DP Barcode :D206247, 206296, 206535
PC Code No.:013803
EFGWB Out. : OCT 11 1994

TO: Virginia Dietrich
Product Manager PM 51
Special Review and Reregistration Division (H7508W)

FROM: Akiva Abramovitch, Chief
Environmental Chemistry Review Section #3
Environmental Fate & Ground Water Branch/EFED (H7507C)

THRU: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (H7507C)

Henry Jacoby 10/11/94

Attached, please find the EFGWB review of...

Reg./File #: 2395

Common Name: MSMA

Product Name: Ansar, Target, Bueno, Daconate, Merge

Company Name: MAA Task Force Three

Purpose: Review of 162-1, 162-2, 164-1 studies for registration; response to data waiver requests

Type Product: Herbicide Action Code: 606, 627, 635 Review Time: 2.5 days

EFGWB Guideline/MRID/Status Summary Table: The review in this package contains...

161-1		162-4	43314801	Y	164-4		166-1	
161-2		163-1			164-5		166-2	
161-3		163-2			165-1		166-3	
161-4		163-3			165-2		167-1	
162-1		164-1	43322801	N	165-3		167-2	
162-2		164-2			165-4		201-1	
162-3		164-3			165-5		202-1	

Y = Acceptable (Study satisfied the Guideline)/Concur U = Upgradeable (Study may become satisfactory with the submission of additional information)
S = Supplemental (Study provided useful information, but Guideline was not satisfied) N = Unacceptable (Study was rejected)/Non-Concur

1. CHEMICAL: Common name:

MSMA.

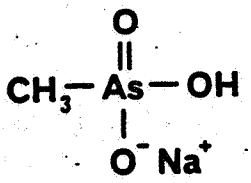
Chemical name(s):

Monosodium methanearsonate.
Methylarsonic acid, monosodium salt

Trade name(s):

MSMA, Ansar 529, Ansar 170, Target MSMA, Daconate, Mesamate, Bueno, Merge 823, Dal-E-Rad, Weed-E-Rad, Arsonate Liquid, Weed-Hoe, and Super Arsonate.

Structure:



Formulations:

Liquid, and liquid plus surfactants.

Physical/Chemical properties:

Molecular formula:	CH_4AsNaO_3.
Molecular weight:	162.0.
Physical state:	Colorless crystalline solid.
Melting point:	132-139 C.
Solubility (25 C):	104 g/mL water.

2. TEST MATERIAL:

Study 1: Active ingredient.

3. STUDY/ACTION TYPE:

Review of aerobic aquatic metabolism study, comments on protocol for aerobic soil metabolism study, and response to registrant comments on EFGWB review of terrestrial field dissipation study submitted in support of reregistration.

4. STUDY IDENTIFICATION:

162-4: Aerobic aquatic metabolism
Atkins, R.H. 1994. Aerobic aquatic metabolism of [^{14}C]MSMA. PTRL Project No. 757; PTRL Report No. 1573. Unpublished study performed by PTRL East, Inc., Richmond, KY, and submitted by Luxembourg Industries (PAMOL), Ltd., Tel Aviv, Israel. (43314801)

164-1: Terrestrial Field Dissipation
Coody, P.N. 1994. Supplemental attachment to MRID number 42616201: Terrestrial field dissipation study in Arkansas soil. Submission of response to deficiencies noted in EPA letter of 2/9/94. Response prepared by PTRL-East, Richmond, KY; and submitted by MAA Research Task Force Three, Memphis, TN. (43322801)

5. REVIEWED BY:

David Edelstein
Soil Scientist
EFGWB/EFED/OPP
Review Section #3

Signature: David Edelstein

Date: OCT - 5 1994

6. APPROVED BY:

Akiva D. Abramovitch
Chief
EFGWB/EFED/OPP
Review Section #3

Signature: K. A. B. for AA

Date: OCT - 5 1994

7. CONCLUSIONS:

162-1: Aerobic soil metabolism (test protocol)
The submitted protocol appears to provide a reasonable basis for assessing the metabolism of MSMA in aerobic soil. However, due to the protocol's similarity to the 162-4 study reviewed in this package, the EFGWB reviewer raises the following concerns:

1) pH, Eh, and dissolved oxygen measurements should be made before the system is purged with pure oxygen, so that the actual conditions existing in the flask during incubation can be determined. Also, the use of a flow-through system rather than a closed system might simplify this issue.

2) The protocol calls for sampling for total arsenic in soil at time 0, 6 months, and 12 months posttreatment. As inorganic forms of arsenic are believed to be MSMA degradates, total soil arsenic should be sampled at each sampling interval.

3) Colony forming units should be enumerated both before and after the experiment, and results of both counts reported.

4) It is recommended that the study author address the relationship between the results of the aerobic soil metabolism study and the reported results of the field studies (MRID 42526001, 42616201).

