

US EPA ARCHIVE DOCUMENT

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

**Data Requirement:** PMRA DATA CODE: 9.4.4  
EPA DP Barcode: D278418  
OECD Data Point:  
EPA Guideline: 72-3(c)

**Test material: BAS 510 F** **Purity (%): 96.9%**  
Common name: Nicobifen  
Chemical name  
IUPAC: 2-chloro-N-(4'-chlorobiphenyl-2-yl) nicotinamide  
CAS name: 3-Pyridinecarboxamide, 2-chloro-N-(4'-chloro[1.1'-biphenyl]-2-yl)  
CAS No.: 188425-85-6  
Synonyms: not stated

**Primary Reviewer:** Peter Takacs, Regi Mathew.  
{PMRA}

**Date:** February 12/2002

**Secondary Reviewer(s):** Thomas M. Steeger, Ph.D.  
{EPA} *Thomas M Steeger*

**Date:** April 1, 2002

**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 ( 0.78 lbs a.i./Acre/application).

**EPA PC Code:** 128008

**CITATION:** Robert L. Boeri, Derek C. Wyskiel, Timothy J. Ward and Catherine M. Holmes. September, 2000. Flow-Through Mollusc Shell Deposition Test with BAS 510 F. T.R. Wilbury Laboratories, Inc. 40 Doaks Lane Marblehead, Massachusetts 01945. Study number 1917-BA.



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**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
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**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

**EXECUTIVE SUMMARY:**

The 96-hr-acute toxicity of BAS 510 F to the Eastern oyster, *Crassostrea virginica*, was studied under flow-through conditions. Juvenile oysters were exposed to control, solvent control, and test chemical at mean-measured concentration of 0.42, 0.78, 1.3, 2.2, 3.9 mg ai/L. Observations for mortality were made daily and shell deposition was measured at the end of the test. The 96-hour EC<sub>50</sub> for shell deposition was 1.02 mg ai/L. No mortality occurred at any treatment level. The 96-hour NOEC could not be calculated due to significant inhibition of shell deposition at all test concentrations; therefore the NOEC is less than 0.421 mg a.i./L.. Based on a 96-hr EC<sub>50</sub> of 1.02 mg a.i./L in oysters, BAS 510F is classified as highly toxic estuarine/marine molluscs on an acute exposure basis.

This study is classified as core and as having fulfilled guideline testing requirements. This study is conditionally required in Canada, and the use pattern indicates that exposure in estuarine habitats can be expected.

**Results Synopsis**

Test Organism Age: juvenile  
Test Type: Flow-through  
EC<sub>50</sub>: 1.02 mg ai/L  
NOEL: < 0.42 mg a.i./L  
Endpoint Effected: shell deposition

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

**I. MATERIALS AND METHODS**

**GUIDELINE FOLLOWED:**

The final definitive test was conducted under flow-through conditions from January 26 to 30, 2001, according to T.R. Wilbury Study Protocol 1917-BA (BASF Study Number 46670, Flow-Through Mollusc Shell Deposition Test with BAS 510 F), which was signed by the study director on September 1, 2000. It was based on procedures of the U.S. Environmental Protection Agency (1985, 1988).

**COMPLIANCE:**

This study was conducted according to EPA Good Laboratory Practice Regulations (40 CFR 160).

**A. MATERIALS:**

**1. Test Material**

BAS 510 F

**Description:** white powder  
**Lot No./Batch No. :** N75  
**Purity:** 95.41%  
**Stability of Compound Under Test Conditions:** expires August 29/2002.  
**Storage conditions of test chemicals:** stored in the dark at room temperature

**Physicochemical properties of BAS 510 F**

Parameter	Values	Comments
Water solubility at 20°C	4.69 mg/L	very insoluble
Vapour pressure	7x10 <sup>-9</sup> mbar @ 20 °C	non-volatile
UV absorption	UV molecular extinction: 1.53x10 <sup>3</sup> at 290 nm	-
pKa	does not dissociate in water	not affected by pH
Kow	910	moderately lipophilic, not likely to bioconcentrate

**2. Test organism:**

**Species:** Eastern oyster, *Crassostrea virginica*

**Age at test initiation:** juvenile

**Source:** commercial supplier (Middle Peninsula Aquaculture, North, Virginia)

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
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PMRA Submission Number 2001-1027

