

US EPA ARCHIVE DOCUMENT

12-20-90

FILE COPY
128850

260482, 84, 85, 86
RECORD NO.

128850
SHAUGHNESSEY NO.

REVIEW NO.

EEB REVIEW

DATE: IN 03/07/90 OUT 12/20/90

FILE OR REG. NO. 8340 - EI, EO, ET, GR

PETITION OR EXP. NO. _____

DATE OF SUBMISSION 02/23/90

DATE RECEIVED BY EFED 03/05/90

RD REQUESTED COMPLETION DATE 06/02/90

EEB ESTIMATED COMPLETION DATE 06/02/90

RD ACTION CODE/TYPE OF REVIEW 116/101

TYPE PRODUCT(S) HERBICIDE

DATA ACCESSION NOS. 413961 - 01,02,03,04,10,11,12,13

PRODUCT MANAGER NO. 23

PRODUCT NAME(S) HOE-039866 (glufosinate - Ignite)

COMPANY NAME Hoechst Celanese

SUBMISSION PURPOSE Review data and respond to previous review.

SHAUGHNESSEY NO.	CHEMICAL AND FORMULATION	% AI
	<u>Ignite/HOE-039866</u>	
	<u>glufosinate ammonium</u>	

EEB REVIEW

Chemical: glufosinate (Ignite - HOE039866) herbicide

100.1 Submission Purpose and Pesticide Use

Hoechst Celanese Corp. has submitted Tier II non-target plant studies (seed germination/seedling emergence, vegetative vigor), seven estuarine studies (4 TGAI and 3 TEP), and supplemental data on diet formulation for two previously reviewed avian reproduction studies (Mallard duck and Bobwhite quail). Hoechst Celanese Corp. is requesting Section 3 registration of two Ignite labels, one for non-selective postemergence weed control in non-crop areas such as highway rights-of-way, airports, railroads, utilities, ornamental plants, pipelines, fencerows, storage yards, turf renovation, set-aside acres, fallow crop land, shelterbelts, tank farms, pump stations, storage and lumber yards, dry ditches, ditchbanks, and dry canals; and the second for non-selective control of emerged weeds before crop emergence in soybeans and field corn, and as a directed spray underneath apple, tree nut, and vine crops.

100.2 Formulation Information

Active Ingredient:

Ammonium-DL-homoalanine-4-yl(methyl phosphinate)..16.22%*

Inert Ingredients:83.78%

* Equal to 1.67# active ingredient per U.S. gallon.

100.3 Application Methods, Directions, Rates

Application is by ground equipment only; applied broadcast or banded, directed or spot sprays (with knapsack or high volume equipment with handgun or other suitable nozzle arrangement) depending on the site. For spot and directed sprays hose-end sprayers are specifically prohibited on the non-crop label. The rates of glufosinate used are dependent on weed species and their height (age) at the time of application. Glufosinate will only control weeds that have emerged prior to application. This herbicide will damage all foliage it comes into contact with, and the label states " avoid contact with all desirable vegetation". Glufosinate, is primarily a contact herbicide with partial systemic activity.

100.4 Target Organisms

Target pests are emerged annual and perennial grasses and broadleaf weeds on the crop label. Ignite is a non-selective, water soluble herbicide. In addition to weeds, Ignite will control a broad range of woody brush and tree species such as multiflora rose, poison ivy, sweet gum, most maple species, most pine species, Douglas fir, and others in non-crop areas.

100.5 Precautionary Labeling

The label prohibits use through any irrigation equipment or with aerial equipment. The label states "Do not apply when weather conditions favor runoff or drift". No other environmental precautions are given.

101 Hazard Assessment

101.1 Discussion

The maximum use rate of 1.44# ai/acre (2.3 pints product/acre) is recommended on both the crop and non-crop labels.

