYL-2-HYDROXYPYRIDINE	3	187

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C ₈ H ₈ O	98862	ACETOPHENONE	1	271
C ₈ H ₈ O	496162	2,3-DIHYDROBENZOFURAN	4	165
C ₈ H ₈ O	529204	2-TOLUALDEHYDE (also: o-TOLUALDEHYDE)	1	273
C ₈ H ₈ O ₃	148538	3-METHOXY SALICYLALDEHYDE #1 (see also: o-VANILLIN #1)	1	275
C ₈ H ₈ O ₃	148538	3-METHOXY SALICYLALDEHYDE #2 (see also: o-VANILLIN #2)	1	277
C ₈ H ₈ O ₃	121335	VANILLIN #1	1	279
C ₈ H ₈ O ₃	121335	VANILLIN #2	1	281
C ₈ H ₈ O ₃	148538	o-VANILLIN #1 (see also: 3-METHOXY SALICYLALDEHYDE #1)	1	275
C ₈ H ₈ O ₃	148538	o-VANILLIN #2 (see also: 3-METHOXY SALICYLALDEHYDE #2)	1	277
C ₈ H ₈ O ₄	2150472	METHYL 2,4-DIHYDROXYBENZOATE	2	181
C ₈ H ₉ NO	99036	3'-AMINOACETOPHENONE (also: M-AMINOACETOPHENONE)	1	283
C ₈ H ₉ NO ₂	614802	2-ACETAMIDOPHENOL #1	1	285
C ₈ H ₉ NO ₂	614802	2-ACETAMIDOPHENOL #2	1	287
C ₈ H ₉ NO ₂	621421	3-ACETAMIDOPHENOL	1	289
C ₈ H ₉ NO ₂	103902	4-ACETAMIDOPHENOL (also: o-METHOXYBENZAMIDE)	1	291
C ₈ H ₉ NO ₂	2439772	2-METHOXYBENZAMIDE	2	183
C ₈ H ₁₀	100414	ETHYLBENZENE #1	3	189
C ₈ H ₁₀	100414	ETHYLBENZENE #2	5	181
C ₈ H ₁₀	95476	o-XYLENE #1	5	183
C ₈ H ₁₀	95476	o-XYLENE #2	5	185
C ₈ H ₁₀	108383	m-XYLENE	5	187
C ₈ H ₁₀	106423	4-XYLENE (also: P-XYLENE)	3	191
C ₈ H ₁₀	1330207	XYLENE, MIXED	5	189
C ₈ H ₁₀ N ₂ O ₃	616864	4-ETHOXY-2-NITROANILINE	3	193
C ₈ H ₁₀ N ₄ O ₂	58082	CAFFEINE	4	167
C ₈ H ₁₀ O	105679	2,4-DIMETHYLPHENOL	2	185
C ₈ H ₁₀ O	123079	4-ETHYLPHENOL	3	195
C ₈ H ₁₀ O ₂	150787	1,4-DIMETHOXYBENZENE (also: P-DIMETHOXYBENZENE)	1	293
C ₈ H ₁₀ O ₂	122996	2-PHENOXYETHANOL	1	295
C ₈ H ₁₁ N	121697	N,N-DIMETHYLANILINE #1	1	297
C ₈ H ₁₁ N	121697	N,N-DIMETHYLANILINE #2	1	299
C ₈ H ₁₁ N	589162	4-ETHYLANILINE	3	197
C ₈ H ₁₁ N	104905	5-ETHYL-2-METHYLPYRIDINE	1	301
C ₈ H ₁₁ NO	2859678	3-(3-PYRIDYL)-1-PROPANOL	1	303
C ₈ H ₁₂ N ₂	629403	1,6-DICYANOHEXANE	1	305
C ₈ H ₁₂ N ₂ OS	5217470	1,3-DIETHYL-2-THIOBARBITURIC ACID	4	169
C ₈ H ₁₂ O	78273	1-ETHYNYL-1-CYCLOHEXANOL	3	199
C ₈ H ₁₂ O ₂	126818	5,5-DIMETHYL-1,3-CYCLOHEXANEDIONE	4	171
C ₈ H ₁₄	764136	2,5-DIMETHYL-2,4-HEXADIENE	3	201
C ₈ H ₁₄ O	110930	6-METHYL-5-HEPTEN-2-ONE	1	307

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C ₈ H ₁₄ O	818724	1-OCTYN-3-OL	4	173
C ₈ H ₁₄ O ₃	2370630	2-ETHOXYETHYL METHACRYLATE	3	203
C ₈ H ₁₆ O	111137	2-OCTANONE	1	309
C ₈ H ₁₆ O	15045439	2,2,5,5-TETRAMETHYLTETRAHYDROFURAN	4	175
C ₈ H ₁₆ O ₂	123660	ETHYL HEXANOATE	1	311
C ₈ H ₁₆ O ₂	142927	HEXYL ACETATE	1	313
C ₈ H ₁₇ Br	111831	1-BROMOCTANE	4	177
C ₈ H ₁₈ O	142961	BUTYL ETHER	4	179
C ₈ H ₁₈ O	104767	2-ETHYL-1-HEXANOL	2	187
C ₈ H ₁₈ O	111875	1-OCTANOL #1 (also: N-OCTANOL #1)	1	315
C ₈ H ₁₈ O	111875	1-OCTANOL #2 (also: N-OCTANOL #2)	2	189
C ₈ H ₁₈ O	111875	1-OCTANOL #3 (also: N-OCTANOL #3)	4	181
C ₈ H ₁₈ O	111875	1-OCTANOL #4 (also: N-OCTANOL #4)	4	183
C ₈ H ₁₈ O	111875	1-OCTANOL #5 (also: N-OCTANOL #5)	5	191
C ₈ H ₁₈ O	111875	1-OCTANOL #6 (also: N-OCTANOL #6)	5	193
C ₈ H ₁₈ S	544401	BUTYL SULFIDE (also: N-BUTYL SULFIDE)	1	317
C ₈ H ₁₈ S	107471	TERT-BUTYL SULFIDE	4	185
C ₈ H ₁₈ S ₂	110065	TERT-BUTYL DISULFIDE (also: t-BUTYL DISULFIDE)	2	191
C ₈ H ₁₈ S ₂	56348404	2,9-DITHIADECANE	2	193
C ₈ H ₁₈ S ₂	54576328	3,8-DITHIADECANE	2	195
C ₈ H ₁₈ S ₂		4,7-DITHIADECANE	2	197
C ₈ H ₁₉ N	693163	1-METHYL HEPTYLAMINE #1	1	319
C ₈ H ₁₉ N	693163	1-METHYL HEPTYLAMINE #2	1	321
C ₈ H ₁₉ N	111864	OCTYLAMINE	4	187
C ₈ H ₁₉ N	107459	TERT-OCTYLAMINE	4	189
C ₈ H ₁₉ NO	96800	2-(DIISOPROPYLAMINO)ETHANOL	4	191
C ₈ H ₁₉ O ₂ PS ₃	298044	DISULFOTON	4	193
C ₈ H ₁₉ O ₃ PS ₂	8065483	DEMETON	5	195
C ₉ H ₇ N	91225	QUINOLINE	5	199
C ₉ H ₇ NO ₂	1129357	METHYL 4-CYANOBENZOATE	1	323
C ₉ H ₉ CL	30030252	CHLOROMETHYL STYRENE (also: P-CHLOROMETHYL STYRENE)	2	199
C ₉ H ₉ CL ₂ NO	709988	PROPANIL	3	205
C ₉ H ₉ N	83341	3-METHYLINDOLE	5	201
C ₉ H ₉ N	6921295	TRIPROPARGYLAMINE	3	207
C ₉ H ₁₀ CL ₂ N ₂ O	330541	DIURON	3	209
C ₉ H ₁₀ O	1745819	2-ALLYLPHENOL	2	201
C ₉ H ₁₀ O ₂	10031820	4-ETHOXYBENZALDEHYDE (also: P-ETHOXYBENZALDEHYDE)	1	325
C ₉ H ₁₀ O ₂	93890	ETHYL BENZOATE	5	203
C ₉ H ₁₀ O ₃	613456	2,4-DIMETHOXYBENZALDEHYDE	1	331

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C ₉ H ₁₀ O ₃	121324	3-ETHOXY-4-HYDROXYBENZALDEHYDE	1	327
C ₉ H ₁₀ O ₃	118616	ETHYL SALICYLATE #1	2	203
C ₉ H ₁₀ O ₃	118616	ETHYL SALICYLATE #2	2	205
C ₉ H ₁₀ O ₃	522410	2'-HYDROXY-4'-METHOXYACETOPHENONE #1	1	329
C ₉ H ₁₀ O ₃	552410	2'-HYDROXY-4'-METHOXYACETOPHENONE #2	3	211
C ₉ H ₁₀ O ₄	708769	4,6-DIMETHOXY-2-HYDROXYBENZALDEHYDE	1	333
C ₉ H ₁₁ CL ₃ NO ₃ PS	2921882	CHLORPYRIFOS #1	4	195
C ₉ H ₁₁ CL ₃ NO ₃ PS	2921882	CHLORPYRIFOS #2	4	197
C ₉ H ₁₁ N	589093	N-ALLYLANILINE	1	335
C ₉ H ₁₁ NO	70699	4'-AMINOPROPIOPHENONE	5	205
C ₉ H ₁₁ NO	100107	4-DIMETHYLAMINOBENZALDEHYDE (also: P-DIMETHYLAMINOBENZALDEHYDE)	1	337
C ₉ H ₁₁ NO ₂	94097	ETHYL 4-AMINOBENZOATE #1 (also: ETHYL P-AMINOBENZOATE #1)	2	207
C ₉ H ₁₁ NO ₂	94097	ETHYL 4-AMINOBENZOATE #2 (also: ETHYL P-AMINOBENZOATE #2)	2	209
C ₉ H ₁₂	98828	ISOPROPYL BENZENE	3	213
C ₉ H ₁₂	95636	1,2,4-TRIMETHYLBENZENE	3	215
C ₉ H ₁₂ O	645567	4-PROPYLPHENOL	3	217
C ₉ H ₁₂ O	2416946	2,3,6-TRIMETHYLPHENOL	5	207
C ₉ H ₁₂ O	527606	2,4,6-TRIMETHYLPHENOL	5	209
C ₉ H ₁₂ O ₂	5673074	2,6-DIMETHOXYTOLUENE	4	199
C ₉ H ₁₃ BrN ₂ O ₂	314409	BROMACIL	4	201
C ₉ H ₁₃ N	103833	N,N-DIMETHYLBENZYLAMINE	3	219
C ₉ H ₁₃ N	99978	N,N-DIMETHYL-P-TOLUIDINE #1	3	221
C ₉ H ₁₃ N	99978	N,N-DIMETHYL-P-TOLUIDINE #2	3	223
C ₉ H ₁₃ N	14321278	N-ETHYLBENZYLAMINE	1	339
C ₉ H ₁₃ N	102272	N-ETHYL-M-TOLUIDINE	1	341
C ₉ H ₁₄ IN	98044	PHENYLTRIMETHYLAMMONIUM IODIDE	4	203
C ₉ H ₁₄ O	78591	ISOPHORONE	5	211
C ₉ H ₁₄ O ₂	3066715	CYCLOHEXYL ACRYLATE	3	225
C ₉ H ₁₄ O ₃	2455245	TETRAHYDROFURFURYL METHACRYLATE	3	227
C ₉ H ₁₅ NO ₆	3206313	TRIETHYL NITRILOTRICARBOXYLATE	4	205
C ₉ H ₁₆ CLNO ₂		2-CHLOROETHYL-N-CYCLOHEXYL CARBAMATE	4	207
C ₉ H ₁₆ O		3,6-DIMETHYL-1-HEPTYN-3-OL	4	209
C ₉ H ₁₆ O ₂	2499958	HEXYL ACRYLATE #1	3	229
C ₉ H ₁₆ O ₂	2499958	HEXYL ACRYLATE #2	4	211
C ₉ H ₁₇ N	2243278	OCTYL CYANIDE #1 (also: N-OCTYL CYANIDE #1)	1	343
C ₉ H ₁₇ N	2243278	OCTYL CYANIDE #2 (also: N-OCTYL CYANIDE #2)	1	345
C ₉ H ₁₈ O	821556	2-NONANONE	3	231
C ₉ H ₁₈ O	502567	5-NONANONE	1	347
C ₉ H ₁₈ O ₂	112050	NONANOIC ACID	1	349
C ₉ H ₁₉ NO	761659	N,N-DIBUTYLFORMAMIDE	1	351
C ₉ H ₁₉ NO	105146	5-DIETHYLAMINO-2-PENTANONE	3	233
C ₉ H ₂₀ O	143088	1-NONANOL	1	353
C ₉ H ₂₁ N	112209	NONYLAMINE	5	213
C ₉ H ₂₁ N	102692	TRIPROPYLAMINE	3	235

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C ₉ H ₂₁ O ₂ PS ₃	13071799	TERBUFOS	5	215
C ₁₀ H ₆ N ₂ O ₅	101836924	2,4-DINITRO-1-NAPHTHOL, SODIUM SALT	4	213
C ₁₀ H ₈	91203	NAPHTHALENE	2	211
C ₁₀ H ₈ O	90153	1-NAPHTHOL	2	213
C ₁₀ H ₉ NO ₆	5292455	DIMETHYL NITROTEREPHTHALATE	2	215
C ₁₀ H ₁₀ N ₂ O ₂ S	2232088	1-(P-TOLUENESULFONYL)IMIDAZOLE	1	355
C ₁₀ H ₁₀ O	127662	2-PHENYL-3-BUTYN-2-OL	4	215
C ₁₀ H ₁₀ O ₂	93914	1-BENZOYLACETONE	5	217
C ₁₀ H ₁₀ O ₄	131113	DIMETHYL PHTHALATE	5	219
C ₁₀ H ₁₁ BrO ₃	1204213	2-BROMO-2',5'-DIMETHOXYACETOPHENONE #1 (also: A-BROMO-2',5'-DIMETHOXYACETOPHENONE #1)	1	357
C ₁₀ H ₁₁ BrO ₃	1204213	2-BROMO-2',5'-DIMETHOXYACETOPHENONE #2 (also: A-BROMO-2',5'-DIMETHOXYACETOPHENONE #2)	2	217
C ₁₀ H ₁₁ BrO ₃	1204213	2-BROMO-2',5'-DIMETHOXYACETOPHENONE #3 (also: A-BROMO-2',5'-DIMETHOXYACETOPHENONE #3)	4	217
C ₁₀ H ₁₁ NO ₄	5372816	DIMETHYL AMINOTEREPHTHALATE	2	219
C ₁₀ H ₁₂ N ₂ O ₅	88857	2-SEC-BUTYL-4,6-DINITROPHENOL #1	2	221
C ₁₀ H ₁₂ N ₂ O ₅	88857	2-SEC-BUTYL-4,6-DINITROPHENOL #2	2	223
C ₁₀ H ₁₂ N ₃ O ₃ PS ₂	86500	AZINPHOS-METHYL	5	221
C ₁₀ H ₁₂ O	122032	4-ISOPROPYLBENZALDEHYDE (also: P-ISOPROPYL BENZALDEHYDE)	1	359
C ₁₀ H ₁₂ O ₄	4460860	2,4,5-TRIMETHOXYBENZALDEHYDE	2	225
C ₁₀ H ₁₃ CLN ₂	59972	TOLAZOLINE HYDROCHLORIDE (also: M-DIETHYLBENZENE)	3	237
C ₁₀ H ₁₄	141935	1,3-DIETHYLBENZENE	3	239
C ₁₀ H ₁₄ O	700583	2-ADAMANTANONE	3	241
C ₁₀ H ₁₄ O	98544	4-TERT-BUTYLPHENOL (also: P-TERT-BUTYLPHENOL)	2	227
C ₁₀ H ₁₄ O	1126790	BUTYL PHENYL ETHER	5	223
C ₁₀ H ₁₅ N	104132	4-BUTYLANILINE	3	243
C ₁₀ H ₁₅ N	91667	N,N-DIETHYLANILINE	3	245
C ₁₀ H ₁₅ NO ₂	120070	N-PHENYLDIETHANOLAMINE	3	247
C ₁₀ H ₁₅ NO ₅ S	886862	ETHYL 3-AMINOBenzoate, Methanesulfonic ACID SALT	4	219
C ₁₀ H ₁₆	281232	ADAMANTANE	3	249
C ₁₀ H ₁₆	5989275	(R)-(+)-LIMONENE	5	225
C ₁₀ H ₁₆ BrO	76299	[(1R)-ENDO]-(+)-3-BROMOCAMPHOR	4	221
C ₁₀ H ₁₆ O	464482	(1S)-(-)-CAMPHOR	5	227
C ₁₀ H ₁₇ N	768945	1-ADAMANTANAMINE	3	251
C ₁₀ H ₁₇ NO ₄ S	28001583	PHENYLTRIMETHYLAMMONIUM METHOSULFATE	4	223
C ₁₀ H ₁₈	1647161	1,9-DECADIENE	2	229
C ₁₀ H ₁₈ O	464459	[(1S)-ENDO]-(-)-BORNEOL #1	4	225
C ₁₀ H ₁₈ O	464459	[(1S)-ENDO]-(-)-BORNEOL #2	4	227
C ₁₀ H ₁₈ O	470826	CINEOLE	4	229
C ₁₀ H ₁₈ O	4117140	2-DECYN-1-OL	4	231
C ₁₀ H ₁₈ O ₂	706149	GAMMA-DECANOLACTONE	4	233
C ₁₀ H ₁₈ O ₄	141286	DIETHYL ADIPATE #1	1	361
C ₁₀ H ₁₈ O ₄	141286	DIETHYL ADIPATE #2	1	363
C ₁₀ H ₁₉ O ₆ PS ₂	121755	MALATHION	4	235