EPA MRID Number {454050-03}

**B. STUDY DESIGN:**

**1. Experimental Conditions**

**a) Range Finding Test:**

A range-finding test was conducted under static renewal conditions from October 18 to 22, 2000. Nominal concentrations of BAS 510 F were 0 (control and solvent control, 0.1 mL/L acetone), 0.10, 0.50, 1.0, 5.0, and 8.0 mg/L. After 96 hours there was 100% survival in the control, solvent control, and at all tested concentrations. Shell growth averaged 1.7 mm in the control, 2.2 mm in the solvent control, 1.7 mm at 0.10 mg ai/L, 1.8 mm at 0.50 mg ai/L, 1.6 mm at 1.0 mg ai/L, 0.2 mm at 5.0 mg ai/L, and 0.6 mm at 8.0 mg ai/L. No sublethal effects were observed at any tested concentration during the test.

**b) Definitive Study**

Table 1. Experimental Parameters

Parameter	Details	Remarks
		Criteria
<u>Source</u>	Oysters obtained from commercial supplier (Middle Peninsula Aquaculture, North, Virginia.	
<u>Mean Valve Height</u>	36 to 49 mm in height measured along long axis	<i>EPA requires mean valve height of 25 - 50 mm measured along the long axis</i>
<u>Acclimation:</u> Period: Conditions: Feeding:	10 days same as test oysters were supplied with live marine phytoplankton to supplement the existing food in the unfiltered, natural seawater that was used as dilution water.	<i>EPA requires acclimation period minimum 10 days</i>
Health:	No abnormalities were noted	
Duration of the test	96 hr	

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster, *Crassostrea virginica*.**

PMRA Submission Number 2001-1027

EPA MRID Number {454050-03}

Parameter	Details	Remarks
		Criteria
<u>Test condition:</u> Flow through	During the test the diluter was activated 1,089 times, resulting in an average of 9.1 volume additions per 24 hours in each test vessel and 0.57 liters per oyster per hour.	
Aeration	Not required to maintain adequate oxygen levels	
<u>Test vessel:</u>  Material: Size: Fill volume:	Glass aquaria 20L 15L	EPA requires 1. Material (glass or stainless steel) 2. Static volume (18.9 L or 5 gal) with 15 L solution b. Static or flow-through volume (300x600x300 = 54000 cc.)
Source of dilution water	Water used for acclimation of test organisms and for all toxicity testing was unfiltered, natural seawater collected directly from the Atlantic Ocean at T.R. Wilbury Laboratories in Marblehead, Massachusetts. The water, which had a salinity of 32 to 35 parts per thousand, was stored in polyethylene tanks where it was aerated.	EPA requires natural unfiltered seawater
<u>Water parameters:</u>  Hardness: pH: Dissolved oxygen: Temperature: Salinity: Pesticides:  Intervals of water quality measurement	not reported 7.8 - 8.1 6.0 - 8.0 mg/L 20.2 - 21.9°C 32 - 34 parts per thousand Not detected  daily	(Static 1 <sup>st</sup> 48 hrs 40%; 2 <sup>nd</sup> 48 hrs 60%; Flow-through 60%) (% of lowest conc. & hour)
<u>Number of replicates:</u>  Control (dilution water): Solvent control: Treatments:	2 2 2	

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster, *Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

Parameter	Details	Remarks
		Criteria
<u>Number of organisms per replicate:</u> Control Solvent control: Treatments:	10 10 10	<i>EPA requires minimum 10/level can be divided among containers.</i>
<u>Treatment concentrations:</u>	Nominal: 0, 0.52, 0.88, 1.4, 2.4, 4.0 mg/L mean measured: 0.421, 0.777, 1.26, 2.20, 3.58 mg/L.	<i>(EPA requires a geometric series with each concentration being at least 60% of the next higher one)</i>
Solvent	acetone (0.5 mL/L)	<i>(EPA requires solvents not to exceed 0.1 mL/L for flow-through tests)</i>
Lighting	A 16 hour light and 8 hour dark photo period was automatically maintained with cool-white fluorescent lights that provided a light intensity of approximately 32 foot candles. A 15 minute transition period was provided between dark and light.	<i>(EPA requires 16 hours light, 8 hours dark; OECD : optional light-dark cycle or complete darkness 14 light:10 dark)</i>
<u>Recovery of chemical:</u>  Frequency of determination: Level of Quantitation: Level of Detection:	  beginning and end of study 0.10 mg ai/L; 0.00232 mg/L	All samples were filtered through a 0.22 µm filter upon collection

**2. Observations:**

**Table 2: Observations**

Parameters	Details	Remarks
		Criteria
Parameters measured including the sublethal effects	Survival at termination of test deposition of new shell growth	
Observation intervals	test initiation and termination	The number of surviving organisms and the occurrence of sublethal effects were determined visually at 0, 24, 48, 72, and 96 hours.