Repeat applications are recommended to control weeds emerging from underground parts or seeds. The maximum amount per acre per year is 4.51# active ingredient (21.6 pints) on the crop label; or three applications. No maximum amount per acre per year is given on the non-crop label.

On 12/13/88 a new chemical registration standard review was conducted for glufosinate herbicide by EEB. This review concluded that the TEP (16.22%) is 10 to 40 X more toxic than the TGAI (96.0 and 97.4%) to aquatic organisms in acute tests. It was expected that the enhancement in toxicity was caused by an inert ingredient. EEB then requested that the registrant conduct estuarine studies comparing the TGAI with the TEP.

COMPARISONS OF TGAI WITH TEP:

SPECIES	TGAI (ppm)	AS TEP (ppm)	DIFFERENCE
Rainbow trout	> 320 (97%)	26.7 (16%)	TEP more toxic
Pumpkinseed	> 320 (97%)		
Bluegill		65.0 (16%)	
<u>Daphnia magna</u> *	667 (97%)	15.0 (16%)	TEP more toxic
Mysid shrimp	7.5 (96%)	43.0 (18%)	TGAI more toxic
Sheepshead minnow	>1000.0 (96%)	13.0 (18%)	TEP more toxic
E.oyster embryo	8.0 (96%)	Supplemental	
Quahog clam	7.5 (96%)	None Submitted	

* MATC = 32 to 56 (96% TGAI)

101.2 Likelihood of Adverse Effects on Nontarget Organisms

AVIAN EFFECTS

Bobwhite quail LD50	>2000 mg/Kg	(TGAI 95.3%)
Mallard duck LD50	>2000 mg/Kg	(TGAI 95.3%)
Bobwhite quail LC50	>5000 ppm	(TGAI 95.3%)
Mallard duck LC50	>5000 ppm	(TGAI 95.3%)
Bobwhite quail repro.	>400 ppm, NOEL	(TGAI 95.3%)
Mallard duck repro.	>400 ppm, NOEL	(TGAI 95.3%)

The above information was taken from the 12/13/88 new chemical review for glufosinate. Based on these data for the TGAI, Ignite is classified as practically non-toxic to birds.

AQUATIC EFFECTS

Based on the above aquatic studies, Ignite is classified as follows:

Technical (TGAI) - Practically non-toxic to cold water fish, warm water fish, and aquatic invertebrates.

Formulated (TEP) - Slightly toxic to cold water fish, warm water fish, and aquatic invertebrates.

ESTUARINE EFFECTS

Estuarine studies were requested by EEB in the 12/13/88 new chemical review, and have been submitted by the registrant. The seven estuarine studies are summarized below:

413961-05	E.Oyster Embryo	EC50	8.0 ppm	(CORE- TGAI 96.0%)
413961-09	E.Oyster Embryo	EC50	-----	(SUPPL.TEP 18.5%)
413961-06	Quahog clam	EC50	>125.0 ppm	(CORE- TGAI 96.0%)
413961-07	Mysid shrimp	EC50	7.5 ppm	(CORE- TGAI 96.0%)
413961-10	Mysid shrimp	EC50	43.2 ppm	(CORE -TEP 18.5%)
413961-08	Sheepshead min.	EC50	13.1 ppm	(CORE- TEP 18.5%)
413961-04	Sheepshead min.	EC50	>1000.0 ppm	(CORE- TGAI 96.0%)

To summarize the seven estuarine studies, it appears that Ignite as TGAI is of moderate toxicity to oysters and Mysid shrimp, and practically non-toxic to quahog clam and sheepshead minnow. When formulated, Ignite was slightly toxic to Mysid shrimp and to the sheepshead minnow. A quahog clam TEP study was not submitted for review.

INSECT EFFECTS

Glufosinate is considered practically non-toxic to the honeybee as follows:

Honeybee	LC50	345.5 ug/bee	(TGAI 95.3%)
Honeybee	LC50	1380->4000 ug/bee	(TEP 20%)

The above data were taken from the 1988 new chemical review.

