Data Evaluation Report on the acute toxicity of BAS 510 F (TGAI) to the green alga *Pseudokirchneriella subcapitata*.

PMRA Submission Number: 2001-1027 **EPA MRID Number{454050-17}**

Data Requirement: PMRA DATA CODE: fresh water algae:9.8.2-1 (TGAI)
EPA DP Barcode: D278418
OECD Data Point: fresh water algae: IIA 8.4.1; marine algae: IIA 8.4.1 (TGAI) and IIIA 10.2.1.11 (EP)
EPA Guideline: 123-2

Test material: BAS 510 F **Purity (%):** 94.4%
Common name: Nicobifen
Chemical name
IUPAC: 2-chloro-N-(4'-chlororobiphenyl-2-yl) nicotinamide
CAS name: 3-Pyridinecarboxamide, 2-chloro-N_(4'-chloro[1.1'-biphenyl]-2-yl)
CAS No.: 188425-85-6
Synonyms:

Primary Reviewer: Peter Takacs **Date:** March 1/02
{PMRA}

Secondary Reviewer(s): Thomas M. Steeger, Ph.D. **Date:** May 30, 2002
{EPA} Thomas M Steeger Supplemental

Company Code: BAZ
Active Code: CHH-BAZ-4
Use Site Category: In Canada, this fungicide is proposed for use on USC 13, 14 and 30; agricultural feed, food and turf uses. BAS 510 F is to be used 2-6 times per growing season depending on the crop, at a maximum recommended application rate of 875 g a.i./ha/application.
EPA PC Code: 128008

CITATION: Johanna Kubitza, February, 2001. Effect of BAS 510 F on the Growth of the Green Alga Pseudokirchneriella subcapitata BASF Agricultural Center Limburgerhof Crop Protection Division Ecology and Environmental Analytics P.O. Box 120 671 14 Limburgerhof, Germany. Studv Code 41 893.

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EXECUTIVE SUMMARY:

In a 96-hour acute toxicity study, the cultures of the green alga *Pseudokirchneriella subcapitata.* were exposed to BAS 510 F at nominal concentrations of 0.1, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 mg a.i/L under static conditions in accordance with the OECD guideline 201. The NOEC was not reported but was calculated to be 0.49 mg a.i./L. The EC_{50} value for biomass, based on cell density was 1.34 mg a.i/L.The calculated EC50 based on percent inhibition of cell number is 1.77 mg a.i./L. The % growth inhibition (biomass) in the treated algal culture as compared to the control ranged from 3 to 95%; the percent growth inhibition based on cell number ranged from 4 to 72%.

This toxicity study is classified as supplemental and does not satisfy the guideline requirements for an acute algal toxicity study. The study can be upgraded to core if the registrant provides additional details on water quality and provide evidence that neither pH nor water hardness affect the solubility and/or toxicity of BAS 510F. Furthermore, it is unclear how other studies encountered solubility problems (precipitate) with BAS 510F even when using a co-solvent; however this study did not use a co-solvent and does not report any difficulties with solubility.

Results Synopsis

Test Organism: green alga *Pseudokirchneriella subcapitata*
Test Type: Static

96 hr EC_{50}: 1.34 mg a.i./L (biomass) 95% C.I.: 1.3-1.38 mg a.i./L
96 hr EC_{50}: 1.77 mg a.i./L (growth rate) 95% C.I:1.19- 3.45 mg a.i./L

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I. MATERIALS AND METHODS

GUIDELINE FOLLOWED:

OECD guideline 201.

COMPLIANCE:

This study was conducted in accordance with the Good Laboratory Practice Regulations; Appendix I to §19a, Section 1, Chemikaliengesetz of July 25, 1994 (Official Bulletin/Federal Republic of Germany, I 1994, P. 1703).

A. MATERIALS:

1. Test Material BAS 510 F

Description:	Solid
Lot No./Batch No. :	N37
Purity:	94.4%
Stability of Compound Under Test Conditions:	Not stated
Storage conditions of test chemicals:	Not satated

Physicochemical properties of [test material].