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster, *Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

Water quality was acceptable (Yes/No)	Yes	
Were raw data included?	Yes	

**II. RESULTS AND DISCUSSION**

**A. MORTALITY:**

No mortality was observed in any of the treatment groups.

**Table 3: Effect of BAS 510 F on mortality of *Crassostrea virginica*.**

Treatment (mg a.i./L) [ mean measured]	No. of organisms	Observation period	
		96 hr	
		No Dead	% mortality
Control	20	0	0
Solvent control	20	0	0
0.421	20	0	0
0.777	20	0	0
1.26	20	0	0
2.20	20	0	0
3.58	20	0	0
NOEC	3.58 mgai/L		
LC <sub>50</sub>	> 3.58 mgai/L		

Shell deposition was significantly lower than pooled control at every treatment level. Therefore a NOEC for this endpoint could not be determined.

**Table 4: Effect of BAS 510 F on shell deposition of *Crassostrea virginica*.**

Treatment (mg a.i./L) [ mean measured]	Observation period
	96 hr
	Mean Shell deposition (mm)
Control	2.0
Solvent control	2.3
0.421	1.5*

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster, *Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

Treatment (mg a.i./L) [ mean measured]	Observation period
	96 hr
	Mean Shell deposition (mm)
0.777	1.4*
1.26	1.3*
2.20	0.7*
3.58	0*
NOEC	<0.42 mg ai/L
EC <sub>50</sub>	1.02 mg ai/L

\* Significantly different from control

**C. REPORTED STATISTICS:**

The EC<sub>50</sub> was calculated by standard statistical techniques (Stephan, 1983). The binomial/nonlinear interpolation method using mean measured concentrations and mean shell growth was employed. The slope of the concentration-response curve could not be calculated by this method. The no observed effect concentration was calculated using TOXSTAT 3.3 (Gulley, *et al.*, 1990). Control and solvent control shell deposition data were compared with a parametric "t" test and found not to be statistically significantly different ( $\alpha = 0.05$ ). Subsequent statistical analyses were performed by comparing the pooled control and solvent control data to the treatment data. A Chi-square test was used to determine that the data were normally distributed and Bartlett's test was used to determine that the variances were homogeneous. Shell deposition data in the treatments were compared to the pooled control data with a one-way analysis of variance (ANOVA) and Bonferroni's test.

**D. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:**

Statistical test: Mann-Whitney Rank Sum Test; SigmaStat v. 2.

This test was performed because the equality of variance assumption was not met for the control data and the lowest treatment group data. The test indicated that the reduction in shell deposition at the low test concentration of 0.42 mg ai/L was statistically significant compared to controls.

Group Median      25%    75%  
 pooled control    2.250 1.900 2.550  
 Col 4 1.600 0.400    2.200  
 T = 488.500    n(small)= 20    n(big)= 20    (P = 0.035)

The differences in the median values among the two groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.035)

Data were not normally distributed, therefore the non-parametric ANOVA, Kruskal-Wallis One Way Analysis of Variance on Ranks with Dunnett's test was also used. All treatment levels were significantly lower than the pooled control.

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster, *Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

All Pairwise Multiple Comparison Procedures (Dunnnett's Method) :

Comparison	Diff of Ranks	p	q'	P<0.05
Col 8 vs pooled control	1342.000		6	6.100 Yes
Col 7 vs pooled control	915.500		5	4.990 Yes
Col 6 vs pooled control	546.500		4	3.718 Yes
Col 5 vs pooled control	496.000		3	4.491 Yes
Col 4 vs pooled control	432.000		2	5.843 Yes

**E. STUDY DEFICIENCIES:** The applicant claimed that pooled control data was used in the analyses, however, percent of control data reported in Table 4 of the study indicates that treatments were compared to the dilution water control only. Since the two controls were not significantly different, this is a minor deficiency.