MAMMALIAN EFFECTS

Based on information contained in the 1988 new chemical review, glufosinate is not acutely toxic to mammals:

Rat/mouse oral	LD50	416-2000 mg/Kg	(TGAI-95.3%)
Rat acute dermal	LD50	1380->4000 mg/Kg	(TEP-20%)

PLANT EFFECTS

Tier II non-target plant studies submitted prior to 1989 were not acceptable. In the 1988 new chemical review, additional non-target plant studies were requested. Hoechst has submitted the following additional studies:

- 1.) Tier II Seed Germination/Seedling Emergence, MRID NO: 413961-11.

2.) Tier II Vegetative Vigor
MRID NO's: 413961-12, 13.

CROPLAND

Ignite will be applied exclusively by ground equipment. The maximum per application label rate on the crop label (soybeans, field corn, apples, tree nuts, vine crops) and the non-crop label is 1.44# active ingredient per acre. Based on this rate, if 5% were to run-off from a 1.0 acre treated area into a 1 acre area, 0.072# ai would be expected to run-off. A 5% runoff expectation is used based on the very high water solubility of glufosinate (1,370,000 ppm)*. Based on the EEC of 0.072# ai, a greater than 25% adverse effect on seed germination of lettuce and tomato would occur. A greater than 25% adverse effect on vegetative vigor is expected for carrot.

NON-CROP LAND

In non-crop areas such as highway rights-of-way, a different scenario is used. If a 40 foot strip of roadside were sprayed the total area is approximately 5.0 acres per mile. If both sides of the roadside were sprayed, the total is 10 acres treated per mile. If a 500 gallon spray tank were used, at the diluent rate of 40 gallons per acre, the applicator could spray approximately 10 acres per tank-full. Using the maximum rate of 1.44#ai/acre, a 10 acre treated area, and 5% runoff, the total EEC is 0.72#ai/acre. At this concentration, all tested plant species except oats were adversely affected at the 25% level in the vegetative vigor study (soybean, carrot, tomato, cucumber, cabbage, corn, onion, ryegrass, and lettuce). All plants are adversely affected (greater than 25%) in the seed germination/seedling emergence tests except for soybean and oat.

VEGETATIVE VIGOR (MRID NO.:413961-12,13)

<u>Species</u>	<u>EC25 (#ai/A)</u>	<u>EC50 (#ai/A)</u>	<u>NOEC (#ai/A)</u>
soybean	0.21 (DW)	0.44 (DW)	0.10 (DW)
carrot	0.06 (DW)	0.21 (DW)	0.05 (DW)
tomato	0.09 (DW)	0.19 (DW)	0.05 (DW)
cucumber	0.16 (DW)	0.27 (DW)	0.20 (DW)
cabbage	0.17 (DW)	0.32 (DW)	0.10 (DW)
oat	0.99 (DW)	>1.00 (DW)	0.80 (DW)
corn	0.31 (PH)	0.53 (PH)	0.20 (PH)
onion	0.11 (PH)	0.18 (PH)	0.10 (PH)
ryegrass	0.61 (DW)	>1.00 (DW)	0.04 (DW)
lettuce	0.14 (DW)	0.24 (DW)	0.10 (DW)

DW = dry weight, PH = plant height

SEED GERMINATION (MRID NO.:413961-11)

<u>Species</u>	<u>EC25 (#ai/A)</u>		<u>EC50 (#ai/A)</u>		<u>NOEC (#ai/A)</u>	
soybean	N/A	(RL)	N/A	(RL)	1.00	(RL)
lettuce	0.05	(RL)	0.22	(RL)	0.02	(RL)
carrot	0.38	(RL)	0.73	(RL)	0.08	(RL)
tomato	0.04	(RL)	0.19	(RL)	0.01	(RL)
cucumber	N/A	(RL)	N/A	(RL)	1.00	(RL)
cabbage	0.15	(RL)	>1.0	(RL)	0.15	(RL)
oat	N/A	(RL)	N/A	(RL)	1.00	(RL)
ryegrass	0.29	(RL)	0.72	(RL)	0.30	(RL)
corn	0.20	(RL)	>1.0	(RL)	1.00	(RL)
onion	0.08	(RL)	0.38	(RL)	0.04	(RL)