Parameter	Values	Comments
Molecular weight	343.21	
Water solubility at 20°C	4.64 mg/L	low solubility
Vapour pressure	$7x10^{-9}$ mbar @ 20 °C	not volatile
UV absorption	UV molecular extinction: $1.53x10^3$ at 290 nm	-
pKa	does not dissociate in water	-
Kow	2.96 @ 21 °C	Low potential to bioconcentrate

2. Test organism:

Name: Green alga, *Pseudokirchneriella subcapitata* (syn. *Selenastrum capricornutum)*

EPA requires a nonvascular species: For tier I testing, only one species, Selenastrum capricornutum, to be tested; for tier II testing, Skeletonema costatum, Anabaena flos-aquae, Selenastrum capricorntum, and a freshwater diatom is tested

OECD suggests that the following species are suitable: Selenastrum capricornutum, Scenedesmus subspicatus, and Chlorella vulgaris. If other species are used, the strain should be reported

Strain: not specified
Source: Stock cultures were cultivated according to OECD 201 recommendations. At least once per year fresh strains were obtained from the "Sammlung von Algenkulturen" Göttingen (Germany); specification: SAG 61.81 *Pseudokirchneriella subcapitata.*
Age of inoculum: not specified
Method of cultivation: not specified

B. STUDY DESIGN:

1. Experimental Conditions

a) Range-finding Study:
A range finding study was conducted to determine treatment levels; details were not provided.
b) Definitive Study

BAS 510 F: Experimental Parameters

Parameter	Details	Remarks *Criteria*
Acclimation Period: Culturing media and conditions: (same as test or not) Health: (any toxicity observed)	**Not stated**	*EPA recommends two week acclimation period.* *OECD recommends an amount of algae suitable for the inoculation of test cultures incubated under the conditions of the test and used when still exponentially growing, normally after an incubation period of about 3 days. When the algal cultures contain deformed or abnormal cells, they must be discarded.*
Test system	Static	

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Parameter	Details	Remarks *Criteria*
Incubation facility	not described	
Duration of the test	96 hr	acceptable *EPA requires: 96 - 120 hours* *OECD requires: 72 hours*
Test vessel Material: (glass/polystyrene) Size: Fill volume:	100 mL glass dimple flasks with a final volume of 60 mL were used	acceptable *OECD recommends 250 ml conical flasks when the volume of the test solution is 100 ml or use a culturing apparatus.*
Details of growth medium Name: pH at test initiation: pH at test termination: Chelator used: Carbon source:	Standard OECD 201 medium 8.0 7.66 Na_2EDTA (0.1 mg/L) $NaHCO_3$	acceptable *EPA recommends 20X-AAP medium and no chelators.* *OECD recommends the medium pH after equilibration with air be ~8 with less than .001 mmol/l of chelator, if used.*
If non-standard nutrient medium was used, detailed composition provided (Yes/No)	-	
Dilution water Source: Type: pH: Total Organic Carbon: Particulate matter: Metals: Pesticides: Chlorine: Water pretreatment (if any): Intervals of water quality measurement	**not provided**	unacceptable *pH:* *EPA : Skeletonema costatum= ~8.0* *Others = ~7.5 from beginning to end of the test.* *OECD: pH is measured at beginning of the test and at 72 hours, it should not normally deviate by more than one unit during the test.* *salinity:* *EPA: 30-35 ppt. EPA is against the use of dechlorinated water.*
Indicate how the test material is added to the medium (added directly or used stock solution)	stock solution was added to test medium	

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Parameter	Details	Remarks *Criteria*
Aeration or agitation	agitated at 135 rpm	acceptable *EPA recommends agitation only for Selenastrum sp. at 100 cycles per min and Skeletonema sp. at ~60 cycles per min. Aeration is not recommended.*
Initial cells density	3000 cells/mL this value is below the OECD recommended cell count of 10000/mL, however, the EPA accepts 3000/mL	acceptable *EPA requires an initial number of 3,000 - 10,000 cells/mL. For Anabaena flos-aquae, cell counts on day 2 are not required.* *OECD recommends that the initial cell concentration be approximately 10,000 cells/ml for S. capricornutum and S. subspicatus. When other species are used the biomass should be comparable.*
Number of replicates Control: Solvent control: Treated ones:	10 5 5	acceptable; the methodology section implies that stock solutions were made up in nutrient media. *EPA requires a negative and/or solvent control with 3 or more replicates per doses. For Navicula sp. tests should be conducted with four replicate.* *OECD prefer three replicates at each test concentration and ideally twice that number ~~of controls. When co-solvents are used,~~ include a solvent control in the test.*
Test concentrations Nominal: Measured:	0.1, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 mg/L 0.09, 0.49, 0.97, 1.44, 1.71, 2.24, 2.45 mg/L	acceptable *EPA requires at least 5 test concentrations, with each at least 60% of the next higher one.* *OECD recommends at least five concentrations arranged in a geometric series, with the lowest concentration tested should have no observed effect on the growth of the algae. The highest concentration tested should inhibit growth by at least 50% relatively to the control and, preferably, stop growth completely.*
Solvent (type, percentage, if used)	not stated	