According to the General Information section (page 9), the purity of BAS 510F is 96.9%; however, under the Test Substance section of the Materials and Methods (page 10, the purity of the BAS 510F is listed as 95.41%.

**F. REVIEWER'S COMMENTS:** All test concentrations resulted in significantly reduced shell deposition in eastern oysters, and an NOEC could not be calculated.

Statistical analyses run assuming the treatment means would be normally distributed shows William's test with all BAS 510F-treated oysters exhibiting significantly decreased shell deposition compared to pooled control; therefore, the NOEL is less than the lowest dose tested, *i.e.*, 0.421 mg a.i./L. Probit analysis of percent inhibition of shell growth using SAS resulted an EC<sub>50</sub> of 1.02 (95% confidence interval: 0.56 - 1.59); probit slope = 2.14 (95% confidence interval: 0.89 - 3.39)

**G. CONCLUSIONS:** This study is classified as core and fulfills guideline testing requirements for an acute toxicity study using Eastern oysters. Although the study failed to establish a definitive NOEC, with an EC<sub>50</sub> = 1.02, BAS 510 F is classified as highly toxic to estuarine/marine molluscs on an acute exposure basis. This study is conditionally required in Canada, and the use pattern indicates that exposure in estuarine habitats can be expected.

**III. REFERENCES:**

Approved 04/01/01 C. K.

SAS (Statistical Analysis System) 2000. SAS Institute, Release 8.01, Cary, North Carolina

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

TITLE: 96-Hr Easter Oyster Shell Deposition Study  
 FILE: c:\BAS O  
 TRANSFORM: NO TRANSFORM NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	2.3000	2.3000
1	Control	2	3.1000	3.1000
1	Control	3	3.8000	3.8000
1	Control	4	1.6000	1.6000
1	Control	5	2.1000	2.1000
1	Control	6	3.4000	3.4000
1	Control	7	1.5000	1.5000
1	Control	8	2.6000	2.6000
1	Control	9	2.4000	2.4000
1	Control	10	2.6000	2.6000
1	Control	11	1.5000	1.5000
1	Control	12	2.6000	2.6000
1	Control	13	3.0000	3.0000
1	Control	14	1.5000	1.5000
1	Control	15	1.0000	1.0000
1	Control	16	2.1000	2.1000
1	Control	17	1.5000	1.5000
1	Control	18	0.0000	0.0000
1	Control	19	0.0000	0.0000
1	Control	20	1.5000	1.5000
1	Control	21	2.3000	2.3000
1	Control	22	3.0000	3.0000
1	Control	23	2.6000	2.6000
1	Control	24	2.5000	2.5000
1	Control	25	0.0000	0.0000
1	Control	26	2.1000	2.1000
1	Control	27	3.6000	3.6000
1	Control	28	3.1000	3.1000
1	Control	29	1.7000	1.7000
1	Control	30	1.7000	1.7000
1	Control	31	2.9000	2.9000
1	Control	32	2.0000	2.0000
1	Control	33	2.1000	2.1000
1	Control	34	2.4000	2.4000
1	Control	35	2.1000	2.1000
1	Control	36	1.6000	1.6000
1	Control	37	3.3000	3.3000
1	Control	38	2.2000	2.2000
1	Control	39	2.5000	2.5000
1	Control	40	3.2000	3.2000
2	0.421	1	2.4000	2.4000
2	0.421	2	1.6000	1.6000
2	0.421	3	1.4000	1.4000
2	0.421	4	3.4000	3.4000
2	0.421	5	2.8000	2.8000
2	0.421	6	2.0000	2.0000
2	0.421	7	2.3000	2.3000
2	0.421	8	0.0000	0.0000