162-4: Aerobic aquatic metabolism (MRID 43314801; acceptable)
Although there are a number of uncertainties in this study, it is marginally acceptable. Methyl-labeled [^{14}C] monosodium methanearsonate (MSMA) degraded slowly on sandy loam soil that was flooded with HPLC-grade water and incubated in the dark at 25.0 ± 0 °C. One [^{14}C]degradate was identified: cacodylic acid, maximum 4.5-5.3% of the applied 30 days posttreatment. By day 30, 0.9-2.0% of the applied radioactivity had been released as CO_2 and 7.5-7.8% of the applied radiocarbon was bound residue.

164-1: Terrestrial Field Dissipation (MRID 42616201, 43314801; upgradeable)
The registrant's response does not satisfy the purpose of the terrestrial field dissipation study, which is to identify the routes of dissipation of MSMA in the field. In the laboratory, MSMA is stable to abiotic processes, biodegrades very slowly, and is not mobile. Yet, in the field, the half-life was reported to be 11 days in one study and 55 days in another. The registrant has not provided any explanation of this difference, although the EFGWB reviewer suspects that the problem lies in the laboratory biodegradation data. New laboratory studies have been

3

required, and EFGWB will revisit the field study when acceptable aerobic soil metabolism and mobility data are received, as this should aid in the interpretation of field results. The registrant is encouraged to discuss laboratory study results in terms of their implications for the field study.

With regard to certain specific comments, the registrant response offers a degradation pathway for MSMA, it does not provide data on the pattern of degradate formation and decline. The pattern is established from measured degradate concentrations, which can be compared to one another and the parent concentration over the time period of the experiment. The terrestrial field dissipation study did not establish a pattern of degradate formation, as concentrations were highly variable, but only established a decline in parent concentration over time. As the rapid disappearance of parent MSMA was unexpected, a corresponding rise in degradate concentrations could have provided an explanation for that result.

The question of arsenic speciation is not simply a matter of academic interest. Arsenite is believed to have more serious toxicological effects than arsenate. However, EFGWB agrees that arsenate-arsenite speciation is primarily a function of site conditions, not a direct consequence of MSMA use. As inorganic arsenic speciation is a site-specific effect, there would be little purpose in requiring data beyond the submitted Eh-pH diagram. No further data on inorganic arsenic speciation is required at this time.

ENVIRONMENTAL FATE ASSESSMENT

Laboratory data indicate that monosodium methanearsonate (MSMA) is to be persistent, but not mobile. Some MSMA degradates may be volatile. In water, the sodium ion dissociates from MSMA to form the methanearsonate anion and methanearsonic acid, which are stable to hydrolysis. MSMA is stable to photolysis in soil and water. While MSMA mobility data are incomplete, inorganic arsenic can form insoluble salts in soil solution, and is not believed to be mobile. MSMA appears to resist aerobic biodegradation. The anaerobic metabolism pathway of MSMA is not clear; the primary anaerobic metabolites of MSMA were said to volatilize, but no evidence was provided for this assertion.

In the field, MSMA appeared to dissipate far more rapidly than would be expected from the laboratory data. The route of dissipation is unclear, as little MSMA appeared to degrade to cacodylic acid, and MSMA does not appear to be mobile. Additional data on MSMA dissipation in the field will be needed. However, the presumed immobility of inorganic arsenic and the fact that it cannot be degraded indicate that repeated applications of MSMA will increase the probability of environmental exposure (i.e., surface water exposure, wildlife exposure) to arsenic.

MSMA does not accumulate in fish.

8. RECOMMENDATIONS:

Inform the registrant that the study aerobic aquatic metabolism is acceptable. However, the registrant's response to comments is not sufficient to permit acceptance of the terrestrial field dissipation studies without the required aerobic soil metabolism and mobility data. The short half-lives reported in the field study must be reconciled with MSMA's apparent persistence in the laboratory.

Data requirement status for MSMA are listed in Table 1.

9. BACKGROUND:

A. Introduction

B. Directions for Use

MSMA (monosodium methanearsonate) is a selective contact herbicide registered for use to control bahiagrass, barnyardgrass, chickweed, cocklebur, crabgrass, dallisgrass, Johnson grass, foxtails, mustard, nutgrass, pigweed, punctureVine, ragweed, sandbur, tules, wild oats and wood sorrel in terrestrial food crops (cotton, bearing citrus, and nonbearing orchards), noncropland areas, and turf. In addition, MSMA may be used to kill trees. Single active ingredient formulations include liquid and liquid plus surfactants. Multiple active ingredient formulations include cacodylic acid, fluometuron, mecoprop, and dicamba.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

Refer to attached review.

11. COMPLETION OF ONE-LINER:

The one-liner has been updated and is attached.

12. CBI APPENDIX:

No claims of confidentiality are made for any of the data reviewed in this package.