Parameter	Details	Remarks *Criteria*
Method and interval of analytical verification: Limit of Detection: Limit of Quantitation:	beginning and end of study using HPLC with UV detection - 0.05 mg ai/L	- - - - - - - - - - - -
Test conditions Temperature: Photoperiod: Light intensity and quality:	 22±1°C Continuous white light, 8000 lux	light intensity (8 Klux) exceeds EPA recommended range of 4 - 5 Klux; water temperature was less than EPA recommended range. *Temperature:* *EPA: Skeletonema: 20°C,* *Others: 24-25°C;* *OECD recommended the temperature in the range of 21 to25°C maintained at ± 2°C* *Photoperiod:* *EPA: S. costatum 14 hr light/ 10 hr dark,* *Others: Continuous;* *OECD: continuous uniform illumination* *Light intensity:* *EPA: Anabaena: 2.0 Klux (±15%),* *Others: 4 - 5 Klux (±15%);* *OECD: approximately 8000 Lux measured with a spherical collector*
Reference chemical, if used Name: Concentrations:	 potassium dichromate 0.05-1.5 mg ai/L	- - - - - - - - - - - -
Other parameters, if any	none	- - - - - - - - - - - -

2. Observations:

Table 1: Observation

Parameters	Details	Remarks *Criteria*
Parameters measured including the growth inhibition/other toxicity symptoms	growth rate and biomass, morphological effects	acceptable *EPA recommends the growth of the algae expressed as the cell count per mL, biomass per volume, or degree of growth as determined by spectrophotometric means.*

Measurement technique for cell density and other end points	Spectrophotometer (623 nm) 5 cm cuvette	acceptable *EPA recommends the measurement technique of cell counts or chlorophyll a* *OECD recommends the electronic particle counter, microscope with counting chamber, fluorimeter, spectrophotometer, and colorimeter. (note: in order to provide useful measurements at low cell concentrations when using a spectrophotometer, it may be necessary to use cuvettes with a light path of at least 4 cm).*
Observation intervals	48, 72, 96 hr	**24 hr samples were not determined for cell count** *EPA and OECD: every 24 hours.*
Other observations, if any	-	
Indicate whether there was exponential growth in the control	96 hr control cell counts were more than 16x initial counts	acceptable *EPA requires control cell count at termination to be ≥ 2X initial count or by a factor of at least 16 during the test.* *OECD: cell concentration in control cultures should have increased by a factor of at least 16 within three days.*
Water quality was acceptable (Yes/No)	no details were provided on dilution water, standard medium was used, thus it will be assumed water quality is acceptable	
Were raw data included?	Yes	

II. RESULTS AND DISCUSSION:

A. INHIBITORY EFFECTS:

Algal cell biomass inhibition ranged from 3% at the lowest treatment level to 95% at the highest concentration, whereas growth rate inhibition ranged from 0.5 to 48%. Total biomass was the most sensitive endpoint in the study.

Table 2: Effect of BAS 510 F on green algal (*Pseudokirchneriella subcapitata*) growth.

Treatment: mean measured concentration (mg a.i./L)	cell count 48 hours	cell count 72hours	96 hours		
			cell count	% inhibition biomass	% inhibition growth rate
control	1.11E5	6.06E5	1.63E6	-	-
0.09	1.1E5	5.89E5	1.577E6	3	0.5
0.49	9.73E4	5.1E5	1.46E6	12.7	1.7
0.97	7.93E4	4.12E5	1.21E6	28.5	4.7
1.44	6.86E4	3.29E5	1.04E6	40.3	7.1
1.71	5.88E4	2.55E5	8.09E5	53.2	11.2
2.24	3.93E4	1.34E5	4.53E5	73.0	20.3
2.45	1.25E4	3.14E4	6.91E4	94.8	48.3

Table 3: Statistical endpoint values for BAS 510 F on green algal (*Pseudokirchneriella subcapitata*) grwoth.