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

2	0.421	9	0.8000	0.8000
2	0.421	10	0.0000	0.0000
2	0.421	11	3.1000	3.1000
2	0.421	12	1.6000	1.6000
2	0.421	13	0.0000	0.0000
2	0.421	14	2.0000	2.0000
2	0.421	15	1.2000	1.2000
2	0.421	16	2.0000	2.0000
2	0.421	17	2.1000	2.1000
2	0.421	18	0.0000	0.0000
2	0.421	19	1.2000	1.2000
2	0.421	20	0.0000	0.0000
3	0.777	1	2.5000	2.5000
3	0.777	2	0.0000	0.0000
3	0.777	3	2.1000	2.1000
3	0.777	4	1.3000	1.3000
3	0.777	5	1.1000	1.1000
3	0.777	6	2.1000	2.1000
3	0.777	7	0.0000	0.0000
3	0.777	8	0.7000	0.7000
3	0.777	9	1.9000	1.9000
3	0.777	10	3.1000	3.1000
3	0.777	11	3.1000	3.1000
3	0.777	12	1.9000	1.9000
3	0.777	13	0.9000	0.9000
3	0.777	14	0.0000	0.0000
3	0.777	15	2.8000	2.8000
3	0.777	16	0.0000	0.0000
3	0.777	17	0.8000	0.8000
3	0.777	18	1.5000	1.5000
3	0.777	19	0.0000	0.0000
3	0.777	20	1.6000	1.6000
4	1.26	1	2.6000	2.6000
4	1.26	2	1.1000	1.1000
4	1.26	3	1.4000	1.4000
4	1.26	4	0.0000	0.0000
4	1.26	5	0.0000	0.0000
4	1.26	6	1.1000	1.1000
4	1.26	7	2.1000	2.1000
4	1.26	8	0.9000	0.9000
4	1.26	9	0.0000	0.0000
4	1.26	10	0.0000	0.0000
4	1.26	11	3.0000	3.0000
4	1.26	12	1.7000	1.7000
4	1.26	13	1.7000	1.7000
4	1.26	14	2.1000	2.1000
4	1.26	15	2.5000	2.5000
4	1.26	16	3.5000	3.5000
4	1.26	17	0.0000	0.0000
4	1.26	18	2.2000	2.2000
4	1.26	19	0.0000	0.0000
4	1.26	20	0.0000	0.0000
5	2.20	1	0.6000	0.6000
5	2.20	2	1.8000	1.8000
5	2.20	3	1.4000	1.4000
5	2.20	4	0.0000	0.0000
5	2.20	5	2.6000	2.6000

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

5	2.20	6	0.0000	0.0000
5	2.20	7	0.0000	0.0000
5	2.20	8	0.0000	0.0000
5	2.20	9	0.0000	0.0000
5	2.20	10	0.0000	0.0000
5	2.20	11	0.0000	0.0000
5	2.20	12	2.4000	2.4000
5	2.20	13	0.5000	0.5000
5	2.20	14	2.0000	2.0000
5	2.20	15	0.0000	0.0000
5	2.20	16	0.9000	0.9000
5	2.20	17	0.9000	0.9000
5	2.20	18	0.0000	0.0000
5	2.20	19	0.0000	0.0000
5	2.20	20	0.0000	0.0000
6	3.58	1	0.0000	0.0000
6	3.58	2	0.0000	0.0000
6	3.58	3	0.0000	0.0000
6	3.58	4	0.0000	0.0000
6	3.58	5	0.0000	0.0000
6	3.58	6	0.0000	0.0000
6	3.58	7	0.0000	0.0000
6	3.58	8	0.0000	0.0000
6	3.58	9	0.0000	0.0000
6	3.58	10	0.0000	0.0000
6	3.58	11	0.0000	0.0000
6	3.58	12	0.0000	0.0000
6	3.58	13	0.0000	0.0000
6	3.58	14	0.0000	0.0000
6	3.58	15	0.0000	0.0000
6	3.58	16	0.0000	0.0000
6	3.58	17	0.0000	0.0000
6	3.58	18	0.0000	0.0000
6	3.58	19	0.0000	0.0000
6	3.58	20	0.0000	0.0000

96-Hr Easter Oyster Shell Deposition Study  
File: c:\BAS\_O Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	40	0.000	3.800	2.175
2	0.421	20	0.000	3.400	1.495
3	0.777	20	0.000	3.100	1.370
4	1.26	20	0.000	3.500	1.295
5	2.20	20	0.000	2.600	0.655
6	3.58	20	0.000	0.000	0.000

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

96-Hr Easter Oyster Shell Deposition Study  
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SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.825	0.908	0.144
2	0.421	1.177	1.085	0.243
3	0.777	1.130	1.063	0.238
4	1.26	1.334	1.155	0.258
5	2.20	0.809	0.899	0.201
6	3.58	0.000	0.000	0.000

96-Hr Easter Oyster Shell Deposition Study  
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ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	73.592	14.718	16.898
Within (Error)	134	116.725	0.871	
Total	139	190.318		

