000701

Date Out EFB: [redacted] 3/7/83

TO: R. Mountfort
Product Manager 23
TS-767

FROM: Emil Regelman,
Acting Chief
Review Section No. 1
Environmental Fate Branch
Hazard Evaluation Division

Attached please find the environmental fate review of:

Reg./File No.: 10707-9

Chemical: Acrolein

Type Product: Herbicide

Product Name: Magnacide H

Company Name Magna Corporation

Submission Purpose: Review data to support label amendment

ZBB Code: Other

ACTION CODE: 305

Date in: 1/24/83

EFB # 161

Date Completed: 3/7/83

TAIS (level II) 62

Days 6

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

1.0 INTRODUCTION

Magna Corporation has submitted data in support of proposed label revisions for Magnacide H (Acrolein, as a. i.), EPA Reg. no. 10707-9, concerning storage and holding time of treated water. Magnacide H is currently registered (as a restricted use pesticide) for use as an aquatic herbicide for the control of submerged and floating weeds and algae in irrigation ditches.

Current general directions include the statements: "Do not permit dairy animals to drink treated water. Do not use where waters will either flow into or transfer via underground streams to potential sources of drinking water. Do not release treated water for 6 days after application into any fish bearing waters or where it will drain into them."

1.1 Chemical

Common name: Acrolein

Chemical name: 2-propenal

Chemical structure: $CH_2=CH-CHO$

2.0 DIRECTIONS FOR USE

Use directions are appended to this review. Maximum use rate yields water concentration of 15 ppm.

Labeling, including, "Magnacide H Application and Safety Manual," have been revised to contain the statement: "Make Application in such a manner that concentrations lethal to fish will not enter fish bearing waters." This proposed revison replaces the (above) statement relating to the 6 day restriction.

3.0 DISCUSSION OF DATA

EFB files indicate no environmental fate data have ever been submitted to support the registration of acrolein for this use.

Data submitted for review include:

3.1 Differential Pulse Polarographic Determination of Acrolein in Water Samples. L. H. Howe. Anal. Chem. 48(14) December 1976. Tab 2, paper 1.

This article describes an analytical method developed for analysis of acrolein using differential pulse polarography (DPP) with a dropping mercury electrode (DME). The detection limit is reported as 0.05 mg/l. Data were reported showing recovery at 0.1, 0.3, and 0.5 mg/l.

The author reports no statistical differences from samples analyzed by DPP and spectrometric determination of adsorbance at 600 nm. However, the article mentioned that other methods of analysis, including spectrometric determination, gave erroneous results.

Conclusion

This study provides information about the development of an analytical method for determining acrolein. However, recovery data are necessary to complete the review of this study.

Note: EFB files contain the full report of this analytical method developed under an Interagency Agreement between the EPA and Tennessee Valley Authority. The author reported recovery of 97% (mean of seven determinations) for concentrations of 0.1 and 0.3 mg/L.

3.2 Polarographic Reduction of Aldehydes and Ketones. Part XXII. Reduction and Oxidation of α,β -Unsaturated Aldehydes: Acrolein, Tiglaldehyde and Substituted Cinnamaldehydes. Spritzer, L. and P. Zuman. J. Electroanal. Chem. 126 (1981). Tab 2. Paper 2.

This article provides additional theoretical information on the reduction of acrolein during polarographic analysis.

Conclusion

This article presents information that EFB considers ancillary.

3.3 Determination of Acrolein in Aqueous Solutions by Differential Pulse Polarography. Brady, J. L. and D. L. Kissel. Magna Corporation. Tab 2. Paper 3.

This report describes, presumably, the analytical method used in subsequent studies submitted on the dissipation of acrolein.

Conclusion

This study is incomplete. Data on sample recovery need to be submitted. The registrant should clarify whether this is the method of analysis used in the field monitoring studies submitted. The descriptions in in those studies are not sufficiently detailed.

3.4 Analysis of Acrolein in Aged Aqueous Media. Comparison of Various Analytical Methods with Bioassays. C. L. Kissel, et. al. J. Agric. Food Chem. 26(6) 1978.

Procedure

A stock solution of acrolein was diluted to a 5% (0.749 M) solution with various buffer solutions (pH 5, phthalate; pH 7, phosphate, phosphate with yellow dye, and tris(hydroxymethyl)aminomethane (Tris);

pH 9, borate and Tris. The solutions were maintained in the dark at 22 ± 2°C. Aliquots were taken a various time intervals.

These stock solutions were analyzed by various methods:

Derivatization: bromide-iodide-thiosulfate titrimetric method, the 2,4-dinitrophenylhydrazine (DNPH) colorimetric method and the aminophenol fluorescence method.

Direct: UV, GLC, NMR, differential pulse polarography (DPP) and direct fluorescence.

Also, bioassays were conducted: ATP photometry, aerobic bacteria plate count, and a bluegill sunfish bioassay study using natural water taken from Clear Creek Tunnel, Trinity County, California.

Results

Bioassays indicated that acrolein completely hydrolyzed within 150 hours at pH 5, 120-180 hours at pH 7, and 5-40 hours at pH 9 at 22 °C.