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C ₁₀ H ₂₀ O	693549	2-DECANONE #1	1	365
C ₁₀ H ₂₀ O	693549	2-DECANONE #2	1	367
C ₁₀ H ₂₀ O	2216515	(1R,2S,5R)-(-)-MENTHOL	4	237
C ₁₀ H ₂₁ N	91656	N,N-DIETHYLCYCLOHEXYLAMINE	4	239
C ₁₀ H ₂₂ N ₂	80524	1,8-DIAMINO-P-MENTHANE	4	241
C ₁₀ H ₂₂ O	112301	1-DECANOL	1	369
C ₁₀ H ₂₂ O	693652	PENTYL ETHER	4	243
C ₁₀ H ₂₂ S ₂		4,9-DITHIADODECANE	2	231
C ₁₀ H ₂₃ N	2016571	DECYLAMINE (also: N-DECYLAMINE)	1	371
C ₁₀ H ₂₄ N ₄	7209383	1,4-BIS(3-AMINOPROPYL)PIPERAZINE	5	229
C ₁₁ H ₉ N	939231	4-PHENYLPYRIDINE	3	253
C ₁₁ H ₁₂ O ₂	2495376	BENZYL METHACRYLATE	3	255
C ₁₁ H ₁₃ NO	6203185	4-DIMETHYLAMINOCINNAMALDEHYDE	2	233
C ₁₁ H ₁₄ O ₄	13909734	2',3',4'-TRIMETHOXYACETOPHENONE #1	1	373
C ₁₁ H ₁₄ O ₄	13909734	2',3',4'-TRIMETHOXYACETOPHENONE #2	3	257
C ₁₁ H ₁₅ NO		4-(TERT-BUTYL)BENZAMIDE (also: P-(TERT-BUTYL)BENZAMIDE)	2	235
C ₁₁ H ₁₅ NO	120218	4-(DIETHYLAMINO)BENZALDEHYDE	2	237
C ₁₁ H ₁₅ NO ₂	17754904	4-(DIETHYLAMINO)SALICYLALDEHYDE	2	239
C ₁₁ H ₁₅ NO ₃	114261	PROPOXUR	4	245
C ₁₁ H ₁₆	538681	AMYL BENZENE	3	259
C ₁₁ H ₁₆ N ₂	2759286	1-BENZYLPIPERAZINE	3	261
C ₁₁ H ₁₆ N ₂ O ₂	2032599	AMINOCARB	5	231
C ₁₁ H ₁₆ O	103059	BENZYL-TERT-BUTANOL	4	247
C ₁₁ H ₁₆ O	80466	P-TERT-PENTYLPHENOL	2	241
C ₁₁ H ₁₇ NO	91883	2-(N-ETHYL-M-TOLUIDINO)ETHANOL	3	263
C ₁₁ H ₁₇ NaN ₂ O ₂ S	71738	THIOPENTAL, SODIUM SALT	4	249
C ₁₁ H ₁₇ NaN ₂ O ₃	57330	PENTOBARBITAL	4	255
C ₁₁ H ₁₇ O ₃ P	1080326	DIETHYL BENZYLPHOSPHONATE	4	251
C ₁₁ H ₁₈ N ₂ O ₃	57432	AMOBARBITAL	4	253
C ₁₁ H ₂₂ O	112129	2-UNDECANONE	3	265
C ₁₁ H ₂₅ N	7307553	UNDECYLAMINE	5	233
C ₁₂ H ₄ CL ₆ S ₂	3808875	2,4,5-TRICHLOROPHENYL DISULFIDE	2	243
C ₁₂ H ₇ BrN ₂ O ₅		4-BROMO-2',4'-DINITRODIPHENYL ETHER	2	245
C ₁₂ H ₈ BrNO	14548459	4-BROMOPHENYL 3-PYRIDYL KETONE	3	267
C ₁₂ H ₈ CLNO ₃		4-CHLOROPHENYL-2-NITROPHENYL ETHER (also: P-CHLOROPHENYL-2-NITROPHENYL ETHER)	2	247
C ₁₂ H ₈ CL ₂ OS	3085425	4-CHLOROPHENYL SULFOXIDE	5	235
C ₁₂ H ₈ F ₂ O	330938	4-FLUOROPHENYL ETHER #1 (also: P-FLUOROPHENYL ETHER #1)	2	249
C ₁₂ H ₈ F ₂ O	330938	4-FLUOROPHENYL ETHER #2 (also: P-FLUOROPHENYL ETHER #2)	2	251
C ₁₂ H ₈ O	132649	DIBENZOFURAN #1	4	257
C ₁₂ H ₈ O	132649	DIBENZOFURAN #2	4	259
C ₁₂ H ₉ NO	14548460	4-BENZOYL PYRIDINE	3	269
C ₁₂ H ₉ NO ₃	620882	4-NITROPHENYL PHENYL ETHER	4	261
C ₁₂ H ₁₀	83329	ACENAPHTHENE	2	253

<u>FORMULA</u>	<u>CAS #</u>	<u>CHEMICAL NAME</u>	<u>VOL.</u> <u>NO.</u>	<u>PAGE</u>
C ₁₂ H ₁₀ N ₂ O	1689823	4-PHENYLAZOPHENOL (also: P-PHENYLAZOPHENOL)	2	255
C ₁₂ H ₁₀ O	101848	PHENYL ETHER	4	263
C ₁₂ H ₁₀ O	90437	2-PHENYLPHENOL	2	257
C ₁₂ H ₁₀ OS	945517	PHENYL SULFOXIDE	5	237
C ₁₂ H ₁₀ O ₂	831823	4-PHENOXYPHENOL (also: P-PHENOXYPHENOL)	2	259
C ₁₂ H ₁₀ O ₃	1965099	4,4'-DIHYDROXYDIPHENYL ETHER #1	2	261
C ₁₂ H ₁₀ O ₃	1965099	4,4'-DIHYDROXYDIPHENYL ETHER #2	2	263
C ₁₂ H ₁₀ S ₂	882337	PHENYL DISULFIDE	2	265
C ₁₂ H ₁₁ N	122394	DIPHENYLAMINE	5	239
C ₁₂ H ₁₁ NO ₂	63252	CARBARYL #1	4	265
C ₁₂ H ₁₁ NO ₂	63252	CARBARYL #2	4	267
C ₁₂ H ₁₁ NO ₂	63252	CARBARYL #3	4	269
C ₁₂ H ₁₁ NO ₂	63252	CARBARYL #4	4	271
C ₁₂ H ₁₂ N ₂	4916578	1,2-BIS(4-PYRIDYL)ETHANE	3	271
C ₁₂ H ₁₂ N ₂ O ₃	50066	PHENOBARBITAL	4	273
C ₁₂ H ₁₄ O ₄	84662	DIETHYL PHTHALATE	2	267
C ₁₂ H ₁₅ NO ₃	1563662	CARBOFURAN	5	241
C ₁₂ H ₁₆		TERT-BUTYLSTYRENE (also: t-BUTYLSTYRENE)	2	269
C ₁₂ H ₁₆ O	2362610	TRANS-2-PHENYL-1-CYCLOHEXANOL	2	271
C ₁₂ H ₁₇ NO	134623	N,N-DIETHYL-M-TOLUAMIDE	1	375
C ₁₂ H ₁₇ NO ₂	2626837	4-(TERT-BUTYL)-PHENYL-N-METHYLCARBAMATE (also: P-(TERT-BUTYL)-PHENYL-N-METHYLCARBAMATE)	1	377
C ₁₂ H ₁₇ NaN ₂ O ₃	309433	SECOBARBITAL	4	275
C ₁₂ H ₁₉ N	24544045	2,6-DIISOPROPYLANILINE #1	1	379
C ₁₂ H ₁₉ N	24544045	2,6-DIISOPROPYLANILINE #2	3	273
C ₁₂ H ₁₉ NO	39905572	4-HEXYLOXYANILINE #1 (NOMINAL CONCENTRATIONS)	1	381
C ₁₂ H ₁₉ NO	39905572	4-HEXYLOXYANILINE #2	3	275
C ₁₂ H ₂₀ O ₄	105759	DIBUTYL FUMARATE #1	2	273
C ₁₂ H ₂₀ O ₄	105759	DIBUTYL FUMARATE #2	2	275
C ₁₂ H ₂₀ O ₄	105759	DIBUTYL FUMARATE #3	4	277
C ₁₂ H ₂₀ O ₄	105759	DIBUTYL FUMARATE #4	5	243
C ₁₂ H ₂₁ N ₂ O ₃ PS	333415	DIAZINON	4	279
C ₁₂ H ₂₂	92513	DICYCLOHEXYL	5	245
C ₁₂ H ₂₂ O ₄	141037	DIBUTYL SUCCINATE	1	383
C ₁₂ H ₂₃ N	2437254	UNDECYL CYANIDE (also: N-UNDECYL CYANIDE)	1	385
C ₁₂ H ₂₄ O	6175491	2-DODECANONE	4	281
C ₁₂ H ₂₅ NO	1120167	DODECANAMIDE	2	277
C ₁₂ H ₂₇ N	143168	DIHEXYLAMINE (also: DI-N-HEXYLAMINE)	1	387
C ₁₂ H ₂₇ N	124221	DODECYLAMINE	5	247
C ₁₂ H ₂₇ O ₄ P	126738	TRIBUTYL PHOSPHATE #1	3	277
C ₁₂ H ₂₇ O ₄ P	126738	TRIBUTYL PHOSPHATE #2	3	279
C ₁₃ H ₆ CL ₆ O ₂	70304	2,2'-METHYLENEBIS(3,4,6-TRICHLOROPHENOL)	1	389
C ₁₃ H ₈ CL ₂ O ₂	79124768	3-(3,4-DICHLOROPHENOXY)BENZALDEHYDE	2	279
C ₁₃ H ₈ O ₂	58275	2-METHYL-1,4-NAPHTHOQUINONE	4	283

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C ₁₃ H ₈ O ₂	90471	XANTHONE #1	4	285
C ₁₃ H ₈ O ₂	90471	XANTHONE #2	4	287
C ₁₃ H ₁₀ CLNO	2894511	2-AMINO-4'-CHLOROBENZOPHENONE	2	281
C ₁₃ H ₁₀ CLNO ₃		4-CHLORO-3-TOLYL-4-NITROPHENYL ETHER (also: 4-CHLORO-M-TOLYL-P-NITROPHENYL ETHER)	2	283
C ₁₃ H ₁₀ CL ₂ O ₂	97234	2,2'-METHYLENEBIS(4-CHLOROPHENOL)	2	285
C ₁₃ H ₁₀ O	119619	BENZOPHENONE #1	1	391
C ₁₃ H ₁₀ O	119619	BENZOPHENONE #2	1	393
C ₁₃ H ₁₀ O ₂	67367	4-PHENOXYBENZALDEHYDE (also: P-PHENOXYBENZALDEHYDE)	1	395
C ₁₃ H ₁₀ O ₃	118558	PHENYL SALICYLATE	2	287
C ₁₃ H ₁₁ NO	607001	N,N-DIPHENYLFORMAMIDE #1	1	397
C ₁₃ H ₁₁ NO	607001	N,N-DIPHENYLFORMAMIDE #2	1	399
C ₁₃ H ₁₁ NO ₂	87172	SALICYLANILIDE	3	281
C ₁₃ H ₁₁ NO ₃	133119	PHENYL 4-AMINOSALICYLATE #1	2	289
C ₁₃ H ₁₁ NO ₃	133119	PHENYL 4-AMINOSALICYLATE #2	2	291
C ₁₃ H ₁₁ NO ₃ S	69723940	1-BENZYLPIRIDINIUM 3-SULFONATE	3	283
C ₁₃ H ₁₃ NO	1484260	3-BENZYLOXYANILINE	1	401
C ₁₃ H ₁₇ Br ₂ NO ₂		2,4-DIBROMO-5,6-DIMETHYLPHENYL-N-BUTYL CARBAMATE	4	289
C ₁₃ H ₁₉ N ₃ O ₄	40487421	FLUCYTHRINATE	5	249
C ₁₃ H ₂₀ O	79776	BETA-IONONE	4	291
C ₁₃ H ₂₂ CLN	56371	BENZYLTRIETHYLAMMONIUM CHLORIDE	4	293
C ₁₃ H ₂₆ O	593088	2-TRIDECANONE	4	295
C ₁₃ H ₂₆ O	462180	7-TRIDECANONE	1	403
C ₁₃ H ₂₈ O	112709	1-TRIDECANOL	1	405
C ₁₃ H ₂₉ N	2869343	TRIDECYLAMINE	5	251
C ₁₃ H ₂₉ NO ₄	6948863	N,N-BIS(2,2-DIETHOXYETHYL)METHYLAMINE #1	3	285
C ₁₃ H ₂₉ NO ₄	6948863	N,N-BIS(2,2-DIETHOXYETHYL)METHYLAMINE #2	3	287
C ₁₄ H ₈ O ₂	84651	ANTHRAQUINONE	4	297
C ₁₄ H ₉ CL ₅ O	115322	DICOFOL	4	299
C ₁₄ H ₁₀ O ₄ S ₂	119802	2,2'-DITHIOSALICYLIC ACID (STATIC)	2	293
C ₁₄ H ₁₁ N	1484135	N-VINYLCARBAZOLE	3	289
C ₁₄ H ₁₄ NO ₄ PS	2104645	O-ETHYL-O(P-NITROPHENYLPHENYL)PHOSPHONOTHIOATE	5	253
C ₁₄ H ₁₄ OS	621089	BENZYL SULFOXIDE	5	255
C ₁₄ H ₁₄ S ₂	103195	P-TOLYL DISULFIDE	2	295
C ₁₄ H ₁₈ O ₄	607818	DIETHYL BENZYLALONATE	2	297
C ₁₄ H ₂₀ CLNO ₂	15972608	ALACHLOR	3	291
C ₁₄ H ₂₀ O ₃		4-(HEXYLOXY)-M-ANISALDEHYDE	1	407
C ₁₄ H ₂₃ N	16245797	4-OCTYLANILINE	4	301
C ₁₄ H ₂₃ NO ₄	34274049	N-(3-METHOXYPROPYL)-3,4,5-TRIMETHOXYBENZYLAMINE	3	293
C ₁₄ H ₂₆ O ₄	105997	DIBUTYL ADIPATE	2	299
C ₁₄ H ₂₆ O ₄	110407	DIETHYL SEBACATE #1	1	409
C ₁₄ H ₂₆ O ₄	110407	DIETHYL SEBACATE #2	2	301
C ₁₄ H ₂₈ O	124254	TETRADECANAL	1	411
C ₁₅ H ₁₀ O ₂	525826	FLAVONE	4	303
C ₁₅ H ₁₂ CL ₄ O ₂	79958	4,4'-ISOPROPYLIDENE BIS(2,6-DICHLOROPHENOL)	4	305
C ₁₅ H ₁₂ O		1,1-DIPHENYL-2-PROPYN-1-OL	4	307
C ₁₅ H ₂₄ O	104405	NONYLPHENOL	2	303