RL = radicle length

SEEDLING EMERGENCE (MRID NO.:413961-11)

<u>Species</u>	<u>EC25 (#ai/A)</u>		<u>EC50 (#ai/A)</u>		<u>NOEC (#ai/A)</u>	
soybean	>1.00	(DW)	>1.00	(DW)	0.75	(DW)
lettuce	0.15	(DW)	0.58	(DW)	0.19	(DW)
carrot	0.33	(PH)	0.66	(PH)	0.38	(PH)
tomato	0.25	(PH)	>1.0	(PH)	0.19	(PH)
cucumber	0.35	(DW)	>1.0	(DW)	0.09	(DW)
cabbage	0.16	(DW)	0.37	(DW)	0.09	(DW)
oat	0.85	(DW)	>1.0	(DW)	0.75	(DW)
ryegrass	0.31	(PH)	0.71	(PH)	0.19	(PH)
corn	0.52	(PH)	>1.0	(PH)	0.38	(PH)
onion	0.23	(PH)	0.43	(PH)	0.38	(PH)

DW = dry weight, PH = plant height.

ENVIRONMENTAL FATE INFORMATION

Based on the EFGWB one liner dated 02/21/90, glufosinate ammonium (Ignite) has a very high water solubility of 1,370,000 ppm and is stable in water and soil. Ignite is very mobile in soils and has an aerobic half-life of 23 days in a silt-loam soil and an anaerobic half-life of 56 days in the same soil. Ignite rapidly dissipated from foliage in less than 3 days.

TERRESTRIAL EXPOSURE

The maximum rate per acre proposed on the proposed crop and non-crop labels is 1.44# ai/acre. Up to three applications

are recommended on the crop label but the maximum number per year is not specified on the non-crop label. It is assumed for this review that no more than 4 total applications per year would be used in non-crop areas for weed control (2 in spring, 2 in fall). In the 1988 new chemical review, the EEB concluded that use of the maximum single application rate of 1.5# ai/acre in non-crop areas would result in minimal acute risks to non-target mammals and birds. The maximum TEEC of 360 ppm is well below the avian dietary LC50's of >5000 ppm and the LD50's of mammals which, when adjusted to LC50's greatly exceed the TEEC.

No enhancement in toxicity for formulated product vs technical was observed in mammal tests. Chronically, EEB concluded that multiple applications would have minimal chronic effects on mammals or birds. EEB requested further clarification of certain points in the avian reproduction studies. The Hoechst response to our request for further information was reviewed by EEB and comments are given under 101.4..

Based on 1.5#ai/acre:

<u>CATEGORY</u>	<u>MAXIMUM</u>	<u>ppm*</u>	<u>TYPICAL</u>
short grass	360		188
long grass	165		138
leafy crops	188		53
forage	87		50
seeds/pods	15-18		5
fruits	11		3
0.1 inch soil	33		---

1370 gm/L
dw < 0.1
 persistence
 39 ± 23 days

* Residues expected immediately after application.