5

DATA REQUIREMENT STATUS: MSMA (TERRESTRIAL FOOD CROPS)

GUIDELINE	MRID #	EFGWB#	DATE	STATUS
HYDROLYSIS (of MAA)	42363001	92-1115	4/93	NOT SATISFIED
AQUEOUS PHOTOLYSIS	41903902	91-0686	4/93	SATISFIED
PHOTOLYSIS ON SOIL	41903901	91-0686	4/93	SATISFIED
AEROBIC SOIL METABOLISM	41886901	91-0689	4/93	NOT SATISFIED
ANAEROBIC AQUATIC METABOLISM	41996501	91-0689	4/93	NOT SATISFIED
AEROBIC AQUATIC METABOLISM	43314801 ✓		9/94	SATISFIED
LEACHING/ ADSORPTION/ DESORPTION	On Amvac ?? 4/6/59'06	6171	12/86	NOT SATISFIED[1]
TERRESTRIAL FIELD DISSIPATION	42526001 42616201 43322801	93-0106	4/93 9/94	NOT SATISFIED
BIOACCUMULATION IN FISH	42432501	92-1283	4/93	SATISFIED
DROPLET SIZE SPECTRUM				NOT SATISFIED
DRIFT FIELD EVALUATION				NOT SATISFIED

1/ Although an adsorption/desorption study of MSMA mobility was accepted on 12/5/86 (EAB #6171), it should be considered supplemental. This study does not fully satisfy the mobility data requirement because three of the four tests were not performed on actual soils.

6

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
MSMA
Last Update on September 14, 1994
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	Section Head:	Date:

Common Name:MSMA
Smiles Code:
PC Code # : 13803 CAS #:2163-80-6 Caswell #:

Chem. Name :MONOSODIUM METHANEARSONIC ACID

Action Type:HERBICIDE

Trade Names:ANSAR; BUENO; DACONATE;DAL-E-RAD
(Formul'tn): LIQUID; LIQUID + SURFACTANT
Physical State:

Use :TURF, COTTON, NON-CROP SITES
Patterns :
(% Usage) :
:

Empirical Form: CH_4AsO_3-Na
Molecular Wgt.: 162.00 Vapor Pressure: E Torr
Melting Point : 132-139 C °C Boiling Point: °C
Log Kow : -3.100 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured)

Solubility in ...					Comments
Water	1.00E	6	ppm	@20.0 °C	104 g/ml
Acetone	E		ppm	@ °C	
Acetonitrile	E		ppm	@ °C	
Benzene	E		ppm	@ °C	
Chloroform	E		ppm	@ °C	
Ethanol	E		ppm	@ °C	
Methanol	E		ppm	@ °C	
Toluene	E		ppm	@ °C	
Xylene	E		ppm	@ °C	
	E		ppm	@ °C	
	E		ppm	@ °C	

Hydrolysis (161-1)
[V] pH 5.0:stable
[ ] pH 7.0:stable
[ ] pH 9.0:stable
[ ] pH :
[ ] pH :
[ ] pH :

9

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
MSMA
Last Update on September 14, 1994
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)
[S] Water:STABLE UNDER ARTIFICIAL LT
[V] :STABLE UNDER NATURAL LIGHT
[ ] :
[ ] :

[V] Soil :STABLE UNDER NATURAL LIGHT
[ ] Air :

Aerobic Soil Metabolism (162-1)
[S] 831 DAYS (PROBABLY HIGH DUE
[ ] TO APPL OF 100 PPM)
[S] 119 DAYS (SOIL ENRICHED WITH
[ ] 16% OM)
[ ]
[ ]
[ ]

Anaerobic Soil Metabolism (162-2)
[S] DEGRADATION RATE LESS THAN
[ ] UNDER AEROBIC CONDITIONS
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aerobic Aquatic Metabolism (162-4)
[V] degraded slowly in HPLC-grade water over sandy loam; qualitative
[ ] half-life was 245 days, based on 30 day experiment. Greatest
[ ] sink was soil binding of the radioactive methyl group. Arsenate
[ ]
[ ]
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
MSMA
Last Update on September 14, 1994
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Soil Partition Coefficient (Kd) (163-1)

	s	s	c	%OC	K
[V]	s	s	c	%OC	K
[ ]	100	-	-	.06	2.5
[ ]	84	11	5	.49	13
[ ]	HEAVY CLAY			9.03	40
[ ]	HEAVY CLAY			9.73	56
[ ]	SAND CLAY			.22	110

Soil Rf Factors (163-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

11

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[ ]
[ ]

Accumulation in Rotational Crops, Field (165-2)
[ ]
[ ]

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[V] <1x; little or no accumulation
[ ]

Bioaccumulation in Non-Target Organisms (165-5)
[ ]
[ ]

Ground Water Monitoring, Prospective (166-1)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[ ]
[ ]
[ ]

Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Field Evaluation (202-1)
[ ]
[ ]
[ ]
[ ]

Degradation Products

Inorganic arsenic
After 160 days under anaerobic conditions, soil residues contained 58% MSMA, 42% cacodylic acid, plus trimethyl arsines.
Arsenic 5+ acid

13

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
MSMA
Last Update on September 14, 1994
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

MSMA appears to be persistent, but not mobile. Some degradates may be volatile. In water, the sodium ion dissociates to form the methanearsonate anion and methanearsonic acid. MSMA is stable to hydrolysis,aqueous photolysis and soil photoysis. Supplemental data suggest an aerobic soil half-life of 313 days.

