UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 12 1991

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Triasulfuron. Metabolite CGA 150829

Tox. Chem. No.: 861C

FROM: Melba S. Morrow, D.V.M. MSM 6/13/91
Review Section II, Toxicology Branch I
Health Effects Division (H7509C)

TO: Robert Taylor, PM 25
Registration Division (H7505C)

THRU: Marion P. Copley, D.V.M. MPC 6/13/91
Section Head, Review Section II
Toxicology Branch I
Health Effects Division (H7509C)

Additional information has been provided on the environmental fate of triasulfuron and its degradate, CGA-150829.

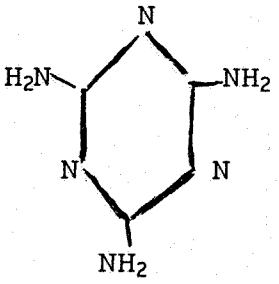
Formation of CGA-150829 involves the cleavage of the sulfonylurea bridge in the parent compound. It is formed primarily by hydrolysis and biotic degradation under aerobic conditions in the soil.

The degradate in question persists in the environment, is mobile and has leaching potential which may affect ground water and /or surface water. The registrant, Ciba Geigy, is currently attempting to identify the soil/leachate residues.

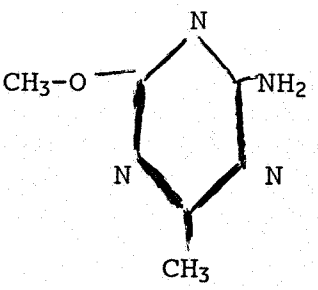
TBI is concerned with the fate of the CGA-150829 degradate because it was not identified as an animal metabolite, is structurally related to melamine (which has been associated with bladder tumors) and poses a potential hazard to drinking water. We feel that additional information will be required to determine the acute toxicity, mutagenicity and perhaps metabolism of CGA-150829.

(See attached memo from EFED)

Structures for Melamine and CGA 150829



Melamine



CGA- 150829

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 10, 1991

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Triasulfuron- Degradate of Potential Concern CGA-150829
Environmental Fate and Transport

TO: Marion Copley, D.V.M.
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FROM: Silvia C. Termes, Ph.D.
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THRU: Henry M. Jacoby, Chief
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As per our previous discussion, I am providing further information on the environmental fate of TRIASULFURON and its degradate of potential concern CGA-150829.

The degradate CGA-150829 is formed from the cleavage of the sulfonylurea bridge. It can form mainly by hydrolysis (particularly at acidic pH) and by biotic degradation in soils under aerobic conditions.

In a silty loam soil incubated under aerobic conditions, formation of CGA-150829 reached a maximum of ca. 30% of the applied radioactive dosage by 28 weeks and then declined to ca. 22% by 52 weeks. In addition, CGA-150829 (like parent triasulfuron and the other sulfonylurea-bridge cleavage degradate CGA-161149) does not have a strong tendency to adsorb onto soil particulates. The solubility of CGA-150829 at pH 5.7 is $\geq$ 300 ppm. This indicates that, together with the low adsorption tendency of CGA-150829, potential for movement to groundwater and/or surface waters is of concern.

From field data we know that residues of triasulfuron and of CGA-150829 move through the soil profile at least to 36 inches and that these residues have been detected in leachates at higher concentrations than in the 30-36 inch soil depth (see Table III). However, the actual components of total radioactive residues have not yet been identified and constitutes a deficiency in the data for this type of studies. The registrant has indicated that they are working on the identification of soil/leachate residues.

SUMMARY OF DEGRADATION STUDIES ON TRIASULFURON (Laboratory)

Study	Medium	Half-life	Comments
HYDROLYSIS	Aqueous Buffered Solutions pH 5 pH 7 pH 9	 31.3 days 3.1 yrs 3.7 yrs	Abiotic hydrolysis involves cleavage of the sulfonylurea bridge to form degradates containing a single ring
PHOTODEGRADATION IN WATER	Aqueous Buffered Solutions pH 9	> 2 months (72-87 days)	There appears to be a slight enhancement in the rate of degradation when samples were irradiated with natural sunlight
PHOTODEGRADATION ON SOIL	Huntington sandy loam (Fayette Co., KY) pH 7.8; 1.7% OM	> 2 months (70-140 days)	Photodegradation on soil does appear to be a significant degradation mode for triasulfuron
AEROBIC SOIL METABOLISM	Silty loam (Les Barges, Switzerland) pH 7.6; 2.4% OM Note: Swiss soil is comparable in physical/ chemical properties to Midwestern US soils	9.5 - 15 weeks	Degradation proceeds by cleavage of the sulfonylurea bridge to form degradates containing only one ring (CGA-161149 and CGA-150829, at a maximum of 9.5% after 8-weeks and 29.7% at 28-weeks, respectively). After 52 weeks, CO_2 production was 14-20%. Nonextractables increased with time. The degradate/metabolite CGA-195660 was also found at < 10%.
ANAEROBIC SOIL METABOLISM	Silty loam (Les Barges, Switzerland); same as aerobic soil metabolism See note above about soil	Estimated 40.6 weeks	Anaerobic conditions slow down the rate of degradation of triasulfuron. CO_2 nearly stopped. Most of the residues were found in the aqueous phase and were predominantly the parent compound.