Critical F value = 2.29 (0.05,5,120)  
Since F > Critical F REJECT Ho:All groups equal

96-Hr Easter Oyster Shell Deposition Study  
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BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	2.175	2.175		
2	0.421	1.495	1.495	2.661	*
3	0.777	1.370	1.370	3.150	*
4	1.26	1.295	1.295	3.443	*
5	2.20	0.655	0.655	5.947	*
6	3.58	0.000	0.000	8.510	*

Bonferroni T table value = 2.36 (1 Tailed Value, P=0.05, df=120,5)

**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster,  
*Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

96-Hr Easter Oyster Shell Deposition Study  
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BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

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GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	40			
2	0.421	20	0.603	27.7	0.680
3	0.777	20	0.603	27.7	0.805
4	1.26	20	0.603	27.7	0.880
5	2.20	20	0.603	27.7	1.520
6	3.58	20	0.603	27.7	2.175

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96-Hr Easter Oyster Shell Deposition Study  
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WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

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GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	40	2.175	2.175	2.175
2	0.421	20	1.495	1.495	1.495
3	0.777	20	1.370	1.370	1.370
4	1.26	20	1.295	1.295	1.295
5	2.20	20	0.655	0.655	0.655
6	3.58	20	0.000	0.000	0.000

---

96-Hr Easter Oyster Shell Deposition Study  
File: c:\BAS\_O Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

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IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	2.175				
0.421	1.495	2.660	*	1.66	k= 1, v=134
0.777	1.370	3.149	*	1.73	k= 2, v=134
1.26	1.295	3.443	*	1.75	k= 3, v=134
2.20	0.655	5.947	*	1.77	k= 4, v=134
3.58	0.000	8.509	*	1.77	k= 5, v=134

---

s = 0.933

Note: df used for table values are approximate when v > 20.

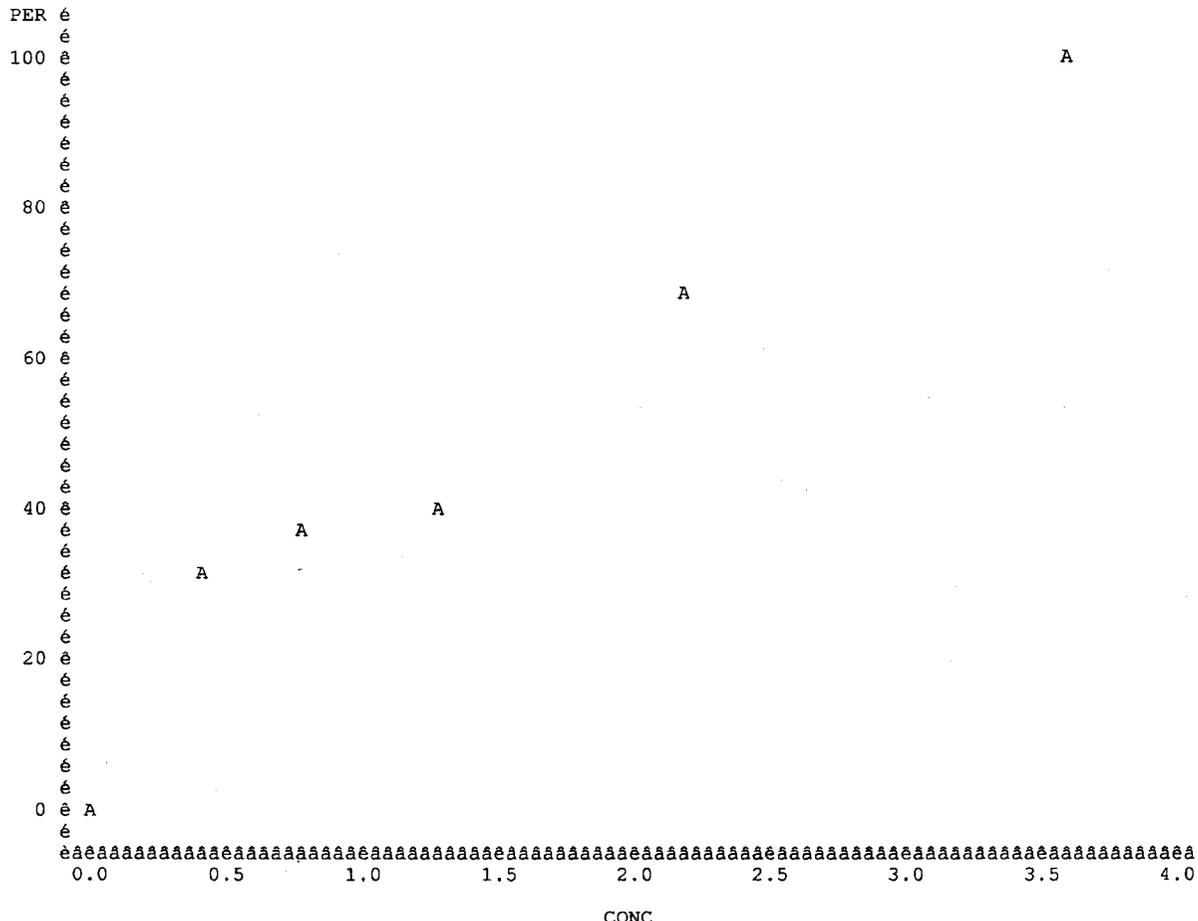
**Data Evaluation Report on the acute toxicity of BAS 510 F to the eastern oyster, *Crassostrea virginica*.**