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C ₁₅ H ₂₆ O	7212444	3-HYDROXY-3,7,11-TRIMETHYL-1,6,10-DODECATRIENE	4	309
C ₁₅ H ₂₈ O ₂	2156970	LAURYL ACRYLATE	3	295
C ₁₆ H ₁₂ O	955839	2,5-DIPHENYLFURAN #1	2	305
C ₁₆ H ₁₂ O	955839	2,5-DIPHENYLFURAN #2	4	311
C ₁₆ H ₁₄	886657	1,4-DIPHENYL-1,3-BUTADIENE	3	297
C ₁₆ H ₂₂ O ₄	84695	DIBUTYL ISOPHTHALATE	2	307
C ₁₆ H ₂₂ O ₄	84742	DIBUTYL PHTHALATE #1 (also: DI-N-BUTYLORHTOPHTHALATE #1)	2	309
C ₁₆ H ₂₂ O ₄	84742	DIBUTYL PHTHALATE #2 (also: DI-N-BUTYLORHTOPHTHALATE #2)	2	311
C ₁₆ H ₂₂ O ₄	1962750	DI-N-BUTYLTEREPHTHALATE (also: DI-N-BUTYLISOPHTHALATE)	4	313
C ₁₆ H ₂₅ NO ₂	55792615	2'-(OCTYLOXY)-ACETANILIDE	3	299
C ₁₆ H ₂₇ N	37529309	4-DECYLANILINE	4	315
C ₁₆ H ₃₆ Sn	1461252	TETRABUTYLTIN	5	257
C ₁₇ H ₁₃ N	3558698	2,6-DIPHENYLPYRIDINE	3	301
C ₁₇ H ₁₈ O ₂	69770236	3-(4-TERT-BUTYLPHENOXY)BENZALDEHYDE	2	313
C ₁₇ H ₁₉ NO ₃	94622	PIPERINE (ALIPHATIC)	4	317
C ₁₇ H ₂₀ N ₄ O ₆	83885	(-)-RIBOFLAVIN	4	319
C ₁₈ H ₉ CL ₆ O ₄ P	75431491	TRIS(2,6-DICHLOROPHENYL) PHOSPHATE	3	303
C ₁₈ H ₁₂ N ₃ O ₇ P		TRIS(M-NITROPHENYL) PHOSPHINE OXIDE	3	305
C ₁₈ H ₁₅ N	603349	TRIPHENYLAMINE	3	307
C ₁₈ H ₁₅ OP	791286	TRIPHENYLPHOSPHINE OXIDE	3	309
C ₁₈ H ₁₅ O ₄ P	115866	TRIPHENYL PHOSPHATE	3	311
C ₁₈ H ₂₈ N ₂ O ₄ S	60139	AMPHETAMINE SULFATE	4	321
C ₁₈ H ₃₀ O	732263	2,4,6-TRI-TERT-BUTYLPHENOL	5	259
C ₁₈ H ₃₁ N	104427	4-DODECYLANILINE	4	323
C ₁₈ H ₃₆ O	143282	CIS-OCTADECEN-1-OL	1	413
C ₁₈ H ₃₉ O ₇ P	78513	TRIS(2-BUTOXYETHYL) PHOSPHATE	3	313
C ₁₉ H ₁₂ O ₆	66762	DICUMAROL	5	261
C ₂₀ H ₁₄ O ₄	84628	DIPHENYL PHTHALATE	2	315
C ₂₀ H ₂₈ O ₂	1740198	DEHYDROABIETIC ACID	2	317
C ₂₀ H ₃₀ N ₂ O ₄ S	65305	NICOTINE SULFATE #1	4	325
C ₂₀ H ₃₀ N ₂ O ₄ S	65305	NICOTINE SULFATE #2	5	263
C ₂₀ H ₃₀ O ₂	514103	ABIETIC ACID	2	319
C ₂₀ H ₃₀ O ₂	5835267	ISOPIMARIC ACID	2	321
C ₂₀ H ₃₀ O ₂	471772	NEOABIETIC ACID #1	2	323
C ₂₀ H ₃₀ O ₂	471772	NEOABIETIC ACID #2	2	325
C ₂₀ H ₃₄ O	596850	MANOOL	3	315
C ₂₁ H ₁₈ N ₂	484479	2,4,5-TRIPHENYLIMIDAZOLE	3	317
C ₂₁ H ₁₈ N ₃ O ₁₀ P		TRIS(5-METHYL-2-NITROPHENYL) PHOSPHATE	3	319
C ₂₁ H ₂₀ CL ₂ O ₃	52645531	PERMETHRIN	4	327
C ₂₁ H ₂₂ N ₂ O ₂ * 1/2(H ₂ SO ₄)	60413	STRYCHNINE HEMISULPHATE SALT	5	265
C ₂₂ H ₂₆ O ₃	10453868	RESMETHRIN	5	267
C ₂₃ H ₂₂ O ₆	83794	ROTENONE #1	3	321
C ₂₃ H ₂₂ O ₆	83794	ROTENONE #2	5	269
C ₂₄ H ₂₀ Sn	595904	TETRAPHENYLTIN	5	271
C ₂₄ H ₂₇ O ₄ P	65695978	TRIS(2,3-DIMETHYLPHENYL) PHOSPHATE	3	323

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$C_{24}H_{27}O_4P$	3862111	TRIS(3,4-DIMETHYLPHENYL) PHOSPHATE	3	325
$C_{24}H_{30}N_3OP$	807205	TRIS(P-DIMETHYLAMINOPHENYL) PHOSPHINE OXIDE	3	327
$C_{24}H_{38}O_4$		DI-N-OCTYLISOPHTHALATE	4	329
$C_{24}H_{38}O_4$	117817	DIOCTYL PHTHALATE	5	273
$C_{24}H_{38}O_4$	117840	DI-N-OCTYLPHTHALATE	4	331
$C_{24}H_{38}O_4$		DI-N-OCTYLTEREPHTHALATE	4	333
$C_{24}H_{54}OSn_2$	56359	BIS(TRIBUTYL TIN) OXIDE	5	275
$C_{25}H_{22}ClNO_3$	51630581	FENVALERATE #1	4	335
$C_{25}H_{22}ClNO_3$	51630581	FENVALERATE #2	5	277
$C_{28}H_{34}O_{10}$		a,w-BUTYLENE DI-[O-(4-HYDROXYBUTOXYCARBONYL)] BENZOATE	4	337
NaN_3	26628228	SODIUM AZIDE	5	279

MEDIAN LETHAL CONCENTRATIONS (LC50) OF TEST CHEMICALS FOR WHICH
VALUES ARE AVAILABLE FOR TIMES LESS THAN 96 HR

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Abietic Acid	(MG/L)	0	-99	0	-99	72	2.63	96	2.38	2	319
Acenaphthene	(MG/L)	0	-99	0	-99	72	1.84	96	1.73	2	253
Acetaldoxime	(MG/L)	24	153.55	48	109.76	72	88.92	96	76.00	5	35
2-Acetamidophenol (Test 1)	(MG/L)	24	48.43	48	22.10	72	22.10	96	22.10	1	285
2-Acetamidophenol (Test 2)	(MG/L)	24	58.24	48	35.71	72	33.71	96	33.00	1	287
3-Acetamidophenol	(MG/L)	0	-99	48	1298.64	72	1184.92	96	1130.00	1	289
4-Acetamidophenol	(MG/L)	0	-99	0	-99	72	920.27	96	814.00	1	291
Acetone (Test 1)	(G/L)	24	8.83	48	8.29	72	8.12	96	8.12	1	51
Acetone (Test 2)	(G/L)	24	9.40	48	8.88	72	7.94	96	7.28	1	53
Acetone (Test 3)	(G/L)	24	8.03	48	6.53	72	6.40	96	6.21	1	55
Acetone Oxime	(MG/L)	24	-99	48	-99	72	708.90	96	558.00	5	57
Acetonitrile	(MG/L)	24	2345.88	48	1933.23	72	1851.58	96	1640.00	1	27
Acetophenone	(MG/L)	24	163.61	48	163.61	72	162.50	96	162.00	1	271
4-Acetylpyridine	(MG/L)	24	267.08	48	200.82	72	177.91	96	168.00	3	159
Acrolein (Test 1)	(UG/L)	24	24.88	48	19.50	72	19.50	96	19.50	4	41
Acrolein (Test 2)	(UG/L)	24	33.77	48	16.56	72	14.00	96	14.00	5	47
Acrylamide	(MG/L)	0	-99	48	190.37	72	145.83	96	109.00	5	53
1-Adamantanamine	(MG/L)	24	49.93	48	39.88	72	34.21	96	25.00	3	251
Adamantane	(UG/L)	0	-99	48	330.20	72	293.94	96	285.00	3	249
2-Adamantanone	(MG/L)	24	59.45	48	59.45	72	60.63	96	60.80	3	241
Alachlor	(MG/L)	24	10.10	48	6.85	72	5.83	96	5.00	3	291
Aldicarb	(UG/L)	24	861.00	48	861.00	72	861.00	96	861.00	5	177
Allyl Alcohol	(MG/L)	24	0.63	48	0.34	72	0.32	96	0.32	5	55
N-Allylaniline	(MG/L)	24	35.90	48	35.90	72	35.90	96	35.90	1	335
Allyl Cyanide	(MG/L)	24	234.20	48	190.33	72	186.43	96	182.00	1	87
Allyl Isothiocyanate	(UG/L)	0	-99	0	-99	72	85.60	96	85.60	5	65
Allyl Methacrylate	(MG/L)	24	1.59	48	1.03	72	1.01	96	0.99	3	171
2-Allylphenol	(MG/L)	24	37.25	48	20.10	72	16.19	96	15.00	2	201
2-Amino-5-bromopyridine	(MG/L)	24	199.08	48	191.16	72	181.34	96	177.00	3	77
Aminocarb	(MG/L)	0	-99	48	3.35	72	2.26	96	1.95	5	231
2-Amino-5-chlorobenzonitrile	(MG/L)	0	-99	0	-99	72	29.46	96	28.60	1	205
2-Amino-4'-chlorobenzophenone	(MG/L)	24	2.46	48	2.12	72	2.12	96	2.12	2	281
2-Amino-4-chloro-6-methylpyrimidine (Test 1)	(MG/L)	24	153.16	48	153.16	72	153.16	96	147.00	3	83
2-Amino-4-chloro-6-methylpyrimidine (Test 2)	(MG/L)	24	148.73	48	146.08	72	146.08	96	136.00	3	85
3-Amino-5,6-dimethyl-1,2,4-triazine	(MG/L)	0	-99	48	1341.27	72	1267.00	96	952.00	3	87
2-Aminoethanol	(MG/L)	24	2555.56	48	2136.92	72	2070.00	96	2070.00	5	39
1-(2-Aminoethyl)piperazine	(MG/L)	0	-99	48	2679.75	72	2305.10	96	2190.00	3	151
1-Amino-2-propanol	(MG/L)	0	-99	48	2987.09	72	2718.50	96	2520.00	1	77
4'-Aminopropiophenone	(MG/L)	24	154.84	48	148.85	72	148.85	96	146.00	5	205
Amobarbital	(MG/L)	24	93.09	48	85.40	72	85.40	96	85.40	4	253
Amphetamine Sulfate	(MG/L)	24	44.25	48	28.80	72	28.80	96	28.80	4	321
Amylamine	(MG/L)	24	208.83	48	181.91	72	180.48	96	177.00	3	103
Amylbenzene	(MG/L)	24	4.02	48	2.54	72	2.01	96	1.71	3	259
Aniline (Test 1)	(MG/L)	0	-99	0	-99	72	134.00	96	134.00	1	155
Aniline (Test 2)	(MG/L)	24	147.04	48	90.90	72	78.39	96	75.50	5	119
Aniline (Test 3)	(MG/L)	24	190.71	48	158.45	72	131.65	96	114.00	5	121
Anthranilamide	(MG/L)	24	507.44	48	413.45	72	395.00	96	395.00	1	235
L-Arabinose	(G/L)	24	37.70	48	37.70	72	37.70	96	37.70	5	81
Azinphos-methyl	(UG/L)	24	77.96	48	74.28	72	68.87	96	64.00	5	221
Benzaldehyde (Test 1)	(MG/L)	24	34.65	48	24.56	72	13.19	96	7.61	1	225
Benzaldehyde (Test 2)	(MG/L)	0	-99	48	16.34	72	13.94	96	12.80	2	155
Benzamide	(MG/L)	24	710.22	48	695.91	72	678.24	96	661.00	2	161