TABLE I. Freundlich Sorption Constants for Parent Triasulfuron and Two Major Degradates
(Data Summarized from MRID #s 41656207; 41656208; 41656209)

Soil Texture	Parent CGA-131036		CGA-161149		CGA-150829	
	K_{ad}	K_{des}	K_{ad}	K_{des}	K_{ad}	K_{des}
Loamy Sand	0.76 (191) n= 0.70	0.89 (225) n= 1.04				
Agricultural Sand			0.40 (134) n= 1.10	1.38 (460) n= 1.10	0.23 (78) n= 1.15	1.07 (357) n= 1.03
	[..... (a)	.....]	[..... (b)		.....	]
Sandy Loam	1.13 (73) n= 0.83	0.89 (224) n= 1.01	1.76 (207) n= 1.10	3.72 (438) n= 1.09	2.77 (163) n= 0.98	1.41 (166) n= 1.12
	[..... (a)	.....]	[..... (b)		.....	]
Silt Loam	1.16 (52) n= 0.93	2.05 (91) n= 1.01	1.29 (86) n= 1.16	2.67 (178) n= 1.16	0.96 (64) n= 1.18	1.84 (123) n= 1.14
	[..... (a)	.....]	[..... (b)		.....	]
Silty Clay Loam	0.62 (65) n= 0.82	1.15 (120) n= 1.00	0.77 (128) n= 1.10	2.24 (373) n= 1.10	1.20 (200) n= 1.22	2.96 (493) n= 1.08

Values in parentheses are K_{oc} values; K_{oc}= $K_{ad;des}$ x 100/%OC; %OC= % Organic Carbon= %OM/2; n=1/slope

Soil Texture	Series Name	%Sand	%Silt	%Clay	%OM	pH	CEC (meq/100g)	BD (g/cm^3)	FC
Loamy Sand	*	85	6	9	0.8	7.8	3	1.49	7.4
Agr. Sand	*	88	11	1	0.6	7.9	3	1.49	9
Sandy Loam (a)	*	69	24	7	3.1	7.5	9	1.24	17.1
Sandy Loam (b)	*	69	21	10	1.7	7.8	10	1.24	16
.....* All of these soils come from the Huntington silt loam series (Origin: Fayette Co., KY)									
Silt Loam (a)	Armour silt loam	16	71	13	4.5	7.2	17	1.37	39.5
Silt Loam (b)	Armour silt loam	17	66	17	3.0	6.5	16	1.37	30
Silt.Cl.Lm.(a)	Salvisa "scl"	17	49	34	1.9	7.1	21	1.59	35.5
Silt.Cl.Lm.(b)	Salvisa "scl"	15	51	34	1.2	6.9	30	1.59	43

OM=Organic Matter; CEC=Cation Exchange Capacity; BD=Bulk Density; FC=Field capacity(g H_2O/100g dry soil)
All of the soils come from Fayette Co, KY.

TABLE II. WATER SOLUBILITY OF TRIASULFURON (CGA-131036) AND DEGRADATES CGA-161149 AND CGA-150829 (in ppm)

pH	Temperature	CGA-131036	CGA-161149	CGA-150829
2.5[a]	20 C	5		
5[a]	20 C	40		
5.7[b]	25 C	-	≥ 1000	≥ 300
7[a]	20 C	1500	-	-

[a] From DEB review (M. Bradley; 12/12/86; MRID #40271903)
[b] From MRID #s 41656208 and 41656211 (batch-equilibrium adsorption/desorption studies for CGA-161149 and CGA-150829, respectively.