Statistical Endpoint	Biomass	Growth rate
NOEC or EC_{05} (mg a.i./L)	Not reported	Not reported
EC_{50} (mg a.i./L) (95% C.I.)	1.34 (1.3-1.38)	3.75 (3.48-4.04)
IC_{50} (mg a.i./L) (95% C.I.)	-	-
other (IC_{25}/EC_{25})	-	-
Reference chemical, if used NOEC EC_{50} (mg/L)	 not stated 0.58 (0.56-0.59)	 not stated 1.17 (1.13-1.2)

B. REPORTED STATISTICS: [

The mathematical determination of the EC_{50} was done by Probit analysis. The calculations were conducted with a PC and the commercial software "TOXSTAT 3.5".

C. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

Statistical Method: Because the study authors used Probit analysis, it was used by the reviewer for verification of the EC_{50} (version 1.5). However, the Probit method is not recommended or suitable for the analysis of algal toxicity data; none the less, the EC_{50} estimate with this method is generally in close agreement with the result of other methods (Walsh et at. 1987). Thus the EC50 value is considered

acceptable. The EC_{50} for biomass calculated by the reviewer was identical to that reported in the study.

EC_{50}: 1.34 mg ai/L

D. STUDY DEFICIENCIES: The acclimation period and dilution water parameters were not reported and 24-hr cell counts were not done. The intensity of light (8 Klux) exceeded EPA's recommended range of 4 - 5 Klux; water temperature (22°C) was below EPA recommended range (24 - 25°C). There was appropriate growth of the control algae during the test and the partial responses bracketed 50% inhibition for biomass, the more sensitive end point. These deficiencies are considered as minor.

E. REVIEWER'S COMMENTS: This study was poorly reported; no information is provided on the dilution water, and an NOEC was not calculated. the positive control (potassium dichromate control study was not run concurrently with the study of BAS 510F. The study did not appear to use a co-solvent even though test concentrations were close to the reported solubility limit (4.64 mg/L at 20°C). Of the aquatic toxicity studies reviewed thus far for BAS 510F, this is the first not to report the use of a co-solvent. Even with co-solvents, previous studies have reported a precipitate at concentrations greater than 1 mg/L. It is unclear how this study avoided the need for a co-solvent and how they seem to have avoided problems with solubility. Unlike previous studies that showed an initially high recovery followed by steady decline in recovery as the concentration of BAS 510F increased, this study (Figure 1) showed a spike in recovery 97% at 1.5 mg/L. Lower recoveries (82%) at the highest exposure concentration (3 mg/L) are consistent with other studies that relied on a co-solvent. For a study conducted under Good Laboratory Practice (GLP), this study provides very little detail on study conditions.

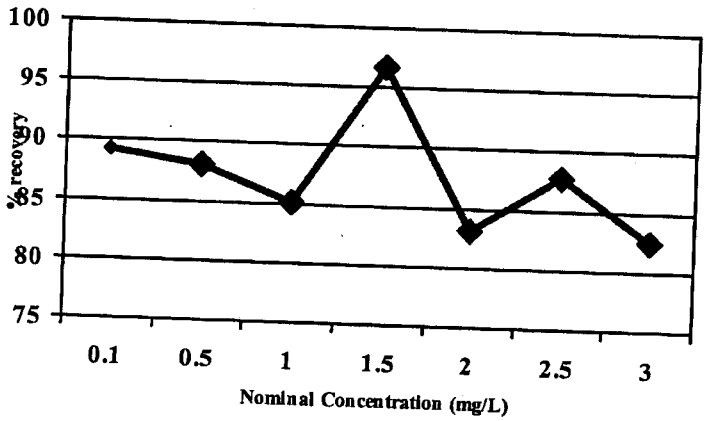


Figure 1 Average percent recovery of BAS 510F with increasing concentration (mg/L).

The probit method is not recommended for algal study analyses. However, using probit analysis of percent inhibition of cell number, EFED calculates the EC50 at 1.77 mg/L (95% CI: 1.19 - 3.45 mg/L) with a slope of 1.83. The NOEC for percent inhibition of cell growth is 0.49 mg/L based on Dunnett's test results (see attached SAS output).