**PMRA Submission Number 2001-1027**

**EPA MRID Number {454050-03}**

PROBIT ANALYSIS (LOG10) OF PERCENT INHIBITION OVER CONCENTRATION 13  
12:06 Monday, April 1, 2002

Plot of PER\*CONC. Legend: A = 1 obs, B = 2 obs, etc.



PROBIT ANALYSIS (LOG10) OF PERCENT INHIBITION OVER CONCENTRATION 14  
12:06 Monday, April 1, 2002

The REG Procedure  
Model: MODEL1  
Dependent Variable: PER

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	5660.71893	5660.71893	84.09	0.0008
Error	4	269.25861	67.31465		
Corrected Total	5	5929.97754			

Root MSE	8.20455	R-Square	0.9546
Dependent Mean	46.43678	Adj R-Sq	0.9432
Coeff Var	17.66822		

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Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	1	11.44286	5.07752	2.25	0.0873
CONC	1	25.48720	2.77934	9.17	0.0008

PROBIT ANALYSIS (LOG10) OF PERCENT INHIBITION OVER CONCENTRATION 15  
12:06 Monday, April 1, 2002

Probit Procedure

Iteration History for Parameter Estimates

Iter	Ridge	Loglikelihood	Intercept	Log10(DOSE)
0	0	-34.657359	0	0
1	0	-28.102715	-0.036879858	1.8311019823
2	0	-27.96384	-0.018706308	2.1279010131
3	0	-27.963597	-0.01749789	2.140447542
4	0	-27.963597	-0.017495232	2.140472048

Model Information

Data Set WORK.B  
 Events Variable RESPONSE  
 Trials Variable N  
 Number of Observations 5  
 Number of Events 28  
 Number of Trials 50  
 Name of Distribution NORMAL  
 Log Likelihood -27.96359666

Last Evaluation of the Negative of the Gradient

Intercept	Log10(DOSE)
-4.43862E-10	-2.59526E-10

Last Evaluation of the Negative of the Hessian

	Intercept	Log10(DOSE)
Intercept	26.621915471	1.6231365929
Log10(DOSE)	1.6231365929	2.5123402569

Algorithm converged.

Goodness-of-Fit Tests

Statistic	Value	DF	Pr > ChiSq
Pearson Chi-Square	3.4475	3	0.3276
L.R. Chi-Square	4.5722	3	0.2059

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PROBIT ANALYSIS (LOG10) OF PERCENT INHIBITION OVER CONCENTRATION 16  
12:06 Monday, April 1, 2002

Probit Procedure

Response-Covariate Profile

Response Levels 2  
Number of Covariate Values 5

Since the chi-square is small ( $p > 0.1000$ ), fiducial limits will be calculated using a t value of 1.96.