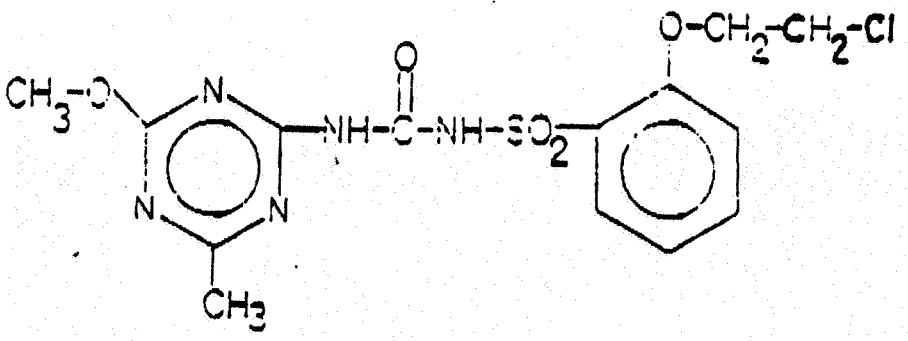
TABLE III. Movement of ^{14}C-Residues (in ppb) to the 30-36 Inch Depth and Leachates

Soil: Goldsboro loamy sand in Clayton, NC

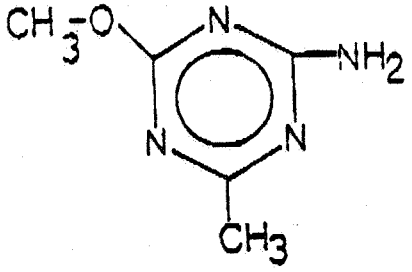
	%Sand	%Silt	%Clay	%OM	pH	CEC	%FC	%WP	%Plant Av. Water
0-12 in	90	6	4	0.8	6.1	< 1	5.2	4.10	1.10
12-24 in	88	6	6	1.6	5.3	2	7.79	6.14	1.65
24-36 in	85	6	9	1.1	5.4	2	6.46	5.28	1.18

Sampling Time (Days)		Test Compound Applied: Parent CGA-131036 ^{14}C-Phenyl 30-36 in	Parent CGA-131036 ^{14}C-Phenyl Lch.	Parent CGA-131036 ^{14}C-Triazine 30-36 in	Parent CGA-131036 ^{14}C-Triazine Lch.	Degradates CGA-161149 30-36 in	Degradates CGA-161149 Lch.	Degradates CGA-150829 30-36 in	Degradates CGA-150829 Lch.
APPLICATION RATE: 60 g ai/hectare									
0		ND	-	ND	-	ND	-	ND	-
1		ND	-	ND	-	ND	-	ND	-
3		ND	-	ND	-	ND	-	ND	-
7	2-in RF	ND	NA	ND	0	ND	NA	ND	0
14		ND	0	ND	0	ND	0	ND	1.43
30		ND	NA	ND	0	ND	0.76	ND	0.08
60		ND	0.07	ND	0.09	ND	0	ND	0.03
92		ND	0.25	ND	0	ND	0	ND	0
183		0.4	0.73	ND	0.46	0.6	1.66	ND	< 0.01
273		0.5	0.85	0.3	0.32	0.6	0.70	ND	0.13
365		0.6	1.15	0.5	0.31	ND	0.63	0.5	0.14
APPLICATION RATE: 160 g ai/hectare									
0		ND		ND		ND		ND	
3		ND		ND		ND		ND	
7	2-in RF	ND	1.19	ND	0	ND	0	ND	NA
14		ND	0	ND	0.60	ND	1.92	ND	0.83
30		ND	0	ND	3.27	ND	0.77	ND	0.83
60		ND	0	ND	0	ND	0.08	ND	0.21
92		ND	1.26	ND	0.01	ND	0.54	ND	0
183		0.4	0.58	0.6	2.19	1.2	5.46	0.5	0.08
273		0.7	1.39	0.9	1.02	2.0	0.43	0.5	0.10
365		1.6	2.03	2.1	0.89	ND	1.39	2.1	0.50

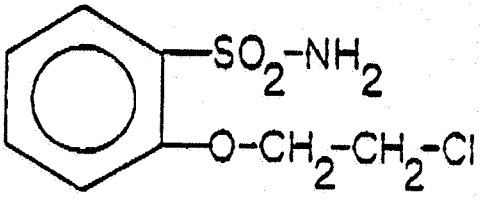
RF= Rain Fall; OM= Organic Matter; CEC= Cation Exhange Capacity (meq/100g); FC= Field Capacity
WP= Wilting Point; Plant Ava. Water= Plant Average Water. ND= None Detected
Detection Limits: 0.17 ppb for ph/tr-CGA-131036; 0.18 ppb (CGA-150829); 0.41 ppb (CGA-161149)



Parent TRIASULFURON:
2-(2-Chloroethoxy)N-[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]-benzenesulfonamide



Degradate CGA-150829:
4-Methoxy-6-methyl-1,3,5-triazin-amine



Degradate CGA-161149:
2-(2-Chloroethoxy)-benzenesulfonamide