F. CONCLUSIONS: Because of the lack of detail in study conditions, this study is classified as supplemental. The study can be upgraded to core if more detailed information is provided on the study conditions and if information is provided on how the laboratory was able to overcome BAS 510F solubility issues without the use of a co-solvent. The EC_{50} for biomass was more sensitive than that of growth rate inhibition (1.34 vs. 1.77 mg ai/L).

96 hr EC_{50} (biomass): 1.34 mg ai/L

III. REFERENCES:

Walsh, Gerald E., Christine H. Deans and Leslie L. McLaughlin. 1987. Comparison of the EC50s of Algal Toxicity Tests Calculated by Four Methods. Environ. Toxicol. Chem. 6:767-770. (ERL,GB 588).

Approved 04/01/01 C.K.

Statistical Analysis System (SAS) output follows:

Average Cell Densities by Treatment 37

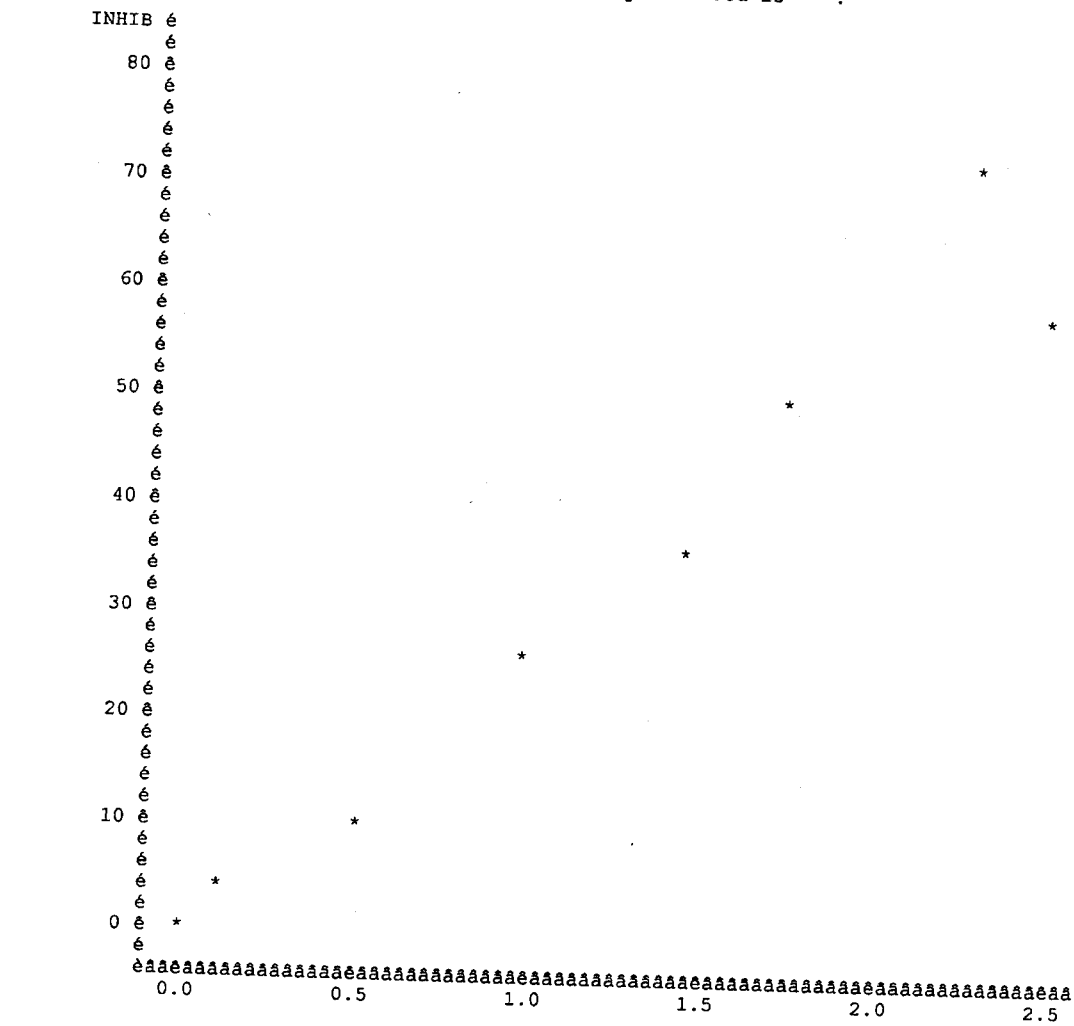
Obs	DOSE	_TYPE_	_FREQ_	MEAN	SE
1	0.00	0	10	1635500	42686.78
2	0.09	0	5	1577600	30350.62
3	0.49	0	5	1467000	64089.00
4	0.97	0	5	1216600	27541.97
5	1.44	0	5	1041760	24401.18
6	1.71	0	5	809360	32230.91
7	2.24	0	4	453850	13821.87
8	2.45	0	5	690940	101538.07