AQUATIC EXPOSURE

Due to the ^{5%} high water solubility and mobility of glufosinate, a ~~100%~~ runoff expectation is used in the calculations. If 10 treated acres drain into a 1 acre body of water, the following aquatic exposure levels are calculated:

$$\begin{array}{r}
 \text{X} \quad 1.44\# \text{ ai/acre} \quad (1 \text{ application}) \\
 \quad \quad \quad 10 \text{ acres} \\
 \hline
 \text{X} \quad 14.4\# \text{ ai applied} \\
 \quad \quad \quad 0.05 \text{ (5\% runoff)} \\
 \hline
 \quad \quad \quad 0.72\# \text{ ai into a body of water}
 \end{array}$$

EEC

6 foot deep water = 43.92 ppb (0.04 ppm)
 6 inch deep water = 528.48 ppb (0.53 ppm)

ONE-TENTH THE LC/EC 50 VALUES

Rainbow trout	2.70	ppm	(TEP -16.2%)
Bluegill	6.50	ppm	(TEP -16.2%)
<u>Daphnia magna</u>	1.50	ppm	(TEP -16.2%)
Quahog clam	12.50	ppm	(TGAI-96.0%)
Mysid shrimp	4.32	ppm	(TEP -18.5%)
Oyster larvae	0.80	ppm	(TGAI-96.0%)
Oyster larvae	-----		(TEP -18.5%)
Sheepshead minnow	1.31	ppm	(TEP -18.5%)

In a 21 day Daphnia magna chronic toxicity test the MATC was 32 to 56 mg ai/L and the NOEC was 32 mg ai/L (TGAI-96.3%).

Based on available data, glufosinate is not expected to be acutely toxic to nontarget freshwater fish or aquatic invertebrates. Ignite is not expected to be acutely toxic to nontarget estuarine shrimp or fish species. An oyster embryo larvae study using the technical chemical indicates that this estuarine species is the most sensitive species to Ignite, however, no adverse effects are expected in the proposed crop areas based on this study.

The oyster embryo larvae study submitted in which the TEP was used was judged supplemental due to failure to achieve a valid LC50. In the TEP range-finding study for the oyster embryo larvae, the results were very erratic as follows: 0.05 ppm (79% mortality), 0.54 ppm (44% mortality), 5.4 ppm (73% mortality), 54.0 ppm (96% mortality), and 540 ppm (100% mortality). Rates selected and results for the definitive study were: 0.21 ppm (0% mortality), 0.35 ppm (0% mortality), 0.58 ppm (0% mortality), 0.97 ppm (0% mortality), 1.62 ppm (0% mortality), and 2.70 ppm (52% mortality). The rates selected for the definitive study require further explanation.

A quahog clam TEP study was not submitted for comparison with the TGAI study. Based on the TGAI quahog acute toxicity study submitted, no adverse nontarget effects are expected to bivalves from the proposed uses of Ignite.

BENEFICIAL INSECT EFFECTS

Based on honeybee acute toxicity data, the proposed Ignite label is not expected to adversely affect non-target beneficial insect species.

NON-TARGET PLANT EFFECTS

Tier I non-target plant effects data for vegetative vigor were submitted and reviewed by EEB (see 1988 new chemical review). At a 2#ai/acre rate >25% phytotoxicity occurred to 8 of the 10 species tested, triggering further Tier II tests.

Tier II terrestrial nontarget plant studies were submitted and reviewed. Based on the studies submitted, adverse nontarget effects on plant seed germination, seedling emergence, and vegetative vigor are expected to occur based on runoff calculations. Refer to 101.2, PLANT EFFECTS, for sensitive species. For crop areas, a greater than 25% adverse effect on the seed germination of lettuce, tomato, and related species is expected based on our runoff calculations. Using the non-crop highway rights-of-way scenario, most non-target plants contacted by runoff are expected to be adversely affected. The glufosinate non-crop label claims temporary dessication of shrubs, trees, and vines and non-selective activity on most weeds. Due to the broad spectrum of plants affected, the low rates at which they are affected, and the high solubility of glufosinate, all non-target plants are at risk. Tier III testing has been triggered.

A Tier II aquatic plant growth study was conducted using Selenastrum capricornutum. Technical glufosinate was used (96.3%). The 5 day EC50 was 7.8 mg/L. The maximum application rate of 1.44#ai/acre is not expected to cause a detrimental effect on algae. Repeat applications are not expected to significantly reduce algae populations.