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Benzene (Test 1)	(MG/L)	24	19.42	48	18.08	72	15.20	96	12.60	5	109
Benzene (Test 2)	(MG/L)	24	53.63	48	44.45	72	30.80	96	24.60	5	111
2,3-Benzofuran	(MG/L)	0	-99	48	22.23	72	22.23	96	14.00	4	163
Benzophenone (Test 1)	(MG/L)	24	15.30	48	15.30	72	15.30	96	15.30	1	391
Benzophenone (Test 2)	(MG/L)	24	14.53	48	14.20	72	14.20	96	14.20	1	393
Benzothiazole	(MG/L)	24	77.39	48	73.12	72	69.09	96	64.00	5	149
1-Benzoylacetone	(MG/L)	24	1.71	48	1.40	72	1.25	96	1.10	5	217
4-Benzoylpyridine	(MG/L)	24	103.00	48	103.00	72	103.00	96	103.00	3	269
Benzylamine	(MG/L)	24	122.71	48	117.79	72	117.79	96	102.00	5	161
Benzyl-tert-butanol	(MG/L)	24	66.40	48	66.40	72	66.40	96	66.40	4	247
Benzyl Methacrylate	(MG/L)	24	7.41	48	5.68	72	5.09	96	4.67	3	255
3-Benzylloxylaniline	(MG/L)	24	10.01	48	9.71	72	9.14	96	9.14	1	401
1-Benzylpiperazine	(MG/L)	24	74.58	48	51.17	72	51.17	96	47.40	3	261
1-Benzylpyridinium 3-Sulfonate	(MG/L)	24	3345.78	48	3345.78	72	2696.29	96	2410.00	3	283
Benzyl Sulfoxide	(MG/L)	24	89.07	48	88.03	72	88.03	96	80.10	5	255
Benzyltriethylammonium Chloride	(MG/L)	24	265.12	48	165.15	72	163.31	96	161.00	4	293
1,4-Bis(3-aminopropyl)piperazine	(MG/L)	0	-99	0	-99	72	3295.54	96	3100.00	5	229
N,N-Bis(2,2-diethoxyethyl)methylamine (Test 1)	(MG/L)	24	637.00	48	637.00	72	637.00	96	637.00	3	285
N,N-Bis(2,2-diethoxyethyl)methylamine (Test 2)	(MG/L)	24	634.00	48	634.00	72	634.00	96	634.00	3	287
1,2-Bis(4-pyridyl)ethane	(MG/L)	24	157.56	48	151.00	72	151.00	96	151.00	3	271
Bis(tri-n-butyltin)Oxide	(UG/L)	24	5.77	48	4.14	72	2.83	96	2.70	5	275
[(1S)-endo]-(-)-Borneol (Test 1)	(MG/L)	24	67.80	48	67.80	72	67.80	96	67.80	4	225
[(1S)-endo]-(-)-Borneol (Test 2)	(MG/L)	24	60.42	48	60.42	72	60.42	96	59.00	4	227
Bromacil	(MG/L)	24	189.91	48	188.17	0	-99	96	186.00	4	201
m-Bromobenzamide	(MG/L)	24	95.97	48	92.70	72	92.70	96	92.70	2	145
1-Bromobutane	(MG/L)	24	36.70	48	36.70	72	36.70	96	36.70	4	59
[(1R)-endo]-(+)-3-Bromocamphor	(MG/L)	24	69.50	48	69.12	72	68.50	96	68.50	4	221
2-Bromo-2',5'-dimethoxyacetophenone (Test 1)	(MG/L)	24	0.09	48	0.09	72	0.09	96	0.09	1	357
2-Bromo-2',5'-dimethoxyacetophenone (Test 2)	(UG/L)	24	72.75	48	60.59	72	54.43	96	52.80	2	217
2-Bromo-2',5'-dimethoxyacetophenone (Test 3)	(UG/L)	24	64.00	48	64.00	72	64.00	96	64.00	4	217
1-Bromoheptane	(MG/L)	24	1.67	48	1.67	72	1.55	96	1.47	4	153
1-Bromohexane	(MG/L)	24	3.45	48	3.45	72	3.45	96	3.45	4	125
2-(Bromomethyl)tetrahydro-2H-pyran	(MG/L)	24	372.25	48	316.76	72	233.10	96	205.00	4	111
1-Bromooctane	(UG/L)	0	-99	48	999.25	72	838.00	96	838.00	4	177
4-Bromophenyl 3-Pyridyl Ketone	(MG/L)	24	23.44	48	23.44	72	21.37	96	20.40	3	267
1-Bromopropane	(MG/L)	24	129.41	48	88.62	72	69.65	96	67.30	4	45
2-Bromo-3-pyridinol	(MG/L)	0	-99	48	625.71	72	526.21	96	469.00	3	67
5-Bromosalicylaldehyde	(MG/L)	24	1.99	48	1.52	72	1.34	96	1.30	1	203
3-Bromothiophene	(MG/L)	24	11.49	48	11.15	72	8.84	96	6.19	4	47
5-Bromovanillin	(MG/L)	0	-99	0	-99	72	69.32	96	59.70	1	263
Butanal (Test 1)	(MG/L)	24	20.18	48	17.03	72	17.03	96	16.00	1	95
Butanal (Test 2)	(MG/L)	0	-99	48	13.40	72	13.40	96	13.40	1	97
1-Butanol	(MG/L)	24	1747.74	48	1730.00	72	1730.00	96	1730.00	1	107
(+)-2-Butanol	(MG/L)	24	3938.04	48	3670.00	72	3670.00	96	3670.00	3	57
2-Butanone	(MG/L)	24	3417.68	48	3399.99	72	3399.99	96	3220.00	1	99
2-Butanone Oxime	(MG/L)	24	1612.54	48	1221.98	72	1096.61	96	843.00	1	105
Butyl Acetate	(MG/L)	24	23.33	48	19.67	72	19.07	96	18.00	1	175
tert-Butyl Acetate	(MG/L)	24	338.05	48	338.05	72	338.05	96	327.00	5	131
Butylamine	(MG/L)	24	904.70	48	456.39	72	298.33	96	268.00	3	63
(+)-sec-Butylamine	(MG/L)	0	-99	0	-99	72	364.91	96	275.00	5	73
4-Butylaniline	(MG/L)	24	12.28	48	11.18	72	10.42	96	10.20	3	243
p-(tert-butyl)Benzamide	(MG/L)	24	31.90	48	31.90	72	31.90	96	31.90	2	235
2-sec-Butyl-4,6-dinitrophenol (Test 1)	(MG/L)	24	0.82	48	0.73	72	0.71	96	0.70	2	221

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
2-sec-Butyl-4,6-dinitrophenol (Test 2)	(MG/L)	24	0.41	48	0.41	72	0.41	96	0.41	2	223
t-Butyl Disulfide	(MG/L)	0	-99	48	1.55	72	1.37	96	1.37	2	191
Butyl Ether	(MG/L)	24	32.30	48	32.30	72	32.30	96	32.30	4	179
tert-Butyl Methyl Ether	(MG/L)	24	675.96	48	675.96	72	675.96	96	672.00	4	75
p-tert-Butylphenol	(MG/L)	24	6.23	48	5.70	72	5.27	96	5.15	2	227
Butyl Phenyl Ether	(MG/L)	24	6.66	48	6.03	72	5.77	96	5.77	5	223
p-(tert-Butyl)-phenyl-N-methylcarbamate	(MG/L)	24	14.34	48	11.79	72	10.19	96	10.00	1	377
tert-Butylstyrene	(UG/L)	0	-99	0	-99	72	618.84	96	495.00	2	269
n-Butyl Sulfide	(MG/L)	0	-99	48	3.58	72	3.58	96	3.58	1	317
tert-Butyl Sulfide	(MG/L)	24	30.01	48	29.10	72	29.10	96	29.10	4	185
2-Butyne-1,4-diol	(MG/L)	24	70.41	48	58.55	72	54.78	96	53.60	4	55
2-Butyn-1-ol	(MG/L)	0	-99	48	15.06	72	11.83	96	10.10	4	53
3-Butyn-1-ol	(MG/L)	0	-99	48	57.66	72	42.91	96	36.10	3	53
DL-3-Butyn-2-ol	(MG/L)	24	13.05	48	12.11	72	11.70	96	11.70	3	55
Caffeine	(MG/L)	24	176.30	48	172.26	72	158.77	96	151.00	4	167
(1S)-(-)-Camphor	(MG/L)	24	17.75	48	17.38	72	17.00	96	17.00	5	227
Carbaryl (Test 1)	(MG/L)	24	13.48	48	9.56	72	8.59	96	6.67	4	265
Carbaryl (Test 2)	(MG/L)	24	10.66	48	8.93	72	8.93	96	8.93	4	267
Carbaryl (Test 3)	(MG/L)	0	-99	48	11.86	72	10.80	96	10.40	4	269
Carbaryl (Test 4)	(MG/L)	24	13.47	48	9.86	72	9.65	96	9.47	4	271
Carbofuran	(UG/L)	24	980.66	48	978.46	72	924.77	96	844.00	5	241
Carbon Tetrachloride	(MG/L)	24	42.80	48	41.40	72	41.40	96	41.40	5	27
1-(Carboxymethyl)pyridinium Chloride	(MG/L)	0	-99	0	-99	72	166.81	96	162.00	4	143
Catechol	(MG/L)	24	16.78	48	10.53	72	9.22	96	9.22	5	117
Chloroacetonitrile	(MG/L)	0	-99	48	3.50	72	2.05	96	1.35	1	21
2-Chloroaniline (Test 1)	(MG/L)	24	25.10	48	20.37	72	11.03	96	5.81	1	151
4-Chlorobenzaldehyde	(MG/L)	24	4.13	48	3.15	72	2.67	96	2.20	1	207
Chlorobenzene	(MG/L)	24	27.57	48	26.70	72	21.84	96	16.90	5	105
4-Chlorocatechol	(MG/L)	24	3.50	48	1.94	72	1.81	96	1.58	2	101
3-Chloro-2-chloromethyl-1-propene	(UG/L)	0	-99	48	335.39	72	229.37	96	189.00	3	51
2-Chloroethanol (Test 1)	(MG/L)	24	87.03	48	38.51	72	37.00	96	37.00	1	31
2-Chloroethanol (Test 2)	(MG/L)	24	136.49	48	77.33	72	73.10	96	73.10	1	33
2-Chloroethanol (Test 3)	(MG/L)	0	-99	48	69.61	72	43.11	96	39.20	2	43
2-Chloroethanol (Test 4)	(MG/L)	0	-99	0	-99	72	95.37	96	83.70	3	35
2-Chloroethanol (Test 5)	(MG/L)	24	80.44	48	70.13	72	58.91	96	50.50	3	37
2-Chloroethyl-n-cyclohexyl Carbamate	(MG/L)	0	-99	48	42.98	72	41.89	96	35.00	4	207
1-(2-Chloroethyl)pyrrolidine Hydrochloride	(MG/L)	24	156.49	48	156.49	72	156.49	96	153.00	3	141
2-Chloro-6-fluorobenzaldehyde	(MG/L)	24	13.85	48	10.66	72	9.69	96	9.41	1	191
Chloroform	(MG/L)	24	147.09	48	112.57	72	89.69	96	70.70	5	29
3'-Chloro-o-formotoluidide	(MG/L)	24	47.62	48	47.62	72	46.60	96	46.60	1	267
5-Chloro-2-mercaptobenzothiazole	(MG/L)	24	3.60	48	3.30	72	3.21	96	3.21	1	197
2-Chloro-4-methylaniline	(MG/L)	24	50.94	48	43.87	72	41.13	96	35.90	1	231
4-Chloro-3-methylphenol (Test 1)	(MG/L)	24	12.95	48	11.18	72	9.00	96	7.38	2	157
4-Chloro-3-methylphenol (Test 2)	(MG/L)	24	10.86	48	9.54	72	7.48	96	4.05	2	159
2-Chloro-1-methylpyridinium Iodide	(MG/L)	24	322.08	48	243.24	72	229.30	96	199.00	4	99
Chloromethyl Styrene	(MG/L)	24	-99	48	0.50	72	0.37	96	0.31	2	199
4'-Chloro-3'-nitroacetophenone	(MG/L)	24	11.74	48	8.84	72	5.50	96	5.50	1	259
2-Chloro-4-nitroaniline (Test 1)	(MG/L)	24	22.53	48	22.05	72	22.05	96	21.50	1	139
2-Chloro-4-nitroaniline (Test 2)	(MG/L)	24	20.99	48	20.15	72	18.90	96	18.90	1	141
2-Chloro-5-nitrobenzaldehyde (Test 1)	(MG/L)	24	6.76	48	5.49	72	4.41	96	3.95	1	193
2-Chloro-5-nitrobenzaldehyde (Test 2)	(MG/L)	24	9.69	48	7.53	72	4.13	96	3.24	1	195
1-Chloro-3-nitrobenzene	(MG/L)	24	18.80	48	18.80	72	18.80	96	18.80	3	109
2-Chlorophenol (Test 1)	(MG/L)	0	-99	0	-99	72	20.55	96	13.80	2	99

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
2-Chlorophenol (Test 2)	(MG/L)	0	-99	48	18.94	72	10.66	96	9.41	4	91
4-Chlorophenol	(MG/L)	24	8.26	48	8.04	72	6.80	96	6.11	5	107
p-Chlorophenyl-o-nitrophenyl Ether	(MG/L)	24	3.85	48	2.34	72	2.25	96	1.92	2	247
6-Chloro-2-picoline	(MG/L)	24	247.82	48	247.82	72	232.00	96	232.00	3	123
1-Chloro-2-propanol	(MG/L)	0	-99	48	484.02	72	355.06	96	245.00	1	61
3-Chloro-1-propanol (Static)	(MG/L)	0	-99	48	1597.36	72	1059.14	96	801.00	1	63
2-Chloro-3-pyridinol	(MG/L)	0	-99	0	-99	72	634.34	96	622.00	3	69
5-Chloro-2-pyridinol	(MG/L)	24	1140.00	48	1140.00	72	1140.00	96	1140.00	3	71
6-Chloro-2-pyridinol	(MG/L)	0	-99	48	253.56	72	217.80	96	214.00	3	73
5-Chlorosalicylaldehyde	(MG/L)	24	1.05	48	0.82	72	0.77	96	0.77	1	209
Chlorpyrifos (Test 1)	(UG/L)	24	320.47	48	247.98	72	219.98	96	200.00	4	195
Cineole	(MG/L)	24	102.00	48	102.00	72	102.00	96	102.00	4	229
o-Cresol	(MG/L)	0	-99	0	-99	72	14.72	96	14.00	5	157
Cresol (Mixed)	(MG/L)	24	-99	48	-99	72	13.04	96	12.80	5	159
3-Cyano-4,6-dimethyl-2-hydroxypyridine	(MG/L)	24	331.81	48	218.92	72	174.13	96	157.00	3	187
2-Cyanopyridine	(MG/L)	24	1048.87	48	927.82	72	755.91	96	726.00	3	117
Cyclohexane	(MG/L)	24	5.58	48	5.37	72	5.01	96	4.53	5	127
Cyclohexanol	(MG/L)	24	755.55	48	719.11	72	704.00	96	704.00	1	167
Cyclohexanone (Test 1)	(MG/L)	24	774.12	48	635.78	72	571.67	96	527.00	1	163
Cyclohexanone (Test 2)	(MG/L)	24	785.33	48	732.00	72	732.00	96	732.00	1	165
Cyclohexanone Oxime	(MG/L)	0	-99	48	303.52	72	238.21	96	208.00	5	125
Cyclohexyl Acrylate	(MG/L)	0	-99	48	2.48	72	1.82	96	1.48	3	225
1,9-Decadiene	(MG/L)	24	0.39	48	0.38	72	0.31	96	0.29	2	229
1-Decanol	(MG/L)	24	2.40	48	2.40	72	2.40	96	2.40	1	369
gamma-Decanolactone	(MG/L)	24	18.72	48	18.36	72	18.00	96	18.00	4	233
2-Decanone (Test 1)	(MG/L)	24	5.77	48	5.70	72	5.70	96	5.70	1	365
2-Decanone (Test 2)	(MG/L)	24	4.18	48	4.16	72	4.16	96	4.10	1	367
n-Decylamine	(MG/L)	24	1.04	48	1.04	72	1.04	96	1.04	1	371
4-Decylaniline	(UG/L)	0	-99	0	-99	72	89.15	96	62.50	4	315
2-Decyn-1-ol	(MG/L)	24	1.47	48	1.21	72	1.18	96	1.07	4	231
Dehydroabiatic Acid	(MG/L)	0	-99	48	2.52	72	2.30	96	2.10	2	317
Demeton	(MG/L)	24	18.53	48	16.68	72	16.46	96	16.00	5	195
1,8-Diamino-p-menthane	(MG/L)	0	-99	48	70.60	72	67.53	96	65.30	4	241
1,2-Diaminopropane	(MG/L)	0	-99	48	1330.08	72	1203.81	96	1010.00	1	81
1,3-Diaminopropane	(MG/L)	24	1579.50	48	1258.90	72	1214.16	96	1190.00	1	83
2,4-Diaminotoluene	(MG/L)	24	2185.02	48	2004.45	72	1581.17	96	1420.00	5	171
1,4-Diazabicyclo[2,2,2]octane	(MG/L)	24	2336.67	48	1825.39	72	1806.96	96	1730.00	4	113
Diazinon	(MG/L)	24	12.82	48	10.35	72	10.06	96	9.35	4	279
Dibenzofuran (Test 1)	(MG/L)	24	1.97	48	1.78	72	1.78	96	1.78	4	257
Dibenzofuran (Test 2)	(MG/L)	0	-99	48	1.87	72	1.85	96	1.85	4	259
1,2-Dibromobenzene	(MG/L)	24	5.35	48	4.91	72	4.05	96	4.05	4	81
3,5-Dibromo-4-hydroxybenzotrile (Test 1)	(MG/L)	24	11.50	48	11.50	72	11.50	96	11.50	1	187
3,5-Dibromo-4-hydroxybenzotrile (Test 2)	(MG/L)	24	13.80	48	13.80	72	13.80	96	13.80	4	139
1,3-Dibromopropane (Test 1)	(MG/L)	0	-99	48	2.49	72	2.46	96	2.44	1	45
1,3-Dibromopropane (Test 2)	(MG/L)	24	5.15	48	1.87	72	1.79	96	1.79	3	45
2,3-Dibromopropanol	(MG/L)	24	165.92	48	112.22	72	85.19	96	71.00	1	47
3,5-Dibromosalicylaldehyde	(MG/L)	24	1.60	48	1.01	72	0.86	96	0.85	1	189
Dibutyl Adipate	(MG/L)	24	4.16	48	3.64	0	-99	96	3.64	2	299
N,N-Dibutylformamide	(MG/L)	24	89.30	48	89.30	72	89.30	96	89.30	1	351
Dibutyl Fumarate (Test 1)	(MG/L)	24	1.05	48	0.86	72	0.82	96	0.76	2	273
Dibutyl Fumarate (Test 2)	(MG/L)	24	1.10	48	0.66	72	0.64	96	0.64	2	275
Dibutyl Fumarate (Test 3)	(UG/L)	24	561.78	48	469.00	72	469.00	96	469.00	4	277
Dibutyl Fumarate (Test 4)	(UG/L)	24	1438.28	48	1139.69	72	780.16	96	684.00	5	243