Average Percent Inhibition of Pseudokirchneriella Cell Number by BAS 510F 38

Obs	DOSE	_TYPE_	_FREQ_	INHIB	SE
1	0.00	0	10	0.0000	2.61001
2	0.09	0	5	3.5402	1.85574
3	0.49	0	5	10.3027	3.91862
4	0.97	0	5	25.6130	1.68401
5	1.44	0	5	36.3033	1.49197
6	1.71	0	5	50.5130	1.97071
7	2.24	0	4	72.2501	0.84512
8	2.45	0	5	57.7536	6.20838

Plot of Percent Inhibition of Pseudokirchneriella Cell Number over Increasing Concentrations 39

Plot of INHIB*DOSE. Symbol used is '*'.



Analysis of Variance for Percent Inhibition of Pseudokirchneriella Cell Number over Dose of B 40

The ANOVA Procedure

Class Level Information

Class	Levels	Values
DOSE	8	0 0.09 0.49 0.97 1.44 1.71 2.24 2.45

Dependent Variable: PRCNT Number of observations 44

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	27551.54322	3935.93475	72.76	<.0001
Error	36	1947.44389	54.09566		
Corrected Total	43	29498.98711			

R-Square	Coeff Var	Root MSE	PRCNT Mean
0.933983	26.76464	7.354975	27.48020

Source	DF	Anova SS	Mean Square	F Value	Pr > F
DOSE	7	27551.54322	3935.93475	72.76	<.0001

Dunnett's t Tests for PRCNT

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments against a control.

Alpha	0.05
Error Degrees of Freedom	36
Error Mean Square	54.09566
Critical Value of Dunnett's t	2.79769

Comparisons significant at the 0.05 level are indicated by ***.

DOSE Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
2.24 - 0	72.250	60.077	84.424	***
2.45 - 0	57.754	46.483	69.024	***
1.71 - 0	50.513	39.243	61.783	***
1.44 - 0	36.303	25.033	47.574	***
0.97 - 0	25.613	14.343	36.883	***
0.49 - 0	10.303	-0.968	21.573	
0.09 - 0	3.540	-7.730	14.811	

Obs	DOSE	N	RESPONSE
1	0.00	100	0
2	0.09	100	4
3	0.49	100	10
4	0.97	100	26
5	1.44	100	36
6	1.71	100	51
7	2.24	100	72
8	2.45	100	58

Probit Analysis of Percent Inhibition of Pseudokirchneriella Cell Number 44

Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-485.20303	0	0
1	0	-390.47387	-0.296110161	1.0856081721
2	0	-380.10043	-0.408859453	1.6236149254
3	0	-379.40425	-0.448011441	1.8098867554
4	0	-379.39952	-0.451673653	1.8268459503
5	0	-379.39952	-0.451699648	1.8269645593

Model Information

Data Set	WORK.E
Events Variable	RESPONSE
Trials Variable	N
Number of Observations	7
Number of Events	257
Number of Trials	700
Name of Distribution	NORMAL
Log Likelihood	-379.3995171

Last Evaluation of the Negative of the Gradient

Intercept	Log10(DOSE)
1.784943E-7	-1.47271E-7

Last Evaluation of the Negative of the Hessian

	Intercept	Log10(DOSE)
Intercept	357.81236318	47.467688753
Log10(DOSE)	47.467688753	36.122963006

Algorithm converged.

Goodness-of-Fit Tests

Statistic	Value	DF	Pr > ChiSq
Pearson Chi-Square	25.7319	5	0.0001
L.R. Chi-Square	21.6601	5	0.0006

Probit Analysis of Percent Inhibition of Pseudokirchneriella Cell Number 45

Probit Procedure

Response-Covariate Profile

Response Levels	2
Number of Covariate Values	7

All variances and covariances have been multiplied by the heterogeneity factor H= 5.1464.