References: EFGWB reviews
Writer : DME

DATA EVALUATION RECORD

STUDY 1

CHEM 013803 MSMA §162-4

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 43314801
Atkins, R.H. 1994. Aerobic aquatic metabolism of [^{14}C]MSMA. PTRL Project No. 757; PTRL Report No. 1573. Unpublished study performed by PTRL East, Inc., Richmond, KY, and submitted by Luxembourg Industries (PAMOL), Ltd., Tel Aviv, Israel.

DIRECT REVIEW TIME = 12

REVIEWED BY: D. Edelstein
TITLE: Soil Scientist
ORG: EFGWB/EFED/OPP
TEL: 703-305-5935

SIGNATURE: D. Edelstein 10/5/94

CONCLUSIONS:

Metabolism - Aerobic Aquatic

1. This study can be used to fulfill data requirements.

2. Methyl-labeled [^{14}C] monosodium methanearsonate (MSMA) degraded slowly on sandy loam soil that was flooded with HPLC-grade water and incubated in the dark at 25.0 ± 0 °C. One [^{14}C]degradate was identified: cacodylic acid, maximum 4.5-5.3% of the applied 30 days posttreatment. By day 30, 0.9-2.0% of the applied radioactivity had been released as CO_2 and 7.5-7.8% of the applied radiocarbon was bound residue.

3. This study is acceptable and fulfills the 162-4 Aerobic aquatic metabolism data requirement for MSMA. No additional data is required at this time.

METHODOLOGY:

Air-dried, sieved (2 mm) Hanford sandy loam soil (59.2% sand, 33.6% silt, 7.2% clay, 0.60% organic matter, pH 6.7, CEC 5.33 meq/100 g) was weighed (20 g) into 500-mL Erlenmeyer flasks with 100 ml of HPLC-grade water. The system was treated at 5.91 ppm (based on total weight of soil and water) with methyl-labeled [^{14}C]MSMA (monosodium methanearsonate; radiochemical purity >98.1%, specific activity 2.4

mCi/mMol, Wil Research Laboratories) dissolved in HPLC-grade water. The sample flasks were stoppered and equipped with gas inlet and outlet tubes. The inlet and outlet tubes were designed to release CO_2 and volatiles while providing a means to replace headspace gas with oxygen. The flasks were incubated in the dark at 25 ± 0.0 C. At each sampling interval, the flasks were flushed with oxygen; the oxygen was vented through a polyurethane foam plug and KI/I_2 (to trap possible volatile arsines), ethylene glycol and 10% KOH trapping solutions (Figure, p. 60). Duplicate flasks of treated soil were collected at 0, 1, 7, 14, 20 and 30 days posttreatment.

A sterile system was also established using the same protocol except that dosing was 6.11 ppm. The foam plug and KI/I_2 traps were not used, as little or no radioactivity were collected in these traps during the viable system experiment. Sampling of the sterile system was on 0, 1, 3 and 7 days posttreatment.

Duplicate flasks were removed at each sample time and flushed with oxygen (120 ml/min for 10 min) for volatile collection. The samples were then centrifuged, and the supernatant aqueous solution decanted. The solution was centrifuged a second time and decanted directly into a vacuum filtration apparatus. The filtered water samples were measured and radioassayed. Subsamples were taken for HPLC and/or TLC analysis and stored at approximately 4°C. The remaining aqueous sample material was stored at -20°C.

Subsamples of each soil sample were analyzed for total radioactivity using LSC following combustion. Additional subsamples were extracted twice with 1.0 N ammonium hydroxide by shaking on a wrist-action shaker for approximately 30 minutes. Between extractions, the samples were centrifuged and the supernatants were decanted. Day 7, 14, and 20 subsamples (5 g) and the entire day 30 sample were extracted a third time with 1.0 N ammonium hydroxide by shaking overnight. These samples were also centrifuged and the supernatant decanted. The three supernatants were pooled (Extract 3), and aliquots were analyzed for total radioactivity using LSC. On day 7, replicate B, filtered water and Extract 1 were mistakenly pooled; this was referred to as Extract 2. When this sample was extracted overnight, the supernatant was pooled with extract 2 to make Extract 4.

Subsamples of the Day 0-Day 1 (Extract 1) and subsamples of Day 7-Day 30 (Extract 3) were radioassayed and stored at 4 °C. Aliquots of the soil extracts were applied to solid phase extraction columns using a vacuum manifold and a vacuum pump. After extraction, volumes were measured and the samples radioassayed. The extracts were also concentrated under nitrogen, then measured and radioassayed. Extracted soil was air dried, and subsamples (number and size not specified) were combusted and analyzed by LSC.