UV analysis provided no useful data. Extraneous peaks were observed.

Data obtained from NMR, DPP and direct fluorescence closely matched data obtained from the bioassay (Tables III and V). Data from derivatized analytical methods did not parallel the bioassay (Table IV).

Different values of acrolein were obtained from different analytical methods. The authors suggest that hydrolysis products could interefer with the analyses of some methods. The authors mention that the compound, 5,6-dihydro-2H-pyran-3-carboxaldehyde, has been reported as a hydrolysis product of acrolein.

The authors report that, in the fish bioassay, the level of acrolein remained constant at 0.8 ppm over the 7 day period. However, it was reported that other data (fish toxicity studies) support a concentration of 0.08 ppm (not 0.8 ppm as suggested by the aminophenol fluorescence analytical method used).

Conclusions

EFB considers this study ancillary. This study is unacceptable as satisfying the hydrolysis data requirement.

Bioassays are not acceptable as indicating half-life as metabolites are not measured. EFB does not accept bioassay data as validating analytical data.

There was poor agreement in the results from the various analytical methods used in the report.

TABLES FROM EPA ACC. # 249308 4

Table III. Normalized Percent Kill for Various Acrolein-Containing Systems vs. Time

system	method	pH	time, h 0	3	24	48	120	144	240
potassium hydrogen phthalate	ATP[a]	5	100		52	40	11	0	0
potassium dihydrogen phosphate	ATP[a]	7	100		77	61	24	11	0
potassium dihydrogen phosphate with dye	ATP[a]	7	100		69	46	0	0	0
tris(hydroxymethyl)aminomethane	ATP[a]	7	100		75	43	20	8	0
sodium borate	ATP[a]	9	43	26	0				
tris(hydroxymethyl)aminomethane	ATP[a]	9	49	24	0				
potassium hydrogen phthalate	ATP[b]	5	100		92	77	38	20	0
potassium dihydrogen phosphate	ATP[b]	7	100		80	80	28	12	0
potassium dihydrogen phosphate with dye	ATP[b]	7	100		75	71	14	0	0
tris(hydroxymethyl)aminomethane	ATP[b]	7	100		95	75	47	43	0
sodium borate	ATP[b]	9	51	33	0				
tris(hydroxymethyl)aminomethane	ATP[b]	9	50	32	0				
potassium hydrogen phthalate	plate[c]	5	100		84	60	11	2	0
potassium dihydrogen phosphate	plate[c]	7	100		69	30	0		
sodium borate	plate[c]	9	98	10	0				
potassium hydrogen phthalate	tube[d]	5	100		90	80	25	10	0
potassium dihydrogen phosphate	tube[d]	7	100		83	62	5	0	
sodium borate	tube[d]	9	100		25	0			

[a] Use concentration, 10 ppm. [b] Use concentration, 50 ppm. [c] Use concentration, 10 ppm, average number of aerobic colonies per sample 4.5×10^6. [d] Use concentration, 10 ppm. Average number of sulfate colonies per sample 4×10^5.

Table IV. Percentage of Acrolein Remaining in Various Buffer Systems vs. Time, as Measured by Derivatization Methods

system	method	pH	time, h 2	7	24	48	96	144	240	30 days
potassium hydrogen phthalate	titrimetric[a]	5			78	62	40	27	18	3
potassium dihydrogen phosphate	titrimetric[a]	7			66	43	27	20	18	3
tris(hydroxymethyl)aminomethane	titrimetric[a]	7			88	76	68	59	52	8
sodium borate	titrimetric[a]	9	72	52	34	29	28	26	24	10
tris(hydroxymethyl)aminomethane	titrimetric[a]	9	93	74	43	30	28	27	25	12
potassium hydrogen phthalate	colorimetric[b]	5	96		95	90	88	85	78	75
potassium dihydrogen phosphate	colorimetric[b]	7	72		58	55	42	38	29	28
potassium dihydrogen phosphate with dye	colorimetric[b]	7	70		63	64	47	46	30	31
tris(hydroxymethyl)aminomethane	colorimetric[b]	7	78		72	73	72	61	50	36
sodium borate	colorimetric[b]	9	43	24	22	20				16
tris(hydroxymethyl)aminomethane	colorimetric[b]	9	56	35	35	27				18
potassium hydrogen phthalate	fluorometric[c]	5	99		99	99	98	95	90	78
potassium dihydrogen phosphate	fluorometric[c]	7	96		94	92	87	72	64	50
potassium dihydrogen phosphate with dye	fluorometric[c]	7	95		93	92	84	77	63	48
tris(hydroxymethyl)aminomethane	fluorometric[c]	7	97		95	96	95	91	84	68
sodium borate	fluorometric[c]	9	70	63	33	30				7
tris(hydroxymethyl)aminomethane	fluorometric[c]	9	92	85	78	72				10

[a] Iodide–bromide–thiosulfate reagents. [b] DNPH method. [c] *m*-Aminophenol method.