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Dibutyl Isophthalate	(MG/L)	24	-99	48	0.96	72	0.90	96	0.90	2	307
Dibutyl Phthalate (Test 1)	(MG/L)	24	1.26	48	0.99	72	0.99	96	0.85	2	309
Dibutyl Phthalate (Test 2)	(MG/L)	24	1.27	48	1.10	72	1.10	96	1.10	2	311
Dibutyl Succinate	(MG/L)	24	4.69	48	4.58	72	4.58	96	4.46	1	383
Di-n-butylterephthalate	(MG/L)	0	-99	0	-99	72	0.78	96	0.59	4	313
2,2-Dichloroacetamide	(MG/L)	0	-99	0	-99	72	407.65	96	241.00	1	23
2',4'-Dichloroacetophenone	(MG/L)	24	12.06	48	11.70	72	11.70	96	11.70	1	261
3,4-Dichloroaniline (Test 1)	(MG/L)	24	9.15	48	9.00	72	7.68	96	7.00	1	143
3,4-Dichloroaniline (Test 2)	(MG/L)	24	11.30	48	10.02	72	8.24	96	8.06	1	145
3,4-Dichloroaniline (Test 3)	(MG/L)	24	11.99	48	9.25	72	8.86	96	7.70	4	93
2,4-Dichlorobenzaldehyde	(MG/L)	0	-99	48	4.26	72	2.24	96	1.80	1	199
2,4-Dichlorobenzamide	(MG/L)	0	-99	0	-99	72	99.18	96	95.60	2	135
2,6-Dichlorobenzamide	(MG/L)	24	469.46	48	469.46	72	469.00	96	469.00	2	137
1,2-Dichlorobenzene	(MG/L)	24	11.76	48	11.76	72	11.19	96	9.47	3	111
1,3-Dichlorobenzene	(MG/L)	24	9.45	48	8.84	72	7.82	96	8.03	3	113
1,4-Dichlorobutane	(MG/L)	24	56.74	48	53.17	72	52.60	96	51.60	1	93
3,4-Dichloro-1-butene (Test 1)	(MG/L)	24	28.10	48	16.41	72	10.55	96	9.33	2	53
3,4-Dichloro-1-butene (Test 2)	(MG/L)	24	29.55	48	13.13	72	11.06	96	7.17	4	51
4,5-Dichlorocatechol	(MG/L)	24	1.23	48	0.99	72	0.89	96	0.89	2	85
trans-1,2-Dichlorocyclohexane	(MG/L)	24	18.40	48	18.40	72	18.40	96	18.40	1	161
1,3-Dichloro-4,6-dinitrobenzene (Test 1)	(MG/L)	24	0.09	48	0.07	72	0.06	96	0.05	1	129
1,3-Dichloro-4,6-dinitrobenzene (Test 2)	(UG/L)	0	-99	48	78.88	72	52.15	96	40.30	2	73
1,2-Dichloroethane	(MG/L)	24	165.85	48	138.94	72	137.25	96	136.00	2	41
4,5-Dichloroguaiacol	(MG/L)	24	4.91	48	4.76	72	4.76	96	4.47	2	147
3,5-Dichloro-4-hydroxybenzonitrile	(MG/L)	24	24.88	48	24.30	72	24.30	96	24.30	5	141
Dichloromethane	(MG/L)	24	344.06	48	330.00	72	330.00	96	330.00	3	27
1,5-Dichloropentane	(MG/L)	24	28.56	48	25.30	72	25.30	96	25.30	1	119
2,4-Dichlorophenol	(MG/L)	24	10.40	48	9.51	72	8.29	96	7.75	2	83
3-(3,4-Dichlorophenoxy)benzaldehyde	(MG/L)	24	0.37	48	0.32	72	0.32	96	0.30	2	279
1,2-Dichloropropane	(MG/L)	24	171.16	48	138.53	72	128.04	96	127.00	2	45
1,3-Dichloropropane (Test 1)	(MG/L)	24	94.20	48	94.20	72	94.20	96	94.20	1	49
1,3-Dichloropropane (Test 2)	(MG/L)	24	132.63	48	131.00	72	131.00	96	131.00	2	47
1,3-Dichloropropene	(UG/L)	24	570.27	48	312.20	72	264.37	96	239.00	5	45
3,4-Dichlorotoluene	(MG/L)	24	4.14	48	3.44	72	3.03	96	2.91	1	223
a,a'-Dichloro-p-xylene	(MG/L)	24	0.13	48	0.05	72	0.04	96	0.04	1	269
Dicumarol	(MG/L)	24	5.80	48	5.11	72	5.11	96	5.11	5	261
1,4-Dicyanobutane	(MG/L)	24	1930.00	48	1930.00	72	1930.00	96	1930.00	1	157
1,6-Dicyanohexane	(MG/L)	24	528.00	48	528.00	72	528.00	96	528.00	1	305
Diethanolamine	(G/L)	24	7.48	48	6.42	72	5.29	96	4.71	5	75
N,N-Diethylacetamide	(G/L)	24	2.66	48	1.62	72	1.50	96	1.50	5	133
Diethyl Adipate (Test 1)	(MG/L)	24	22.24	48	17.06	72	16.82	96	16.80	1	361
Diethyl Adipate (Test 2)	(MG/L)	24	23.20	48	20.38	72	20.03	96	19.30	1	363
Diethylamine	(MG/L)	24	1473.63	48	907.96	72	855.00	96	855.00	1	111
4-(Diethylamino)benzaldehyde	(MG/L)	24	24.48	48	24.48	72	24.48	96	23.90	2	237
5-Diethylamino-2-pentanone	(MG/L)	24	418.27	48	379.89	72	344.50	96	336.00	3	233
4-(Diethylamino)salicylaldehyde	(MG/L)	24	6.86	48	6.32	72	5.98	96	5.36	2	239
N,N-Diethylaniline	(MG/L)	24	16.40	48	16.40	72	16.40	96	16.40	3	245
1,3-Diethylbenzene	(MG/L)	24	6.77	48	4.71	72	4.52	96	4.15	3	239
Diethyl Benzylmalonate	(MG/L)	24	6.85	48	5.92	72	5.73	96	5.43	2	297
Diethyl Benzylphosphonate	(MG/L)	24	343.96	48	336.00	72	336.00	96	336.00	4	251
Diethyl Chloromalonate	(MG/L)	24	1.74	48	1.12	72	0.98	96	0.95	1	239
N,N-Diethylcyclohexylamine	(MG/L)	24	22.34	48	21.40	72	21.40	96	21.40	4	239
N,N-Diethylethanolamine	(MG/L)	24	2406.24	48	1822.45	72	1780.00	96	1780.00	3	149

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Diethyl Ether	(G/L)	24	2.87	48	2.56	72	2.56	96	2.56	3	59
Diethyl Malonate (Test 1)	(MG/L)	24	24.58	48	17.44	72	16.38	96	15.40	1	241
Diethyl Malonate (Test 2)	(MG/L)	24	28.94	48	24.54	72	20.96	96	17.40	2	169
Diethyl Malonate (Test 3)	(MG/L)	24	25.03	48	15.36	72	12.50	96	11.80	3	177
Diethyl Phthalate	(MG/L)	24	42.58	48	32.74	72	31.80	96	31.80	2	267
Diethyl Sebacate (Test 1)	(MG/L)	24	3.10	48	2.92	72	2.84	96	2.70	1	409
Diethyl Sebacate (Test 2)	(MG/L)	0	-99	48	3.07	72	2.77	96	2.73	2	301
1,3-Diethyl-2-thiobarbituric Acid	(MG/L)	24	5338.41	48	4731.98	72	4510.00	96	4510.00	4	169
N,N-Diethyl-m-toluamide	(MG/L)	24	112.43	48	110.95	72	110.95	96	110.00	1	375
Di-n-hexylamine	(MG/L)	24	0.79	48	0.79	72	0.79	96	0.78	1	387
2,3-Dihydrobenzofuran	(MG/L)	24	97.65	48	97.65	72	89.30	96	81.70	4	165
2,4-Dihydroxybenzaldehyde	(MG/L)	24	13.83	48	13.52	72	13.10	96	13.10	1	229
4,4'-Dihydroxydiphenyl Ether (Test 1)	(MG/L)	24	5.86	48	5.22	72	5.22	96	5.22	2	261
4,4'-Dihydroxydiphenyl Ether (Test 2)	(MG/L)	24	6.90	48	6.63	72	6.50	96	6.39	2	263
3,5-Diiodo-4-hydroxybenzotrile	(MG/L)	24	6.80	48	6.80	72	6.80	96	6.80	5	143
2-(Diisopropylamino)ethanol	(MG/L)	24	207.14	48	201.00	72	201.00	96	201.00	4	191
2,6-Diisopropylaniline (Test 1)	(MG/L)	24	14.20	48	14.20	72	14.20	96	14.20	1	379
2,6-Diisopropylaniline (Test 2)	(MG/L)	24	17.15	48	16.50	72	16.50	96	16.50	3	273
2,4-Dimethoxybenzaldehyde	(MG/L)	24	36.55	48	28.28	72	23.04	96	20.10	1	331
p-Dimethoxybenzene	(MG/L)	0	-99	48	131.19	72	119.54	96	117.00	1	293
4,6-Dimethoxy-2-hydroxybenzaldehyde	(MG/L)	24	4.99	48	2.69	72	2.69	96	2.68	1	333
Dimethoxymethane	(G/L)	24	6.99	48	6.99	72	6.99	96	6.99	5	61
2,6-Dimethoxytoluene	(MG/L)	24	20.20	48	20.20	72	20.20	96	20.20	4	199
p-Dimethylaminobenzaldehyde	(MG/L)	24	55.39	48	55.39	72	50.90	96	45.70	1	337
4-Dimethylaminocinnamaldehyde	(MG/L)	24	7.86	48	7.33	72	6.58	96	5.90	2	233
4-Dimethylamino-3-methyl-2-butanone	(MG/L)	24	12.73	48	10.08	72	8.81	96	8.50	1	245
3-Dimethylaminopropyl Chloride Hydrochloride	(MG/L)	24	133.00	48	133.00	72	133.00	96	133.00	3	101
2-Dimethylaminopyridine	(MG/L)	24	127.00	48	127.00	72	127.00	96	127.00	3	169
Dimethyl Aminoterephthalate	(MG/L)	24	11.18	48	9.30	72	9.08	96	8.94	2	219
N,N-Dimethylaniline (Test 1)	(MG/L)	24	78.20	48	78.20	72	78.20	96	78.20	1	297
N,N-Dimethylaniline (Test 2)	(MG/L)	24	52.60	48	52.60	72	52.60	96	52.60	1	299
N,N-Dimethylbenzylamine	(MG/L)	24	37.80	48	37.80	72	37.80	96	37.80	3	219
3,3-Dimethyl-2-butanone	(MG/L)	24	153.09	48	109.69	72	88.16	96	87.00	1	169
3,3-Dimethylbutylamine	(MG/L)	24	757.83	48	696.34	72	602.00	96	602.00	4	137
5,5-Dimethyl-1,3-cyclohexanedione	(G/L)	0	-99	0	-99	72	11.50	96	11.50	4	171
2,5-Dimethylfuran	(MG/L)	24	85.05	48	85.05	72	74.45	96	71.10	4	101
3,3-Dimethylglutaric Acid (Static)	(G/L)	24	14.10	48	14.10	0	-99	96	-99	5	173
3,6-Dimethyl-1-heptyn-3-ol	(MG/L)	24	49.00	48	49.00	72	49.00	96	49.00	4	209
2,5-Dimethyl-2,4-hexadiene	(MG/L)	24	4.37	48	3.78	72	3.78	96	3.78	3	201
5,5-Dimethylhydantoin	(G/L)	24	20.28	48	18.82	72	18.42	96	16.50	4	65
1,1-Dimethylhydrazine	(MG/L)	0	-99	48	10.69	72	8.54	96	7.85	5	41
2,6-Dimethylmorpholine	(MG/L)	24	643.86	48	396.41	72	387.00	96	387.00	3	137
Dimethyl Nitroterephthalate	(MG/L)	24	7.07	48	6.52	72	6.52	96	6.52	2	215
2,4-Dimethyl-3-pentanol	(MG/L)	24	163.00	48	163.00	72	163.00	96	163.00	4	155
3,4-Dimethyl-1-pentyn-3-ol	(MG/L)	24	273.08	48	205.00	72	205.00	96	205.00	4	147
2,4-Dimethylphenol	(MG/L)	24	28.90	48	24.26	72	19.48	96	16.60	2	185
Dimethyl Phthalate	(MG/L)	24	121.00	48	121.00	72	121.00	96	121.00	5	219
(+)-1,2-Dimethylpropylamine	(MG/L)	0	-99	48	284.00	72	284.00	96	284.00	3	105
2,2-Dimethyl-1-propylamine	(MG/L)	0	-99	48	536.53	72	484.84	96	475.00	3	107
N,N-Dimethyl-p-toluidine (Test 1)	(MG/L)	24	52.00	48	52.00	72	52.00	96	52.00	3	221
N,N-Dimethyl-p-toluidine (Test 2)	(MG/L)	24	57.97	48	47.03	72	46.00	96	46.00	3	223
2,3-Dimethylvaleraldehyde	(MG/L)	0	-99	0	-99	72	17.27	96	16.00	2	171
2,4-Dinitroaniline (Test 1)	(MG/L)	24	15.50	48	15.50	72	15.50	96	15.50	1	147