Please check to be sure that the large chi-square (p < 0.0001) is not caused by systematic departure from the model. A t value of 2.57 will be used in computing fiducial limits.

Analysis of Parameter Estimates

Variable	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq	Label
Intercept	1	-0.45170	0.13198	11.7129	0.0006	Intercept
Log10(DOSE)	1	1.82695	0.41539	19.3442	<.0001	

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	0.017420	-0.022890
Log10(DOSE)	-0.022890	0.172547

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
0.24724051	0.54735599

Estimated Covariance Matrix for Tolerance Parameters

	MU	SIGMA
MU	0.004988	0.003242
SIGMA	0.003242	0.015488

Probit Analysis of Percent Inhibition of Pseudokirchneriella Cell Number

Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits	
0.01	-1.02610	-2.67667	-0.57786
0.02	-0.87689	-2.32060	-0.48069
0.03	-0.78222	-2.09518	-0.41855
0.04	-0.71101	-1.92593	-0.37147
0.05	-0.65308	-1.78854	-0.33290
0.06	-0.60377	-1.67182	-0.29985
0.07	-0.56054	-1.56970	-0.27065
0.08	-0.52183	-1.47845	-0.24432
0.09	-0.48663	-1.39566	-0.22018
0.10	-0.45422	-1.31963	-0.19777
0.15	-0.32006	-1.00741	-0.10245
0.20	-0.21343	-0.76395	-0.02200
0.25	-0.12195	-0.56116	0.05309
0.30	-0.03979	-0.38748	0.12896
0.35	0.03633	-0.23849	0.21121
0.40	0.10857	-0.11298	0.30512
0.45	0.17846	-0.00967	0.41411
0.50	0.24724	0.07519	0.53818
0.55	0.31602	0.14707	0.67523
0.60	0.38591	0.21106	0.82353
0.65	0.45815	0.27103	0.98299
0.70	0.53427	0.32991	1.15535
0.75	0.61643	0.39028	1.34453
0.80	0.70791	0.45500	1.55769
0.85	0.81454	0.52829	1.80830
0.90	0.94871	0.61843	2.12570
0.91	0.98111	0.63996	2.20261
0.92	1.01631	0.66327	2.28624
0.93	1.05502	0.68880	2.37829
0.94	1.09826	0.71721	2.48119
0.95	1.14756	0.74951	2.59867
0.96	1.20549	0.78732	2.73682
0.97	1.27670	0.83363	2.90683
0.98	1.37137	0.89496	3.13307
0.99	1.52058	0.99120	3.49007

Probit Analysis of Percent Inhibition of Pseudokirchneriella Cell Number 47

Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	0.09417	0.00211	0.26433
0.02	0.13277	0.00478	0.33061
0.03	0.16511	0.00803	0.38146
0.04	0.19453	0.01186	0.42514
0.05	0.22229	0.01627	0.46462
0.06	0.24902	0.02129	0.50136
0.07	0.27508	0.02693	0.53623
0.08	0.30072	0.03323	0.56975
0.09	0.32611	0.04021	0.60232
0.10	0.35138	0.04790	0.63421
0.15	0.47857	0.09831	0.78987
0.20	0.61175	0.17221	0.95060
0.25	0.75519	0.27469	1.13002
0.30	0.91245	0.40975	1.34574
0.35	1.08726	0.57745	1.62632
0.40	1.28401	0.77094	2.01893
0.45	1.50820	0.97798	2.59484
0.50	1.76702	1.18902	3.35286
0.55	2.07025	1.40305	4.73399
0.60	2.43171	1.62578	6.66092
0.65	2.87176	1.86651	9.61591
0.70	3.42195	2.13753	14.30041
0.75	4.13453	2.45628	22.10693
0.80	5.10396	2.85099	36.11529
0.85	6.52437	3.37512	64.31344
0.90	8.88598	4.15369	133.56773
0.91	9.57438	4.36479	159.44373
0.92	10.38281	4.60538	193.30368
0.93	11.35072	4.88425	238.94050
0.94	12.53878	5.21450	302.82702
0.95	14.04627	5.61704	396.89078
0.96	16.05052	6.12798	545.53648
0.97	18.91055	6.81759	806.92438
0.98	23.51648	7.85164	1359
0.99	33.15744	9.79931	3091