To confirm the presence of cacodylic acid in the viable system, an approximate 70 ml subsample of the water phase of Flask B, Day 30,

Replicate A was lyophilized and resuspended in HPLC-grade water. Multiple injections of this solution on the HPLC column and the early peak collected. These fractions were pooled and lyophilized to concentrate the sample. The sample was derivatized with methylthioglycolate to aid GC analysis. Following reaction, the derivative was extracted from the aqueous phase with hexane.

A sterile incubation was performed to determine whether cacodylic acid was a product of microbial activity. The soil and flasks were sterilized by autoclaving twice at 121 °C and 15 psi for 30 minutes. In opther respects, the sterile system was the same as the viable system. Duplicate flakss were sampled at 0, 1, 3 and 7 days posttreatment. Flasks were flushed with oxygen, then pH, Eh and dissolved oxygen were measured. The contents of the flasks were centrifuged, and the supernatant water decanted, filtered, measured, and radioassayed. A 10-ml subsample was cleaned up on a Varian Florosil ssolid phase extraction column; the eluate and rinse were radioassayed. Water samples were then analyzed by HPLC.

Sterile soil pellets were extracted in the same manner as in the viable soil study, with overnight extraction being performed on the day 3 and day 7 samples only. The extract from the day 0 and 1 samples was referred to as Extract 1, while the day 3 and 7 extracts were called Extract 5. Post extraction soils were dried, combusted and analyzed by LSC.

Extracts from the viable system and aqueous samples were analyzed by reverse-phase HPLC using a LC-NH_2 column eluted with either an HPLC-grade water or a 1% acetic acid gradient; the column was equipped with UV (265 nm) and radioactivity detection. The gradient for the sterile system extracts was acetonitrile:HPLC-grade water (1:1, v:v) or 2% acetic acid. Eluate fractions were collected and analyzed using LSC. The method detection limit was twice the background radiation, or 0.01 ppm. Further evidence of the presence of cacodylic acid in the water phase of a representative sample was provideded by comparing Day 1 and Day 30 samples of the ^{14}C-labeled material from the extract to the known R_f value of cacodylic acid. Cellulose TLC plates were developed in ethyl acetate:17.4 N glacial acetic acid:water (3:2:1,v:v:v). The radiolabeled areas were visualized, then scraped and quantitated by LSC. Identification of the methylthioglycolate derivatives of ^{14}C-MSMA and ^{14}C-cacodylic acid were provided by GC and GC/MS.

Aliquots of the trapping solutions and an acetonitrile extract of the polyurethane foam plug were analyzed for total radioactivity using LSC. The identification of [^{14}C]residues in the KOH trapping solutions as $^{14}CO_2$ was confirmed using barium chloride precipitation.

DATA SUMMARY:

Methyl-labeled [^{14}C]MSMA (monosodium methanearsonate; radiochemical purity >98%), at 5.91 ppm, degraded with a registrant-calculated half-life of 245 days on sandy loam soil that was flooded and incubated in the dark at 25.0 ± 0.0 C. The study author reported that, based on HPLC and peak integration analyses, [^{14}C]MSMA comprised an average of 96.7% of the applied immediately posttreatment, 87.5-97.6% at 1 through 20 days, and 85.6-87.1% at 30 days posttreatment (Table VII). In the viable soil system, one other [^{14}C]degradate was identified:

cacodylic acid (CA)

was a maximum of 9.1% of the applied 1 day posttreatment, but was found at approximately 1-5% of the applied at all sampling intervals. [^{14}C]Residues that were not extracted from the soil were 1.7-2.0% of the applied at time 0, 4.7-5.0% at 1 day, and reached a maximum of 7.5-7.8% by 30 days (Table VI). [^{14}C]Residues in the KOH volatile trapping solution were 0.9-2.0% of the applied at 30 days; no [^{14}C]volatiles were detected in the potassium iodide/iodine trapping solution. During the study, the material balances ranged from 99.9 to 103.0% of the applied with no discernable pattern of loss.

No cacodylic acid was recovered from the sterile system, suggesting that cacodylic acid is a microbial degradate of MSMA. The rate of soil binding in that system seemed to be somewhat faster than in the viable system.

COMMENTS:

1. It is not certain that aerobic conditions were maintained throughout the experiment. Aerobic soil and aquatic metabolism experiments are typically run with flow-through aeration systems, but the system flasks in this study were closed, rasing the possibility that microbial activity could be sufficient to consume the available oxygen. Although the headspace filled with oxygen on a weekly basis, there is no evidence that this was enough to maintain aerobic conditions. pH, Eh, and dissolved oxygen were measured <u>after</u> the flask was purged with oxygen in order to collect volatiles, which means that the measurements in Table V are of the effect of purging a 500 ml flask containing 100 ml of water with 120 ml/min of oxygen for 10 minutes, not of the conditions existing in the flask during incubation.