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
2,4-Dinitroaniline (Test 2)	(MG/L)	24	14.46	48	14.46	72	14.20	96	14.20	3	119
1,4-Dinitrobenzene	(MG/L)	24	0.81	48	0.76	72	0.72	96	0.71	2	87
4,6-Dinitro-o-cresol (Test 1)	(MG/L)	24	2.77	48	2.40	72	2.06	96	1.95	2	151
4,6-Dinitro-o-cresol (Test 2)	(MG/L)	24	1.95	48	1.75	72	1.59	96	1.54	2	153
2,4-Dinitro-1-naphthol, Sodium Salt	(MG/L)	24	4.24	48	4.24	72	4.24	96	4.24	4	213
2,4-Dinitrophenol (Test 1)	(MG/L)	24	25.99	48	21.85	72	20.45	96	19.40	2	89
2,4-Dinitrophenol (Test 2)	(MG/L)	24	10.60	48	10.60	72	10.60	96	10.60	2	91
2,4-Dinitrophenol (Test 3)	(MG/L)	24	6.72	48	6.58	72	6.58	96	6.58	2	93
2,4-Dinitrophenol (Test 4)	(MG/L)	24	10.68	48	10.68	72	10.50	96	10.50	2	95
2,4-Dinitrophenol (Test 5)	(MG/L)	24	10.60	48	10.60	72	10.60	96	10.60	2	97
2,4-Dinitrophenol (Test 6)	(MG/L)	24	14.40	48	13.57	72	12.29	96	11.00	4	85
2,4-Dinitrophenol (Test 7)	(MG/L)	24	14.65	48	13.93	72	11.34	96	11.00	4	87
2,4-Dinitrophenol (Test 8)	(MG/L)	24	8.72	48	8.72	72	8.72	96	8.15	5	97
2,4-Dinitrophenol (Test 9)	(MG/L)	24	13.76	48	13.30	72	13.30	96	13.30	5	99
2,4-Dinitrophenol (Test 10)	(MG/L)	24	14.17	48	13.70	72	13.70	96	11.90	5	101
2,5-Dinitrophenol	(MG/L)	0	-99	48	4.03	72	3.82	96	3.36	4	89
2,6-Dinitrophenol	(MG/L)	24	39.70	48	39.70	72	39.70	96	39.70	5	103
2,4-Dinitrotoluene	(MG/L)	24	36.10	48	26.27	72	25.75	96	24.30	5	151
1,4-Dioxane (Test 1)	(G/L)	0	-99	48	11.26	72	10.82	96	9.85	5	67
1,4-Dioxane (Test 2)	(G/L)	0	-99	0	-99	72	11.08	96	10.80	5	69
Diphenylamine	(MG/L)	0	-99	48	3.79	72	3.79	96	3.79	5	239
N,N-Diphenylformamide (Test 1)	(MG/L)	24	37.89	48	37.89	72	36.39	96	26.30	1	397
N,N-Diphenylformamide (Test 2)	(MG/L)	24	37.27	48	36.98	72	36.16	96	35.10	1	399
2,5-Diphenylfuran	(MG/L)	24	0.07	48	0.05	72	0.05	96	0.05	2	305
Diphenyl Phthalate	(UG/L)	24	463.38	48	168.21	72	88.33	96	80.00	2	315
1,1-Diphenyl-2-propyn-1-ol	(MG/L)	24	11.10	48	11.10	72	11.10	96	11.10	4	307
2,6-Diphenylpyridine	(UG/L)	24	434.14	48	327.98	72	242.94	96	212.00	3	301
Disulfoton	(MG/L)	24	4.36	48	4.02	72	4.00	96	3.98	4	193
2,9-Dithiadecane	(MG/L)	24	10.48	48	10.31	72	10.10	96	10.10	2	193
3,8-Dithiadecane	(MG/L)	24	11.09	48	8.70	72	6.66	96	6.06	2	195
4,7-Dithiadecane	(MG/L)	0	-99	0	-99	72	8.16	96	7.52	2	197
4,9-Dithiadodecane	(MG/L)	24	3.77	48	3.51	72	3.06	96	2.99	2	231
3,6-Dithiaoctane	(MG/L)	24	60.20	48	60.20	72	60.20	96	60.20	2	129
Diuron	(MG/L)	24	26.12	48	22.48	72	17.96	96	14.20	3	209
2-Dodecanone	(MG/L)	24	1.41	48	1.34	72	1.22	96	1.18	4	281
Dodecylamine	(UG/L)	24	187.74	48	105.83	72	103.00	96	103.00	5	247
Ethanal (Test 1)	(MG/L)	24	60.18	48	38.04	72	31.98	96	30.80	1	29
Ethanal (Test 2)	(MG/L)	24	57.82	48	40.97	72	38.43	96	37.20	5	33
Ethanol (Test 1)	(G/L)	24	15.53	48	15.53	72	15.48	96	15.30	1	35
Ethanol (Test 2)	(G/L)	24	15.39	48	14.82	72	14.68	96	14.20	1	37
p-Ethoxybenzaldehyde	(MG/L)	0	-99	48	40.11	0	-99	96	28.10	1	325
2-(2-Ethoxyethoxy)ethanol	(G/L)	24	29.74	48	27.28	72	26.90	96	26.50	4	129
2-Ethoxyethyl Acetate	(MG/L)	24	43.92	48	43.38	72	42.50	96	42.10	2	125
2-Ethoxyethyl Methacrylate	(MG/L)	24	64.94	48	32.59	72	27.70	96	27.70	3	203
3-Ethoxy-4-hydroxybenzaldehyde	(MG/L)	24	99.86	48	93.39	72	89.70	96	87.60	1	327
4-Ethoxy-2-nitroaniline	(MG/L)	24	26.00	48	26.00	72	26.00	96	26.00	3	193
Ethyl Acetate	(MG/L)	24	327.77	48	253.10	72	230.00	96	230.00	1	103
Ethyl Acrylate	(MG/L)	0	-99	48	3.31	72	2.58	96	2.50	5	77
Ethyl 3-Aminobenzoate, Methanesulfonic Acid Salt	(MG/L)	24	105.05	48	79.00	72	79.00	96	79.00	4	219
Ethyl p-Aminobenzoate (Test 2)	(MG/L)	24	37.43	48	36.00	72	36.00	96	36.00	2	209
2-(Ethylamino)ethanol	(MG/L)	0	-99	0	-99	72	1860.99	96	1480.00	1	113
4-Ethylaniline	(MG/L)	24	95.68	48	86.12	72	80.93	96	73.00	3	197
Ethylbenzene (Test 1)	(MG/L)	24	18.47	48	15.91	72	14.40	96	12.10	3	189

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Ethylbenzene (Test 2)	(MG/L)	24	9.94	48	9.94	72	9.94	96	9.09	5	181
Ethyl Benzoate	(MG/L)	24	31.77	48	19.44	72	15.23	96	10.80	5	203
N-Ethylbenzylamine	(MG/L)	24	63.80	48	61.05	72	57.10	96	57.10	1	339
Ethylenediamine	(MG/L)	24	755.07	48	402.91	72	301.47	96	220.00	5	43
Ethyl Hexanoate	(MG/L)	0	-99	0	-99	72	11.63	96	8.94	1	311
2-Ethyl-1-hexanol	(MG/L)	24	28.90	48	28.90	72	28.90	96	28.20	2	187
5-Ethyl-2-methylpyridine	(MG/L)	24	81.10	48	81.10	72	81.10	96	81.10	1	301
O-Ethyl-O(p-nitrophenylphenyl)phosphonothiate	(UG/L)	24	213.92	48	166.11	72	133.72	96	78.60	5	253
4-Ethylphenol	(MG/L)	24	19.47	48	14.45	72	13.91	96	10.40	3	195
2-Ethylpyridine	(MG/L)	24	414.00	48	414.00	72	414.00	96	414.00	5	163
Ethyl Salicylate (Test 1)	(MG/L)	24	20.00	48	19.88	0	-99	96	19.80	2	203
Ethyl Salicylate (Test 2)	(MG/L)	24	20.70	48	20.70	72	20.70	96	20.70	2	205
N-Ethyl-m-toluidine	(MG/L)	24	49.50	48	49.50	72	49.50	96	49.50	1	341
2-(N-Ethyl-m-toluidino)ethanol	(MG/L)	24	56.51	48	54.07	72	52.90	96	52.90	3	263
Ethyl Trifluoroacetate	(G/L)	24	14.08	48	12.95	72	12.95	96	10.00	4	49
1-Ethynyl-1-cyclohexanol	(MG/L)	0	-99	48	288.27	72	288.27	96	256.00	3	199
Fenvalerate (Test 1)	(UG/L)	24	5.87	48	5.62	72	5.62	96	5.14	4	335
Fenvalerate (Test 2)	(UG/L)	24	0.70	48	0.50	72	0.46	96	0.42	5	277
Flavone	(MG/L)	24	3.65	48	3.57	72	3.50	96	3.50	4	303
Flucythrinate	(UG/L)	24	0.33	48	0.26	72	0.23	96	0.19	5	249
4-Fluoroaniline	(MG/L)	24	32.67	48	22.87	72	17.90	96	16.90	1	153
o-Fluorobenzaldehyde	(MG/L)	0	-99	48	3.64	72	2.25	96	1.37	1	211
4-Fluoro-N-methylaniline	(MG/L)	0	-99	48	52.65	72	39.20	96	38.40	1	233
1-Fluoro-4-nitrobenzene	(MG/L)	24	29.69	48	28.78	72	28.40	96	28.40	1	137
p-Fluorophenyl Ether (Test 1)	(MG/L)	0	-99	0	-99	72	1.29	96	1.20	2	249
p-Fluorophenyl Ether (Test 2)	(MG/L)	0	-99	48	1.23	72	1.13	96	1.06	2	251
2-Fluorotoluene (Test 2)	(MG/L)	24	24.17	48	19.60	0	-99	96	19.60	3	157
Formaldehyde	(MG/L)	24	42.84	48	27.08	72	24.85	96	24.10	5	31
Furan	(MG/L)	0	-99	48	71.73	72	61.00	96	61.00	1	85
3-Furanmethanol (Static)	(MG/L)	24	1147.62	48	587.50	72	546.73	96	508.00	1	115
1-Heptanol	(MG/L)	24	34.50	48	34.50	72	34.50	96	34.50	3	181
2-Heptanone	(MG/L)	24	131.00	48	131.00	72	131.00	96	131.00	3	179
n-Heptylamine	(MG/L)	24	21.80	48	21.80	72	21.80	96	21.80	1	247
1-Heptyn-3-ol	(MG/L)	24	2.51	48	1.84	72	1.83	96	1.76	4	73
Hexachloro-1,3-butadiene	(MG/L)	0	-99	48	0.22	72	0.11	96	0.09	2	51
Hexachloroethane (Test 1)	(MG/L)	24	1.80	48	1.57	72	1.57	96	1.53	2	29
Hexachloroethane (Test 2)	(MG/L)	24	1.88	48	1.55	72	1.39	96	1.32	2	31
2,4-Hexadiene (Test 1)	(MG/L)	24	20.60	48	20.60	72	20.60	96	20.60	4	103
2,4-Hexadiene (Test 2)	(MG/L)	0	-99	48	21.25	72	20.70	96	19.40	4	105
1,5-Hexadien-3-ol	(MG/L)	24	70.68	48	43.33	72	38.91	96	38.10	4	107
1,1,1,3,3,3-Hexafluoro-2-propanol	(MG/L)	24	265.96	48	244.00	72	244.00	96	244.00	3	41
Hexamethylenetetramine	(G/L)	24	57.29	48	55.33	72	51.61	96	49.80	4	115
Hexanal (Test 1)	(MG/L)	24	27.55	48	20.93	72	17.07	96	14.00	2	121
Hexanal (Test 2)	(MG/L)	0	-99	48	27.35	0	-99	100	22.00	5	129
Hexane	(MG/L)	24	2.70	48	2.50	72	2.50	96	2.50	5	135
Hexanoic Acid	(MG/L)	24	545.10	48	533.03	72	327.86	96	320.00	1	177
1-Hexanol	(MG/L)	24	99.23	48	99.23	72	98.00	96	97.70	1	179
2-Hexanone	(MG/L)	24	428.00	48	428.00	72	428.00	96	428.00	3	139
1-Hexen-3-ol	(MG/L)	24	40.63	48	35.79	72	33.22	96	30.40	4	117
cis-3-Hexen-1-ol	(MG/L)	24	404.99	48	396.82	72	388.81	96	381.00	4	119
trans-3-Hexen-1-ol	(MG/L)	24	271.00	48	271.00	72	271.00	96	271.00	4	121
Hexyl Acetate	(MG/L)	24	5.79	48	4.38	72	4.00	96	4.00	1	313
Hexyl Acrylate (Test 1)	(MG/L)	0	-99	48	1.87	72	1.35	96	1.09	3	229

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Hexyl Acrylate (Test 2)	(MG/L)	0	-99	48	1.99	72	1.24	96	1.14	4	211
Hexylamine	(MG/L)	24	58.56	48	56.60	72	56.60	96	56.60	3	147
4-Hexyloxyaniline (Test 1)	(MG/L)	24	3.37	48	3.37	72	2.80	96	2.80	1	381
4-Hexyloxyaniline (Test 2)	(MG/L)	24	3.23	48	3.23	72	3.23	96	3.23	3	275
2-Hydroxybenzamide	(MG/L)	24	147.16	48	122.85	72	111.12	96	101.00	2	163
2-Hydroxyethyl Acrylate	(MG/L)	24	12.13	48	5.03	72	4.80	96	4.80	3	89
2-Hydroxyethyl Ether	(G/L)	24	75.20	48	75.20	72	75.20	96	75.20	5	71
2-Hydroxyethyl Methacrylate	(MG/L)	0	-99	48	455.32	72	320.08	96	227.00	3	131
4-(2-Hydroxyethyl)morpholine	(MG/L)	24	3825.52	48	3508.36	72	3290.70	96	2710.00	3	143
1-(2-Hydroxyethyl)piperazine	(G/L)	24	12.18	48	6.82	72	6.41	96	6.41	3	145
2'-Hydroxy-4'-methoxyacetophenone (Test 1)	(MG/L)	24	63.40	48	54.90	72	54.90	96	54.90	1	329
2'-Hydroxy-4'-methoxyacetophenone (Test 2)	(MG/L)	24	96.25	48	96.25	72	94.15	96	87.80	3	211
5-Hydroxy-2-nitrobenzaldehyde	(MG/L)	24	43.58	48	42.14	72	41.90	96	41.90	1	221
3-Hydroxy-2-nitropyridine	(MG/L)	24	218.56	48	218.56	72	218.56	96	167.00	3	75
2-Hydroxypropyl Acrylate (Test 1)	(MG/L)	0	-99	48	8.73	72	4.66	96	3.61	3	133
2-Hydroxypropyl Acrylate (Test 2)	(MG/L)	0	-99	0	-99	72	5.77	96	3.10	3	135
3-Hydroxy-3,7,11-trimethyl-1,6,10-dodecatriene	(MG/L)	24	1.82	48	1.74	72	1.60	96	1.43	4	309
Iodoform	(MG/L)	24	4.98	48	4.98	72	3.26	96	2.92	4	39
Beta-Ionone	(MG/L)	24	5.09	48	5.09	72	5.09	96	5.09	4	291
Isobutyl Acrylate (Test 1)	(MG/L)	0	-99	0	-99	72	2.92	96	2.09	3	173
Isobutyl Acrylate (Test 2)	(MG/L)	0	-99	48	3.32	72	2.77	96	2.11	4	151
Isophorone	(MG/L)	24	-99	48	-99	72	254.50	96	228.00	5	211
Isopimaric Acid	(MG/L)	0	-99	48	1.48	72	1.23	96	0.87	2	321
p-Isopropyl Benzaldehyde	(MG/L)	24	7.77	48	6.81	72	6.62	96	6.62	1	359
Isopropylbenzene	(MG/L)	0	-99	0	-99	72	6.47	96	6.32	3	213
Isopropyl Disulfide	(MG/L)	0	-99	0	-99	72	8.31	96	8.31	2	131
Isopropyl Ether	(MG/L)	24	786.00	48	786.00	72	786.00	96	786.00	2	127
4,4'-Isopropylidenebis(2,6-dichlorophenol)	(MG/L)	24	1.61	48	1.59	72	1.42	96	1.33	4	305
Isopropyl Methacrylate	(MG/L)	0	-99	48	44.89	72	42.05	96	38.00	3	175
Isovaleraldehyde	(MG/L)	0	-99	48	3.98	72	3.38	96	3.25	2	57
(R)-(+)-Limonene	(UG/L)	24	758.37	48	728.73	72	702.00	96	702.00	5	225
Malathion	(MG/L)	0	-99	48	17.13	72	15.53	96	14.10	4	235
Malononitrile	(MG/L)	0	-99	0	-99	72	0.94	96	0.56	1	41
Manool	(MG/L)	24	0.14	48	0.14	72	0.13	96	0.12	3	315
(1R,2S,5R)-(-)-Menthol	(MG/L)	24	18.90	48	18.90	72	18.90	96	18.90	4	237
Methanol	(G/L)	24	29.71	48	29.71	72	29.71	96	29.40	1	19
Methomyl	(MG/L)	24	2.63	48	2.52	72	2.34	96	2.11	4	71
o-Methoxybenzamide	(MG/L)	0	-99	48	130.24	72	120.00	96	120.00	2	183
2-Methoxyethylamine	(MG/L)	24	1185.19	48	830.13	72	537.21	96	524.00	1	79
3-Methoxyphenol	(MG/L)	0	-99	0	-99	72	84.57	96	74.00	2	165
4-Methoxyphenol	(MG/L)	24	284.44	48	227.26	72	137.20	96	110.00	2	167
N-(3-Methoxypropyl)-3,4,5-Trimethoxybenzylamine	(MG/L)	24	139.15	48	139.15	72	139.15	96	136.00	3	293
Methyl Acetate (Test 1)	(MG/L)	0	-99	48	398.16	72	349.78	96	320.00	1	57
Methyl Acetate (Test 2)	(MG/L)	24	563.86	48	437.13	72	420.60	96	399.00	2	49
N-Methylaniline	(MG/L)	24	206.48	48	165.63	72	119.64	96	100.00	5	165
3-Methyl-2-butanone	(MG/L)	24	1271.05	48	1183.57	72	1043.87	96	864.00	1	121
2-Methyl-3-butyn-2-ol	(MG/L)	24	3360.84	48	3360.84	72	3360.84	96	3290.00	4	67
2-Methylbutyraldehyde	(MG/L)	24	24.57	48	13.56	72	10.42	96	9.97	2	59
Methyl p-Chlorobenzoate	(MG/L)	24	14.82	48	12.67	72	11.00	96	11.00	2	177
Methyl 4-Chloro-2-nitrobenzoate	(MG/L)	24	29.87	48	28.51	0	-99	96	27.70	2	173
Methyl 4-Cyanobenzoate	(MG/L)	24	61.80	48	53.57	72	49.93	96	46.80	1	323
Methyl 2,5-Dichlorobenzoate	(MG/L)	24	14.56	48	14.13	0	-99	96	14.00	2	175
Methyl 2,4-Dihydroxybenzoate	(MG/L)	24	49.26	48	45.80	0	-99	96	45.80	2	181