101.3 Endangered Species Considerations

TERRESTRIAL

Glufosinate is not expected to be acutely or chronically toxic to mammalian or avian endangered species. All studies below are with TGAI material.

ONE-TENTH THE LD/LC50 VALUES

Mallard duck	200 ppm (acute oral)
Bobwhite quail	200 ppm (acute oral)
Mallard duck	500 ppm (acute dietary)
Bobwhite quail	500 ppm (acute dietary)
Mallard duck	>400 ppm (NOEL-Avian Repro.)
Bobwhite quail	>400 ppm (NOEL-Avian Repro.)
Rat/mouse	42-200 ppm (acute oral)

AQUATICONE-TWENTIETH THE LC/EC50 VALUES

Rainbow trout	16.00 ppm (acute-TGAI)
Rainbow trout	1.34 ppm (acute-TEP)
Bluegill	3.25 ppm (acute-TEP)
<u>Daphnia magna</u>	33.40 ppm (acute-TGAI)
<u>Daphnia magna</u>	0.75 ppm (acute-TEP)
Quahog clam	6.25 ppm (acute-TGAI)
Mysid shrimp	0.38 ppm (acute-TGAI)
Mysid shrimp	2.16 ppm (acute-TEP)
Oyster larvae	0.40 ppm (acute-TGAI)
Sheepshead minnow	0.66 ppm (acute-TEP)

Based on the previous EEC calculations using 5% runoff into a 6 foot deep water body, no adverse effects on endangered aquatic species are expected to occur from up to 4 theoretical applications per year. Based on 6 inch deep water body calculations, if glufosinate were to be directly applied to water, or were to runoff into shallow water areas, the potential for adverse effects to endangered aquatic organisms from just one application (see Mysid shrimp-TGAI, Oyster larvae-TGAI), exists.

INSECT

Based on honeybee acute studies, glufosinate (Ignite) is not expected to be acutely toxic to endangered insect species.

PLANTS

Ignite will be applied exclusively by ground equipment. However, the number of endangered plant species located in and around non-crop areas is extensive (see attached listing). Because this herbicide is broad spectrum in it's toxicity to plants, and is of high water solubility, the listed endangered/threatened plant species are believed to be at risk from one or more applications of glufosinate as proposed.

Ignite is not expected to adversely affect algae (Selenastrum capricornutum) at the proposed maximum application rate.

101.4 Adequacy of Toxicity Data

The supplemental data submitted regarding the Mallard duck reproduction study (MRID:413961-03) were reviewed (EEB-C. Laird). Information regarding diet preparation technique was acceptable. However, EEB still needs clarification of the residue analysis data for the avian feed (eg. when were the samples taken, were samples taken for each dose level during week 1, 12, and 22, etc.).

The supplemental data submitted regarding the Bobwhite Quail reproduction study (MRID:413961-02) were reviewed (EEB-C. Laird). EEB needs further clarification of information presented in Appendix 2 (Appendix 2 is attached). It is unclear (as presented in Appendix 2) what is being shown in the tables. Are these analyses of avian premix or are they representative samples from test diets during the test? When were these samples taken? Also, where are the analyses of samples taken for each dose level during weeks 1, 12, and 22 of the main study?

101.5 Adequacy of Labeling

On the Ignite crop label, pages 4 to 8 recommend 7.0 pints/acre/year on soybeans. On page 9, the proposed label recommends up to 7.2 pints/acre/year. This discrepancy needs to be corrected.

The Ignite non-crop label must state "Do not apply directly to water or to swamps, bogs, marshes, or potholes." "Do not apply in areas that drain into shallow water bodies or low-lying areas."

Delete the following sites from the proposed non-crop label: dry ditches, dry canals, and ditchbanks.

The Ignite non-crop label must state the total number of applications allowed per acre per year.