Analysis of Parameter Estimates

Variable	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq	Label
Intercept	1	-0.01750	0.19775	0.0078	0.9295	Intercept
Log10(DOSE)	1	2.14047	0.64371	11.0572	0.0009	

Estimated Covariance Matrix

	Intercept	Log10(DOSE)
Intercept	0.039103	-0.025263
Log10(DOSE)	-0.025263	0.414357

Probit Model in Terms of Tolerance Distribution

MU	SIGMA
0.00817354	0.46718667

Estimated Covariance Matrix  
for Tolerance Parameters

	MU	SIGMA
MU	0.008451	-0.002231
SIGMA	-0.002231	0.019740

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PROBIT ANALYSIS (LOG10) OF PERCENT INHIBITION OVER CONCENTRATION 17  
12:06 Monday, April 1, 2002

Probit Procedure

Probit Analysis on Log10(DOSE)

Probability	Log10(DOSE)	95% Fiducial Limits	
0.01	-1.07867	-2.73797	-0.63286
0.02	-0.95131	-2.43062	-0.54989
0.03	-0.87051	-2.23600	-0.49687
0.04	-0.80972	-2.08984	-0.45672
0.05	-0.76028	-1.97116	-0.42388
0.06	-0.71820	-1.87030	-0.39575
0.07	-0.68130	-1.78201	-0.37095
0.08	-0.64826	-1.70308	-0.34862
0.09	-0.61821	-1.63143	-0.32819
0.10	-0.59055	-1.56558	-0.30927
0.15	-0.47603	-1.29442	-0.22946
0.20	-0.38502	-1.08132	-0.16362
0.25	-0.30694	-0.90118	-0.10445
0.30	-0.23682	-0.74266	-0.04807
0.35	-0.17184	-0.59991	0.00832
0.40	-0.11019	-0.46995	0.06732
0.45	-0.05053	-0.35158	0.13178
0.50	0.00817	-0.24474	0.20487
0.55	0.06688	-0.14973	0.28978
0.60	0.12653	-0.06609	0.38897
0.65	0.18819	0.00799	0.50385
0.70	0.25317	0.07549	0.63550
0.75	0.32329	0.13983	0.78606
0.80	0.40137	0.20471	0.96048
0.85	0.49238	0.27473	1.16940
0.90	0.60690	0.35772	1.43738
0.91	0.63456	0.37719	1.50268
0.92	0.66460	0.39815	1.57381
0.93	0.69764	0.42100	1.65222
0.94	0.73454	0.44630	1.74001
0.95	0.77663	0.47492	1.84037
0.96	0.82607	0.50826	1.95857
0.97	0.88686	0.54890	2.10422
0.98	0.96766	0.60246	2.29830
0.99	1.09501	0.68605	2.60503

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PROBIT ANALYSIS (LOG10) OF PERCENT INHIBITION OVER CONCENTRATION 18  
12:06 Monday, April 1, 2002

Probit Procedure

Probit Analysis on DOSE

Probability	DOSE	95% Fiducial Limits	
0.01	0.08343	0.00183	0.23289
0.02	0.11186	0.00371	0.28191
0.03	0.13474	0.00581	0.31852
0.04	0.15498	0.00813	0.34936
0.05	0.17367	0.01069	0.37681
0.06	0.19134	0.01348	0.40202
0.07	0.20831	0.01652	0.42564
0.08	0.22477	0.01981	0.44810
0.09	0.24087	0.02337	0.46969
0.10	0.25671	0.02719	0.49061
0.15	0.33417	0.05077	0.58958
0.20	0.41208	0.08292	0.68609
0.25	0.49324	0.12555	0.78623
0.30	0.57967	0.18086	0.89522
0.35	0.67322	0.25124	1.01934
0.40	0.77591	0.33889	1.16768
0.45	0.89016	0.44507	1.35450
0.50	1.01900	0.56919	1.60277
0.55	1.16649	0.70839	1.94888
0.60	1.33824	0.85883	2.44892
0.65	1.54238	1.01858	3.19045
0.70	1.79129	1.18984	4.32012
0.75	2.10517	1.37984	6.11025
0.80	2.51981	1.60218	9.13026
0.85	3.10729	1.88249	14.77070
0.90	4.04480	2.27886	27.37688
0.91	4.31079	2.38336	31.81862
0.92	4.61960	2.50123	37.48083
0.93	4.98475	2.63634	44.89724
0.94	5.42679	2.79449	54.95522
0.95	5.97898	2.98481	69.24269
0.96	6.69994	3.22298	90.90090
0.97	7.70647	3.53918	127.12053
0.98	9.28234	4.00371	198.74671
0.99	12.44550	4.85348	402.74134