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
2,2'-Methylenebis(4-chlorophenol)	(UG/L)	24	318.32	48	310.00	72	310.00	96	310.00	2	285
2,2'-Methylene Bis(3,4,6-trichlorophenol)	(MG/L)	24	0.03	48	0.02	72	0.02	96	0.02	1	389
6-Methyl-5-hepten-2-one	(MG/L)	24	85.70	48	85.70	72	85.70	96	85.70	1	307
1-Methylheptylamine (Test 1)	(MG/L)	24	5.23	48	5.11	72	5.11	96	5.11	1	319
1-Methylheptylamine (Test 2)	(MG/L)	24	5.82	48	5.28	72	5.28	96	5.28	1	321
5-Methyl-2-hexanone	(MG/L)	24	159.00	48	159.00	72	159.00	96	159.00	1	243
2-Methylimidazole	(MG/L)	24	358.86	48	286.00	72	286.00	96	286.00	1	91
3-Methylindole	(MG/L)	24	18.24	48	14.17	72	12.02	96	8.84	5	201
Methyl Methacrylate	(MG/L)	0	-99	0	-99	72	373.46	96	259.00	5	79
2-Methyl-1,4-naphthoquinone	(UG/L)	24	125.76	48	119.40	72	112.04	96	110.00	4	283
Methyl p-Nitrobenzoate	(MG/L)	24	24.11	0	-99	72	23.80	96	23.80	2	179
4-Methyloxazole	(MG/L)	24	2769.88	48	1853.68	72	1483.39	96	1390.00	3	49
2-Methyl-2,4-pentanediol	(G/L)	24	10.89	48	10.89	72	10.70	96	10.70	1	181
3-Methyl-3-pentanol	(MG/L)	24	734.93	48	718.44	72	702.31	96	672.00	4	127
4-Methyl-2-pentanone (Test 1)	(MG/L)	24	505.00	48	505.00	0	-99	96	505.00	1	171
4-Methyl-2-pentanone (Test 2)	(MG/L)	24	594.81	48	553.20	72	540.00	96	540.00	1	173
3-Methyl-1-pentyn-3-ol	(MG/L)	24	1243.32	48	1220.00	72	1220.00	96	1220.00	4	109
4-Methylphenol	(MG/L)	0	-99	0	-99	72	16.84	96	16.50	3	165
1-Methylpiperazine	(MG/L)	0	-99	48	3222.42	72	2520.31	96	2300.00	3	95
2-Methylpiperazine	(G/L)	24	4.21	48	3.68	72	3.53	96	2.24	3	97
2-Methyl-1-propanol	(MG/L)	24	1442.78	48	1442.78	72	1430.00	96	1430.00	1	109
2-Methyl-2-propanol	(G/L)	24	6.41	48	6.41	72	6.41	96	6.41	3	61
Methyl Sulfoxide	(G/L)	24	34.00	48	34.00	72	34.00	96	34.00	5	37
2-Methyl-3,3,4,4-tetrafluoro-2-butanol	(MG/L)	24	582.00	48	582.00	72	582.00	96	582.00	4	63
2-Methylvaleraldehyde	(MG/L)	0	-99	48	40.20	72	25.26	96	18.80	2	123
Naphthalene	(MG/L)	24	7.82	48	6.42	72	6.14	96	6.14	2	211
1-Naphthol	(MG/L)	24	7.67	48	4.73	72	4.63	96	4.63	2	213
Neobiotic Acid (Test 2)	(MG/L)	0	-99	48	1.69	72	1.37	96	1.30	2	325
Nicotine Sulfate (Test 1)	(MG/L)	24	14.00	48	13.04	72	12.44	96	12.20	4	325
Nicotine Sulfate (Test 2)	(MG/L)	24	15.60	48	15.60	72	15.60	96	15.60	5	263
p-Nitroaniline	(MG/L)	24	137.07	48	137.07	72	128.11	96	125.00	5	113
o-Nitrobenzaldehyde (Test 1)	(MG/L)	24	25.55	48	20.73	72	16.03	96	12.50	1	217
o-Nitrobenzaldehyde (Test 2)	(MG/L)	24	23.23	48	22.50	72	21.12	96	16.60	1	219
4-Nitrobenzamide	(MG/L)	0	-99	48	144.70	72	135.00	96	133.00	2	149
Nitrobenzene	(MG/L)	24	167.10	48	160.33	72	129.70	96	119.00	2	103
2-Nitrophenol	(MG/L)	24	200.35	48	200.35	72	183.10	96	160.00	4	95
4-Nitrophenol (Test 1)	(MG/L)	24	84.57	48	78.30	72	67.08	96	58.60	2	105
4-Nitrophenol (Test 2)	(MG/L)	24	64.60	48	54.40	72	44.11	96	41.00	2	107
4-Nitrophenol (Test 3)	(MG/L)	24	43.43	48	42.97	72	42.04	96	37.30	2	109
4-Nitrophenyl Phenyl Ether	(MG/L)	0	-99	48	2.78	72	2.65	96	2.65	4	261
m-Nitrotoluene	(MG/L)	24	25.60	48	25.60	72	25.60	96	25.60	3	161
Nonanoic Acid	(MG/L)	24	108.26	48	105.69	78	104.00	96	104.00	1	349
1-Nonanol	(MG/L)	24	6.03	48	6.03	72	5.70	96	5.70	1	353
2-Nonanone	(MG/L)	24	15.20	48	15.20	72	15.20	96	15.20	3	231
5-Nonanone	(MG/L)	24	31.00	48	31.00	72	31.00	96	31.00	1	347
Nonylamine	(MG/L)	24	2.32	48	2.26	72	2.26	96	2.16	5	213
Nonylphenol	(MG/L)	0	-99	48	0.16	72	0.14	96	0.14	2	303
exo-Norborneol	(MG/L)	24	361.07	48	329.47	72	262.06	96	228.00	4	149
Norbornylene	(MG/L)	0	-99	48	22.65	72	15.44	96	10.00	4	145
1-Octanol (Test 1)	(MG/L)	24	14.12	48	14.12	72	13.94	96	13.50	1	315
1-Octanol (Test 2)	(MG/L)	24	14.89	48	14.60	72	14.60	96	14.60	2	189
1-Octanol (Test 3)	(MG/L)	24	13.44	48	13.10	72	13.10	96	13.10	4	181
1-Octanol (Test 4)	(MG/L)	24	14.52	48	14.00	72	14.00	96	14.00	4	183

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
1-Octanol (Test 5)	(MG/L)	24	13.10	48	13.10	72	13.10	96	13.10	5	191
1-Octanol (Test 6)	(MG/L)	24	13.00	48	13.00	72	13.00	96	13.00	5	193
2-Octanone	(MG/L)	24	36.00	48	36.00	72	36.00	96	36.00	1	309
Octylamine	(MG/L)	24	7.58	48	5.79	72	5.31	96	5.19	4	187
tert-Octylamine	(MG/L)	24	32.35	48	25.75	72	25.16	96	24.60	4	189
4-Octylaniline	(UG/L)	0	-99	48	185.71	72	139.94	96	119.00	4	301
n-Octyl Cyanide (Test 1)	(MG/L)	24	5.01	48	4.91	72	4.91	96	4.91	1	343
n-Octyl Cyanide (Test 2)	(MG/L)	24	8.05	48	5.61	72	5.61	96	5.61	1	345
2'-(Octyloxy)-acetanilide	(MG/L)	24	0.67	48	0.47	72	0.45	96	0.45	3	299
1-Octyn-3-ol	(UG/L)	24	797.24	48	458.12	72	430.05	96	413.00	4	173
Oxamyl	(MG/L)	0	-99	48	8.93	72	8.61	96	8.30	5	175
Pentabromophenol	(UG/L)	0	-99	48	99.94	72	94.69	96	93.00	4	77
Pentachloroethane	(MG/L)	24	7.95	48	7.62	72	7.53	96	7.53	2	35
Pentachlorophenol (Test 1)	(UG/L)	24	328.38	48	252.49	72	240.00	96	240.00	2	63
Pentachlorophenol (Test 2)	(UG/L)	24	237.00	0	-99	0	-99	96	237.00	2	65
Pentachlorophenol (Test 3)	(UG/L)	24	325.44	48	301.00	0	-99	96	301.00	2	67
Pentachlorophenol (Test 4)	(UG/L)	24	242.00	0	-99	0	-99	96	242.00	2	69
Pentachlorophenol (Test 5)	(UG/L)	24	390.31	48	350.00	72	350.00	96	350.00	2	71
Pentachlorophenol (Test 6)	(UG/L)	24	150.64	48	98.60	72	98.60	96	98.60	5	83
Pentachlorophenol (Test 7)	(UG/L)	24	283.85	48	241.22	72	222.00	96	222.00	5	85
Pentachlorophenol (Test 8)	(UG/L)	24	305.88	48	282.61	72	261.00	96	261.00	5	87
Pentachlorophenol (Test 9)	(UG/L)	24	437.08	48	437.08	72	381.00	96	381.00	5	89
Pentachloropyridine	(MG/L)	24	1.19	48	0.96	72	0.67	96	0.47	3	65
2,3,4,5,6-Pentafluoroaniline	(MG/L)	24	39.39	48	39.39	72	39.39	96	37.10	1	131
Pentafluorobenzaldehyde	(MG/L)	24	2.46	48	1.37	72	1.24	96	1.10	1	185
2,4-Pentanedione (Test 1)	(MG/L)	24	199.77	48	117.70	72	111.05	96	104.00	1	117
2,4-Pentanedione (Test 2)	(MG/L)	0	-99	48	209.54	72	175.00	96	175.00	2	55
1-Pentanol	(MG/L)	24	477.80	48	472.00	72	472.00	96	472.00	3	99
2-Pentanone	(MG/L)	24	1433.88	48	1319.32	72	1265.52	96	1240.00	3	91
3-Pentanone	(MG/L)	24	1540.00	48	1540.00	72	1540.00	96	1540.00	1	123
Pentobarbital, Sodium Salt	(MG/L)	24	51.10	48	50.00	72	50.00	96	49.50	4	255
Pentyl Ether	(MG/L)	24	3.48	48	3.28	72	3.20	96	3.14	4	243
p-tert-Pentylphenol	(MG/L)	24	3.28	48	2.67	72	2.59	96	2.59	2	241
(+)-4-Pentyn-2-ol	(MG/L)	24	61.02	48	37.42	72	35.14	96	35.10	4	69
Permethrin	(UG/L)	24	34.17	48	30.19	72	20.15	96	16.00	4	327
Phenobarbital	(MG/L)	24	506.80	48	506.80	72	506.80	96	484.00	4	273
Phenol (Test 2)	(MG/L)	0	-99	0	-99	72	41.70	96	32.40	2	115
p-Phenoxybenzaldehyde	(MG/L)	24	7.23	48	5.63	72	5.06	96	4.60	1	395
2-Phenoxyethanol	(MG/L)	24	351.78	48	351.78	72	351.78	96	344.00	1	295
p-Phenoxyphenol	(MG/L)	24	5.42	48	5.23	72	5.23	96	4.95	2	259
Phenyl 4-aminosalicylate (Test 1)	(MG/L)	24	4.62	48	4.13	72	4.13	96	4.13	2	289
Phenyl 4-Aminosalicylate (Test 2)	(MG/L)	24	5.51	48	5.51	72	5.51	96	5.51	2	291
p-Phenylazophenol	(MG/L)	0	-99	0	-99	72	1.18	96	1.17	2	255
2-Phenyl-3-butyn-2-ol	(MG/L)	24	113.00	48	113.00	72	113.00	96	113.00	4	215
trans-2-Phenyl-1-cyclohexanol	(MG/L)	24	44.40	48	44.40	72	44.40	96	44.40	2	271
N-Phenyldiethanolamine	(MG/L)	24	735.00	48	735.00	72	735.00	96	735.00	3	247
Phenyl Disulfide	(MG/L)	24	0.26	48	0.15	72	0.14	96	0.11	2	265
Phenyl Ether	(MG/L)	24	4.00	48	4.00	72	4.00	96	4.00	4	263
2-Phenylphenol	(MG/L)	24	6.41	48	6.28	0	-99	96	6.15	2	257
4-Phenylpyridine	(MG/L)	24	17.08	48	16.43	72	16.43	96	16.10	3	253
Phenyl Salicylate	(MG/L)	24	1.24	48	1.18	0	-99	96	1.18	2	287
Phenyl Sulfoxide	(MG/L)	24	87.30	48	87.30	72	87.30	96	87.30	5	237
Phenyltrimethylammonium Iodide	(MG/L)	24	293.95	48	266.71	72	264.44	96	243.00	4	203