   However, indirect evidence suggests that aerobic conditions were maintained. The headspace had a volume of nearly 400 ml, and the water presumably contained some dissolved oxygen at study initiation. Little CO_2 was released, further suggesting that not all of the available oxygen was consumed during the experiment. While this aspect of the experiment was handled poorly, there does not seem to be any benefit to be gained by requiring a new study.

2. No measurements were made of background levels of arsenic; it was not possible to determine if any MSMA was transformed to arsenate. It appears that a methylation/demethylation process was ocurring in the system to transform some of the MSMA into cacodylic acid and some of the radiocarbon into bound residue. It would have been helpful to see whether total soil arsenic showed a rise comparable to the rise in bound radiocarbon. In an earlier aerobic soil metabolism study (MRID 41886901, reviewed 1/6/94) the study author reported that the major degradate of MSMA was arsenic (V) acid.

3. A count was provided of "colony forming units" to demonstrate that there was an active microbial population in the test system (Table II). However, it was not stated whether the count was made before or after the study.

4. The study author notes that "pooling the initial extract representing the entire soil sample (Extract 1) and a 5-g subsample extract as was done for Day 7, 14, and 20 samples, does not provide a totally representative extract sample for subsequent chromatographic analysis." The study author suggests that the importance of this is limited as only MSMA was found in the soil extracts.

5. The study author notes that "the duration of the aerobic aquatic incubation (30 days) under viable microbial conditions is not sufficiently long for determination of an accurate rate of degradation (and/or dissipation) of [^{14}C]MSMA." Therefore, the projected dissipation half-lives (245 days in viable soil, 128 days in sterile soil) should only be regarded as qualitative values implying considerable persistence for MSMA in soil.

6. Results of the TLC anaylses, which are given in terms of % of the recovered radioactivity, are comparable to HPLC results when adjusted for over all recovery.

ISK BIOSCIENCES™

April 25, 1995

Ms. Cynthia Giles-Parker (PM22)
Office of Pesticide Programs
Registration Division (H-7505C)
Document Processing Desk (EUP)
Environmental Protection Agency
Room 266A, Crystal Mall 2
1921 Jefferson Davis Highway
Arlington, VA 22202

Dear Ms. Giles-Parker,

SUBJECT: Label Amendment Request for Bueno 6 (50534-6)
Add Vines (grapes) to Non-bearing orchard Use Directions
Amendment Originally Submitted January 21, 1994
EPA Letter of April 20, 1995

In your letter of April 20, 1995, you stated that insufficient data was cited to support this use, citing lack of product chemistry citations and lack of residue chemistry data and a second teratogenicity species.

We apologize that product chemistry data was not cited. The list has been upgraded to include this information. Residue chemistry is not required since this is a non-food use (non-bearing vines only). The second teratogenicity species has been added although this is only conditionally required according to the CFR. Plant protection Tier I studies are normally waived by the EPA on herbicides since it is assumed that phytotoxicity will occur. Tier I studies, therefore, were not required in reregistration. Citations for Tier II studies were provided.

All data cited is owned by ISK Biosciences Corporation. Members of the MAA Research Task Force co-own the generic data jointly so we are able to claim the use of this data without offering to pay other member companies. Product specific data is wholly owned by ISK Biosciences Corporation. A new signed citation form is included to cover the additionally cited data. Our data listing is up to date with that of the reregistration branch.

I have also further reviewed the CFR data requirements and question whether this data matrix is really required since technically this is not a new use. We are adding the listing of another non-bearing fruit and nut crop which should not require different data from those non-bearing orchard crops already listed on the label. The label restricts use to prior to the first year of harvest to avoid possible issues with residues. Please reconsider your decision to treat this as a new use.

Please contact me at (216) 357-4188 during normal business hours with questions.

Sincerely,
ISK BIOSCIENCES CORPORATION

Elizabeth D. Owens, Ph.D.
Manager, Product Registrations

cc: Ron Kendall, Reregistration

Attachments

ISK Biosciences Corporation
5966 Heisley Road, P.O. Box 8000, Mentor, Ohio 44061-8000, U.S.A.
216/357-4100 · FAX: 216/354-9506

30

ISK BIOSCIENCES CORPORATION
BUENO 6
DATA CITATIONS IN SUPPORT OF NON-BEARING VINES

PRODUCT CHEMISTRY (158.155, 158.160, 158.162, 158.165, 158.167, 158.170, 158.175, 158.180, 158.190) MSMA & SYNTHETIC MSMA:

61-1	Product Identity and Disclosure of Ingredients	MRID 41608101, 42387801, 42153501
61-2	Description of Beginning Materials, Manufacturing	MRID 41608102, 42387801, 42081201
61-3	Formation of Impurities	MRID 41608103,42387801
62-1	Preliminary Analysis	MRID 42387802, 41608104
62-2	Certification of Ingredient Limits See also CSF dated 10/26/83	MRID 41608105, 42387802
62-3	Analytical Methods to Verify Certified Limits	MRID 41608106, 42387802
63-2 to 63-21	Physical & Chemical Characteristics	MRID 41608107, 42451101, Acc. #256172, 42103301, 41610001,