The Ignite non-crop label states: "Ignite herbicide will damage all foliage it comes into contact with; therefore, avoid contact to all desirable foliage." Additional precautions regarding adverse effects to non-target and endangered plant species due to runoff from the treated site must be considered as well. This statement should be modified as follows to account for runoff effects as well as foliar effects: "Ignite herbicide drift or runoff from the treatment area will damage all plants it comes in contact with; therefore, avoid contact with all non-target vegetation."

101.5 Labeling Adequacy cont.

Endangered species:

Virtually all endangered/threatened plants in or adjacent to the Ignite treated areas will be at risk. Most endangered/threatened plants are found in non-agricultural areas.

Until the EEB can receive a consultation from the Fish and Wildlife Service, the registrant must disallow Ignite use in the counties in which endangered/threatened plant species exist. The attached list identifies by county those plant species of concern. The Ignite label must list the county or area within a given county in which Ignite cannot be used.

102.0 Classification

Not currently classified.

103.0 Conclusions

NON-TARGET SPECIES

Use of glufosinate as proposed on the Ignite crop and non-crop labels is not expected to adversely affect non-target birds, mammals, beneficial insects, algae, freshwater or estuarine aquatic organisms.

Any off-target movement of glufosinate (Ignite) is expected to adversely affect non-target terrestrial plant species due to its high water solubility and broad spectrum, non-selective activity. Minimal exposure is expected from drift during application due to the "ground application only" restriction on the label.

ENDANGERED SPECIES

The proposed use of glufosinate (Ignite) is not expected to adversely affect endangered birds, mammals, beneficial insects, algae, or freshwater/estuarine aquatic organisms under normal use conditions. Any movement from the treated site into shallow water bodies (6") triggers our concerns for endangered estuarine species (shrimp and oysters), however, the label revisions under 101.5 are expected to minimize our concerns.

Any off-target movement of Ignite is expected to adversely affect non-target endangered terrestrial plant species by runoff due to its high water solubility. Ignite must be disallowed in those counties (or areas within counties) where endangered/threatened plants exist in or adjacent to non-crop areas.

103.0 Conclusions cont.

Outstanding data requirements:

- 1.) 72-3 LC50 estuarine quahog clam study using the TEP.
- 2.) 72-3 LC50 embryo Eastern oyster study using the TEP.

New data requirements:

- 1.) Tier III non-target plant phytotoxicity (terrestrial species). Due to the broad spectrum of non-target terrestrial plants at risk, we expect similar effects on aquatic macrophytes. Prior to requiring a Tier III non-target plant phytotoxicity test on aquatic macrophytes, a 123-2 Tier II test on Lemna gibba is requested.

Submission of residue monitoring data for a non-crop area (highway rights-of-way suggested) may negate our need for a Tier III terrestrial non-target plant study. Prior to the initiation of any monitoring study, EEB suggests that a protocol be submitted for review.



12/20/90

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Project No.: HST 247/248
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5. Content of Test Substance and Active Ingredient in the Diet
Type: SDS Quail Layers Ration
Batch: 2333

Sample No.	mg/kg added		Days after Preparation	mg/kg found	
	Test Substance	Active Ingredient		Active Ingredient	Test Substance
Group 1					
Top 1 / 25 mg/kg	25	24.2	10	22.3	23.5
"	25	24.2	28	24.7	25.3
Middle 1 / 25 mg/kg	25	24.2	10	20.4	21.1
"	25	24.2	28	20.1	20.7
Bottom 1 / 25 mg/kg	25	24.2	10	21.0	21.7
"	25	24.2	28	24.7	25.3
Group 2					
Top 2 / 25 mg/kg	25	24.2	10	25.3	25.1
"	25	24.2	28	25.4	25.2
Middle 2 / 25 mg/kg	25	24.2	10	25.3	26.6
"	25	24.2	28	24.7	25.5
Bottom 2 / 25 mg/kg	25	24.2	10	19.4	20.0
"	25	24.2	28	17.3	17.9

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