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Phenyltrimethylammonium Methosulfate	(MG/L)	24	291.61	48	260.91	72	256.95	96	248.00	4	223
2-Picoline	(MG/L)	24	897.00	48	897.00	72	897.00	96	897.00	3	125
3-Picoline	(MG/L)	0	-99	0	-99	72	167.26	96	144.00	5	123
4-Picoline	(MG/L)	24	702.27	48	634.02	72	517.93	96	403.00	3	127
Piperine	(MG/L)	24	10.29	48	8.34	72	8.00	96	7.84	4	317
Propanil	(MG/L)	24	11.93	48	10.59	72	10.37	96	8.60	3	205
1-Propanol (Test 1)	(G/L)	24	5.04	48	5.04	72	4.63	96	4.63	1	65
1-Propanol (Test 2)	(G/L)	24	4.73	48	4.64	72	4.56	96	4.48	1	67
2-Propanol (Test 1)	(G/L)	24	10.17	48	10.06	72	9.75	96	9.64	1	69
2-Propanol (Test 2)	(G/L)	24	10.49	48	10.40	0	-99	96	10.40	1	71
2-Propanol (Test 3)	(G/L)	24	6.55	48	6.55	72	6.55	96	6.55	1	73
Propionic Acid, Sodium Salt	(MG/L)	0	-99	48	4878.09	72	4784.90	96	4740.00	1	43
Propionitrile	(MG/L)	24	1520.00	48	1520.00	72	1520.00	96	1520.00	5	51
Propoxur	(MG/L)	24	16.35	48	13.46	72	10.55	96	8.80	4	245
Propyl Acetate	(MG/L)	24	68.91	48	65.14	72	63.33	96	60.00	1	125
Propylamine	(MG/L)	0	-99	48	575.14	72	368.33	96	308.00	1	75
Propyl Disulfide	(MG/L)	24	4.02	48	3.43	72	2.83	96	2.62	2	133
4-Propylphenol	(MG/L)	24	12.00	48	11.64	72	11.47	96	11.00	3	217
n-Propyl Sulfide	(MG/L)	24	21.70	48	21.70	72	21.70	96	21.70	1	183
2-Propyn-1-ol (Test 1)	(MG/L)	0	-99	48	2.77	72	1.81	96	1.53	3	43
2-Propyn-1-ol (Test 2)	(MG/L)	24	3.52	48	2.08	72	1.66	96	1.44	4	43
Pyridine (Test 1)	(MG/L)	24	478.26	48	183.98	72	112.92	96	106.00	3	79
Pyridine (Test 2)	(MG/L)	0	-99	48	157.97	72	117.96	96	93.80	3	81
3-Pyridinecarboxaldehyde	(MG/L)	0	-99	48	18.41	72	17.36	96	16.40	3	115
2,6-Pyridinedicarboxylic Acid	(MG/L)	24	326.27	48	322.00	72	322.00	96	322.00	3	153
3-(3-Pyridyl)-1-propanol	(MG/L)	0	-99	48	423.97	72	176.21	96	150.00	1	303
Pyrrrole	(MG/L)	24	220.42	48	220.42	72	215.52	96	210.00	1	89
Quinoline	(MG/L)	24	82.69	48	77.80	72	77.80	96	77.80	5	199
Resmethrin	(UG/L)	0	-99	48	13.76	72	7.50	96	6.16	5	267
Rotenone (Test 1)	(UG/L)	24	5.26	48	4.51	72	4.51	96	4.51	3	321
Rotenone (Test 2)	(UG/L)	24	6.58	48	6.00	72	6.00	96	6.00	5	269
Saccharin, Sodium Salt Hydrate	(G/L)	24	19.38	48	19.38	72	18.30	96	18.30	4	141
Salicylaldehyde	(MG/L)	24	2.54	48	2.51	72	2.41	96	2.30	1	227
Salicylaldoxime	(MG/L)	24	-99	48	3.55	72	3.23	96	3.23	5	153
Salicylanilide	(MG/L)	0	-99	48	4.71	72	4.23	96	3.95	3	281
Salicylic Acid, Sodium Salt (Test 1)	(MG/L)	24	1853.26	48	1591.25	72	1501.17	96	1370.00	2	141
Salicylic Acid, Sodium Salt (Test 2)	(MG/L)	0	-99	48	2489.87	72	2316.71	96	2160.00	2	143
Secobarbital, Sodium Salt	(MG/L)	24	24.42	48	23.60	72	23.60	96	23.60	4	275
Sodium Azide	(MG/L)	24	11.49	48	6.22	72	5.83	96	5.46	5	279
Solketal	(G/L)	24	17.94	48	17.31	72	17.31	96	16.70	4	123
Strychnine Hemisulphate Salt	(MG/L)	24	1.60	48	1.24	72	1.24	96	1.24	5	265
Styrene	(MG/L)	24	7.31	48	4.02	72	4.02	96	4.02	5	179
Terbufos	(UG/L)	24	14.44	48	13.93	72	13.61	96	13.30	5	215
a,a,a',a'-Tetrabromo-o-xylene	(UG/L)	0	-99	0	-99	72	484.03	96	437.00	4	161
Tetrabutyltin	(UG/L)	24	95.80	48	59.05	72	55.23	96	45.20	5	257
2,3,5,6-Tetrachloroaniline	(MG/L)	0	-99	48	0.42	72	0.27	96	0.27	1	133
Tetrachlorocatechol	(MG/L)	24	1.75	48	1.33	72	1.30	96	1.27	2	77
1,1,2,2-Tetrachloroethane	(MG/L)	24	22.54	48	22.11	72	20.39	96	20.30	2	37
Tetrachloroethylene (Test 1)	(MG/L)	24	17.87	48	15.91	72	14.86	96	13.40	2	25
Tetrachloroethylene (Test 2)	(MG/L)	24	23.93	48	22.00	72	20.80	96	20.30	2	27
2,3,4,5-Tetrachlorophenol	(UG/L)	24	464.31	48	420.17	0	-99	96	410.00	2	75
2,3,4,6-Tetrachlorophenol	(MG/L)	24	1.11	48	1.07	72	1.07	96	1.03	5	139
a,a-2,6-Tetrachlorotoluene	(MG/L)	24	1.62	48	1.11	72	1.02	96	0.97	1	201

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
Tetraethyltin	(UG/L)	0	-99	48	26.85	72	16.34	96	11.00	5	197
a,a,a-4-Tetrafluoro-o-toluidine	(MG/L)	24	29.60	48	29.60	72	29.60	96	29.60	1	215
a,a,a-4-Tetrafluoro-m-toluidine	(MG/L)	24	36.41	48	33.59	72	32.36	96	30.10	1	213
Tetrahydrofuran	(MG/L)	24	2543.99	48	2201.52	72	2201.52	96	2160.00	1	101
Tetrahydrofurfuryl Methacrylate	(MG/L)	0	-99	0	-99	72	42.27	96	34.70	3	227
Tetramethylammonium Chloride	(MG/L)	24	576.05	48	580.71	72	504.31	96	462.00	4	61
2,2,5,5-Tetramethyltetrahydrofuran	(MG/L)	24	168.00	48	168.00	72	168.00	96	168.00	4	175
Thiopental, Sodium Salt	(MG/L)	24	28.43	48	26.20	72	26.20	96	26.20	4	249
Tolazoline Hydrochloride	(MG/L)	24	509.44	48	414.61	72	397.88	96	354.00	3	237
o-Tolualdehyde	(MG/L)	24	57.93	48	55.67	72	55.67	96	52.80	1	273
Toluene (Test 1)	(MG/L)	0	-99	48	39.88	72	37.98	96	36.20	3	163
Toluene (Test 2)	(MG/L)	24	43.48	48	32.74	72	32.91	96	31.70	5	155
1-(p-Toluenesulfonyl)imidazole	(MG/L)	24	44.85	48	44.85	72	44.85	96	41.80	1	355
4-Toluidine (Test 1)	(MG/L)	24	253.95	48	238.61	72	180.13	96	149.00	3	167
4-Toluidine (Test 2)	(MG/L)	0	-99	48	213.26	72	203.12	96	171.00	5	167
o-Tolunitrile	(MG/L)	24	44.70	48	44.70	72	44.70	96	44.70	1	265
2,4,5-Tribromoimidazole (nominal) (Test 1)	(MG/L)	24	11.00	48	8.14	72	7.96	96	7.96	1	39
2,4,5-Tribromoimidazole (Test 2)	(MG/L)	24	4.70	48	4.70	72	4.70	96	4.70	3	39
2,4,6-Tribromophenol	(MG/L)	24	9.53	48	7.64	72	6.77	96	6.54	2	79
2,4,6-Tri-tert-butylphenol	(UG/L)	24	-99	48	66.14	72	61.00	96	61.00	5	259
Tributyl Phosphate (Test 1)	(MG/L)	24	11.00	48	11.00	72	11.00	96	11.00	3	277
Tributyl Phosphate (Test 2)	(MG/L)	24	8.18	48	8.18	72	8.18	96	8.18	3	279
2',3',4'-Trichloroacetophenone	(MG/L)	0	-99	0	-99	72	2.00	96	2.00	1	253
2,3,4-Trichloroaniline	(MG/L)	24	5.17	48	4.05	72	3.91	96	3.56	1	135
1,2,4-Trichlorobenzene	(UG/L)	24	3366.77	48	3265.37	72	3101.45	96	2990.00	5	91
1,3,5-Trichloro-2,4-dinitrobenzene	(MG/L)	24	0.66	48	0.55	72	0.33	96	0.22	1	127
1,1,1-Trichloroethane (Test 1)	(MG/L)	24	52.90	48	52.90	72	52.90	96	52.90	3	29
1,1,1-Trichloroethane (Test 2)	(MG/L)	24	61.52	48	59.83	72	56.60	96	42.30	3	31
1,1,2-Trichloroethane	(MG/L)	24	81.60	0	-99	0	-99	96	81.60	2	39
2,2,2-Trichloroethanol	(MG/L)	24	323.11	48	313.23	72	299.00	96	299.00	1	25
Trichloroethylene	(MG/L)	24	58.75	48	57.71	72	53.64	96	44.10	2	33
1,1,1-Trichloro-2-methyl-2-propanol Hydrate	(MG/L)	24	135.00	48	135.00	72	135.00	96	135.00	4	57
2,4,6-Trichlorophenol (Test 2)	(MG/L)	24	8.81	48	8.27	72	4.76	96	4.55	4	79
2,4,6-Trichlorophenol (Test 3)	(MG/L)	24	5.22	48	4.54	72	3.95	96	2.80	5	93
1,2,3-Trichloropropane	(MG/L)	24	66.50	48	66.50	72	66.50	96	66.50	5	49
2-Tridecanone	(MG/L)	24	0.68	48	0.59	72	0.42	96	0.36	4	295
Tridecylamine	(UG/L)	24	147.60	48	88.45	72	74.75	96	65.40	5	251
Triethanolamine	(G/L)	24	13.48	48	12.30	72	11.80	96	11.80	5	137
Triethylene Glycol (Test 1)	(G/L)	24	76.70	48	72.75	72	66.33	96	59.90	4	131
Triethylene Glycol (Test 2)	(G/L)	24	71.65	48	71.65	72	70.65	96	70.20	4	133
Triethylene Glycol (Test 3)	(G/L)	24	83.24	48	83.24	72	77.40	96	77.40	4	135
Triethyl Nitritotricarboxylate	(MG/L)	24	42.32	48	26.98	72	19.07	96	13.30	4	205
2,2,2-Trifluoroethanol	(MG/L)	0	-99	48	163.10	72	137.35	96	119.00	3	33
3-Trifluoromethyl-4-nitrophenol	(MG/L)	24	9.29	48	9.14	72	9.14	96	9.14	5	145
a,a,a-Trifluoro-m-tolualdehyde (Test 1)	(MG/L)	24	2.11	48	1.22	72	0.94	96	0.92	1	255
a,a,a-Trifluoro-m-tolualdehyde (Test 2)	(MG/L)	0	-99	48	1.37	72	0.84	96	0.76	3	185
a,a,a-Trifluoro-o-tolunitrile	(MG/L)	24	55.62	48	50.68	72	48.12	96	42.20	1	251
a,a,a-Trifluoro-m-tolunitrile	(MG/L)	0	-99	48	53.28	72	47.70	96	47.70	1	249
2,4,6-Triiodophenol	(MG/L)	24	1.33	48	1.30	72	1.30	96	1.21	5	95
2',3',4'-Trimethoxyacetophenone (Test 1)	(MG/L)	24	178.95	48	177.46	72	176.05	96	172.00	1	373
2',3',4'-Trimethoxyacetophenone (Test 2)	(MG/L)	24	238.39	48	233.94	72	233.94	96	229.00	3	257
2,4,5-Trimethoxybenzaldehyde	(MG/L)	24	78.93	48	62.73	72	56.70	96	49.50	2	225
1,2,4-Trimethylbenzene	(MG/L)	0	-99	48	9.15	72	8.70	96	7.72	3	215

-99 = Value not calculable.

Chemical Name	Units	Hour	LC50	Hour	LC50	Hour	LC50	Hour	LC50	Volume	Page
2,4,5-Trimethyloxazole	(MG/L)	24	448.00	48	448.00	72	448.00	96	448.00	1	159
2,3,6-Trimethylphenol	(MG/L)	0	-99	48	12.73	72	9.74	96	8.20	5	207
2,4,6-Trimethylphenol	(MG/L)	24	14.13	48	13.83	72	13.26	96	13.00	5	209
Trimethyl Phosphate	(G/L)	24	13.35	48	12.06	72	8.13	96	7.01	5	63
s-Trioxane	(G/L)	24	6.45	48	6.07	72	5.95	96	5.95	1	59
Triphenyl Phosphate	(MG/L)	24	0.94	48	0.91	72	0.87	96	0.87	3	311
Triphenylphosphine Oxide	(MG/L)	24	55.95	48	53.70	72	53.70	96	53.70	3	309
Tripropargylamine	(MG/L)	24	296.00	48	296.00	72	296.00	96	296.00	3	207
Tripropylamine	(MG/L)	24	50.90	48	50.90	72	50.90	96	50.90	3	235
Tris(2-butoxyethyl) Phosphate	(MG/L)	24	11.52	48	11.52	72	11.52	96	11.20	3	313
2-Undecanone	(MG/L)	24	1.78	48	1.50	72	1.50	96	1.50	3	265
Undecylamine	(MG/L)	24	0.38	48	0.22	72	0.21	96	0.21	5	233
n-Undecyl Cyanide	(MG/L)	24	1.75	48	1.12	72	0.43	96	0.43	1	385
Urethane	(G/L)	24	5.47	48	5.24	72	5.24	96	5.24	5	59
Valeraldehyde (Test 1)	(MG/L)	0	-99	48	12.93	72	12.40	96	12.40	2	61
Valeraldehyde (Test 2)	(MG/L)	0	-99	48	13.40	72	13.40	96	13.40	3	93
Vanillin (Test 1)	(MG/L)	24	109.79	48	63.84	72	57.00	96	57.00	1	279
Vanillin (Test 2)	(MG/L)	0	-99	0	-99	72	123.00	96	123.00	1	281
o-Vanillin (Test 1)	(MG/L)	24	4.05	48	3.64	72	2.96	96	2.60	1	275
o-Vanillin (Test 2)	(MG/L)	24	4.18	48	3.53	72	2.97	96	2.20	1	277
N-Vinylcarbazole	(UG/L)	0	-99	0	-99	72	5.95	96	3.20	3	289
o-Xylene (Test 1)	(MG/L)	24	16.40	48	16.40	72	16.40	96	16.40	5	183
o-Xylene (Test 2)	(MG/L)	24	16.69	48	16.69	72	16.69	96	16.40	5	185
m-Xylene	(MG/L)	24	18.25	48	16.00	72	16.00	96	16.00	5	187
p-Xylene	(MG/L)	0	-99	48	11.90	72	11.35	96	8.87	3	191
Xylene, Mixed	(MG/L)	24	14.04	48	13.40	72	13.40	96	13.40	5	189