42378601

ECOLOGICAL EFFECTS (158.490):

71-1a	Avian Oral Acute (Quail)	MRID 41610002
71-2a	Avian Dietary Acute (Quail)	MRID 41610003
71-2b	Avian Dietary Acute (Duck)	MRID 41610004
72-1a	Fresh Water Fish Acute (Bluegill)	MRID 41748001
72-1c	Fresh Water Fish Acute (Trout)	MRID 41747301
72-2a	Fresh Water Invertebrate (Daphnia)	MRID 41940605

TOXICOLOGY (158.340)

81-1	Acute Oral (Rat)	MRID 92108001, 41892004, 41890001
81-2	Acute Dermal	MRID 41890001, 41892005
81-3	Acute Inhalation	MRID 42604601, 41892006
81-4	Primary Eye Irritation	MRID 92108003, 41892007
81-5	Primary Dermal Irritation	MRID 92108004, 41892008
81-6	Dermal Sensitization	MRID 41890002
82-1a	90-Day Feeding (rodent)	MRID 40606201, 40632601
82-1b	90-Day Feeding (non-rodent)	MRID 40546101
82-2	21 Day Dermal	MRID 41872701, 42659701
83-1a	Chronic Tox (Rodent)	MRID 41669001
83-1b	Chronic Tox (non-rodent)	MRID 40546101
83-2a	Oncogenicity (Rat)	MRID 41669001
83-2b	Oncogenicity (Mouse)	MRID 42173201
83-3a	Teratogenicity (Rat)	MRID 41926402, 41926401
83-3b	Teratogenicity - Rabbit	MRID 01593001 + add'tl data of 12/14/94
84-2a	Gene Mutation	MRID 41615902
84-2b	Structural Chromosomal Aberration	MRID 41615903
84-4	Other Genotoxic Effects	MRID 41615904, 41615905
85-1	General Metabolism	MRID 42010502, 42010501

NON-TARGET PLANT STUDIES (158.540):

123-1a	Seed Germination/Seedling Emergence	MRID 41705501, 42572501
123-1b	Vegetative Vigor	MRID 41705502, 41905604
123-2	Aquatic Plant Growth	MRID 41748201, 41748202, 41940601, 41940602

ENVIRONMENTAL FATE (158.290):

161-1	Hydrolysis	MRID 42363001
161-2	Photodgradation in Water	MRID 41903902
162-1	Aerobic Soil	MRID 41886901
163-1	Leaching and Adsorption/Desorption	MRID 41615906
164-1	Terrestrial Field Soil Dissipation	MRID 42526001, 42616201

SPRAY DRIFT (158.440)

ISK Biosciences is a member of the Spray Drift Task Force which is currently completing and submitting studies to fulfill this data requirement.

RE-ENTRY AND EXPOSURE (158.390)

ISK Biosciences is a member of the MAA Research Task Force which is generating data to satisfy these data requirements under Phase 4 of reregistration.

EPA

United States
Environmental Protection Agency
Washington, DC 20460

Form Approved
OMB No. 2070-0060
Approval Expires 02-28-95

Certification with Respect to Citation of Data

Applicants Name and Address	EPA File Symbol/Registration Number	50534-6
ISK Biosciences Corporation 5966 Heisley Road P.O. Box 8000 Mentor, Ohio 44061-8000	Product Name	Bueno 6
	Date of Application	March 3, 1995

NOTE: If your product is a 100% repackaging of another EPA-registered product that you purchase, and is labeled for the same uses, you do not need to submit this form. You must submit the Formulator's Exemption Statement (EPA Form 8570-27).

1. This application is supported by all data submitted or cited in the application. In addition, if cite-all options are indicated, this application is supported by all data in the Agency's files that concern the properties or effects of this product that is identical or substantially similar and that is one of the types of data that would be required to be submitted if this application sought the initial registration of a product of identical or similar composition and intended uses under the data requirements in effect on the date of approval of this application. (Check the appropriate boxes, in items 2 and 3, or 4 below that pertain to your application.)

2. I certify that, for each study cited in support of this application for registration that is an exclusive use study.

   [X] I am the original submitter*; or

   [ ] I have obtained the written permission of the original submitter for _____ (insert name of chemical), which is _____ (insert names of companies) (for multiple chemicals link the companies who are original data submitters with the appropriate chemical name) to cite that study*

3. I certify that, for each study cited in support of this application for registration that is not an exclusive use study;

   a. [ ] I am the original data submitter*; or

   [ ] I have obtained the written permission of the original data submitter for _____ (insert name of chemical), which is _____ (insert names of companies) (for multiple chemicals link the companies who are original data submitters with the appropriate chemical name) to cite that study*; or

   b. [ ] I have notified in writing the companies _____ (insert names of companies) for _____ (insert name of chemical) that have submitted data I have cited to support this application and have offered to: (a) Pay compensation for those data in accordance with section 3(c)(1)(F) and 3(c)(2)(D) of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); and (b) Commence negotiations to determine which data are subject to the compensation requirement of FIFRA and the amount and terms of compensation due, if any. The companies I have notified are:

   Companies _____ (insert names of companies) for _____ (insert name of chemical) (for multiple chemicals link the companies who are original data submitters with the appropriate chemical name) listed on the Pesticide Data Submitters List for all active ingredients contained in my product (cite-all method or cite-all option under Selective Method*). (Also, sign the General Offer Statement below.)

   Companies _____ (insert names of companies) for _____ (insert name of chemical) (for multiple chemicals link the companies who are original data submitters with the appropriate chemical name) that have submitted the studies which I have cited (Selective method*).

4. [ ] I certify that for each study cited in support of this application I am not required to offer data compensation or obtain written permission because all time periods for exclusive use and data compensation have expired.

* A Data Matrix identifying these studies is attached. (Note: a Data Matrix is not required under the cite-all method)

Signature	Name and Title	Date
Elizabeth Owens	Elizabeth D. Owens Manager, Product Registrations	April 25, 1995

General Offer to Pay: I hereby offer and agree to pay compensation to other persons, with regard to the approval of this application, to the extent required.

Signature	Name and Title	Date

EPA Form 8570-29 (Rev. 5-94) Electronic and Paper versions acceptable.

29

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NOV 15 1994

CERTIFIED MAIL

E. M. Bellet, Ph.D.
Chemical Consultants International, Inc.
7270 West 98th Terrace, Suite 100
Overland Park, Kansas 66212

Subject: Review of Environmental Fate Data supporting the reregistration of monosodium methanearsonate (MSMA) Case# 2395, AI#'s 13803.

Dear Dr. Bellet:

The Agency has reviewed your protocol submission for guideline(GDLN 162-1: Aerobic Soil Metabolism as well as your study submissions MRID# 43314801 for GDLN 162-4: Aerobic Aquatic Metabolism, and MRID#s 42616201 and 43314801 for GDLN 164-1: Terrestrial Field Dissipation.

Your protocol appears to provide a reasonable basis for assessing the metabolism of MSMA in aerobic soils. However, due to the protocols similarity to the GDLN 162-4 study reviewed below the Agency has the following concerns:

GDLN 162-1: Aerobic soil metabolism, test protocol

1. Measure pH, Eh, and dissolved oxygen before the system is purged with pure oxygen, so that the actual conditions existing in the flask during incubation can be determined. Also, the use of a flow through system rather than a closed system might simplify this issue.

2. The protocol calls for sampling for total arsenic in soil at time 0, 6 months, and 12 months posttreatment. As organic forms of arsenic are believed to be MSMA degradates, total soil arsenic should be sampled at each sampling interval.

3. Colony forming units should be enumerated both before and after the experiment, and results of both counts reported.

4. You should address the relationship between the results of this aerobic soil metabolism study and the reported results of the field studies.

CONCURRENCES								
SYMBOL								
SURNAME								
DATE	11/8/94	11/9/94						

EPA Form 1320-1A (1/90) *Printed on Recycled Paper* OFFICIAL FILE COP

GDLN 162-4: Aerobic aquatic metabolism, MRID# 43314801:

Although there are uncertainties in this study, it is minimally acceptable. Methyl-labeled MSMA degraded slowly in sandy loam soil that was flooded with HPLC-grade water and cacodylic acid was identified as one degradate. The above study satisfies the data requirements for GDLN 162-4. No additional data are required at this time.

GDLN 164-1: Terrestrial; field dissipation, MRID#s 42616201 and 43314801

Your response does not satisfy the purpose of the terrestrial field dissipation study which is to identify the routes of dissipation of MSMA in the field. In the laboratory MSMA is stable to abiotic processes, biodegrades very slowly, and is not mobile. Yet, in the field, the half life was reported to be 11 days in one study and 55 in another. You have not provided a good explanation of this difference, although the Agency believes that the problem lies in the laboratory biodegradation data.

The Agency has just reviewed your protocol for a new aerobic soil metabolism study (GDLN 162-1) and our letter dated June 14, 1994 informed you that the new due date for studies on GDLNs 162-1 and 162-3 is February 28, 1996. Because the Agency believes the discrepancies in data can be resolved by new laboratory studies we are reserving our decision on the terrestrial field data until new laboratory studies are submitted.

I have enclosed copies of the Data evaluation reviews. If you have any questions please contact Ron Kendall in the Accelerated Reregistration Branch at (703) 606-8068.

Sincerely,

Jay S. Ellenberger, Chief
Accelerated Reregistration Branch
Special Review and
Reregistration Division

cc: ISK Biotech
APC Holdings
David Edelstein, EFED
Cynthia Giles, RD

7508W:R.Kendall:rk:11/01/94:Rm:4L3:308-8068:Disk:cy94:MSMA11

2