Table V. Percentage of Acrolein Remaining in Various Buffer Systems vs. Time, as Measured by Direct Methods

system	method	pH	time, h 2	24	48	144	30 days
potassium hydrogen phthalate	GLC	5	99	90	88	85	76
potassium dihydrogen phosphate	GLC	7	95	91	87	73	48
potassium dihydrogen phosphate with dye	GLC	7	93	87	83	62	44
tris(hydroxymethyl)aminomethane	GLC	7	99	90	87	79	63
sodium borate	GLC	9	72	28	18		9
tris(hydroxymethyl)aminomethane	GLC	9	90	60	43		10
potassium hydrogen phthalate	NMR	5		72	55	17	8
potassium dihydrogen phosphate	NMR	7		55	37	8	6
potassium dihydrogen phosphate with dye	NMR	7		55	39	8	8
tris(hydroxymethyl)aminomethane	NMR	7		78	60	22	8
sodium borate	NMR	9	60	21	15		12
tris(hydroxymethyl)aminomethane	NMR	9	88	38	22		14
potassium hydrogen phthalate	polarograph[a]	5	98	83	68	20	6
potassium dihydrogen phosphate	polarograph[a]	7	97	67	42	7	1
potassium dihydrogen phosphate with dye	polarograph[a]	7	97	68	43	7	1
tris(hydroxymethyl)aminomethane	polarograph[a]	7	98	84	80	47	5
sodium borate	polarograph[a]	9	62	9	4	4	1
tris(hydroxymethyl)aminomethane	polarograph[a]	9	78	33	11	3	1
potassium hydrogen phthalate	fluorometric[b]	5	97	96	98	94	90
potassium dihydrogen phosphate	fluorometric[b]	7	52	27	1	<0.1	
potassium dihydrogen phosphate with dye	fluorometric[b]	7	52	25	2	<0.1	
tris(hydroxymethyl)aminomethane	fluorometric[b]	7	62	64	41	40	26
sodium borate	fluorometric[b]	9	<0.1	<0.1			
tris(hydroxymethyl)aminomethane	fluorometric[b]	9	4	<0.1	<0.1		

[a] Differential pulse mode. [b] Direct method.

5

3.5 "Monitoring Acrolein in Naturally Occurring Systems." C. L. Kissel, et. al. Magna Corp.

Procedure

Samples of four naturally occurring field waters were fortified with acrolein at various concentrations:

Water System	PPM Fortification Level
Oil field floodwaters	
Water C	49 (C-49)*, 151 (C-151)
Water Q	17 (Q-17), 49 (Q-49), 151 (Q-151)
Commercial Cooling tower	
Water P	10 (P-10)
Commercial irrigation project	
Water T	1.3 (T-1.3)

* (-) represents water system-fortification listing used in tables.

Samples were stored at 22° C. Aliquots were taken at various times and analyzed by several methods: colorimetry (DNPH), GLC, UV spectroscopy, m- aminophenol fluorescence (APF), and differential pulse polarography (DPP).

Analysis was also by bacteria and fish bioassays (using field water T and rainbow trout). Fish were added to the water 10 minutes; 24, 48, 72, and 192 hours after acrolein was added.

The sulfide scavenging properties of acrolein were also measured as a part of this study.

Results

The analytical method which measured acroelin directly suggest that acrolein does dissipate in natural water systems presumably maintained under laboratory conditions.

Residue data reported, based on analysis by various analytical methods, gave poor agreement for samples taken after 6 hours incubation. Also, it appears that concentration has an effect on results when analyzed by methods using derivatization steps. See Table 2.

It appears that differential pulse polarography (DPP) is the analytical method of choice by the registrant (since it correlates with bioassay

TABLES FROM EPA ACC. # 249308.

Table 2. Comparison of Various Acrolein Analytical Methods.

Water System[a]	Analysis Method[b]	Acrolein Concentration (ppm) at Various Solution Aging Times 0 h	6 h	24 h	48 h	72 h	96 h	192 h
C-49	APF	52	50	48	45	45	44	40
C-49	DNPH	49	42	37	32	29	25	13
C-49	DPP	55	39	22	17	16	12	2
C-49	GLC	50	46	30	22	20	18	10
C-49	UV	48	43	32	22	15	10	2
C-151	APF	160	155	140	140	138	135	90
C-151	DNPH	150	128	120	110	105	88	50
C-151	DPP	150	120	86	55	47	30	9
C-151	GLC	160	155	101	77	75	70	69
C-151	UV	151	129	108	74	61	38	7
Q-17	APF	19	18	17	17	17	17	17
Q-17	DNPH	19	18	17	16	16	15	14
Q-17	DPP	17	15	9	7	6	5	5
Q-17	GLC	16	12	9	7	6	5	4
Q-17	UV	15	14	11	9	7	5	2
Q-49	APF	52	52	50	50	48	48	46
Q-49	DNPH	44	44	43	39	38	35	35
Q-49	DPP	45	40	28	17	16	15	10
Q-49	GLC	48	45	19	10	6	5	3
Q-49	UV	53	45	36	27	20	14	6
Q-151	APF	160	158	155	155	149	145	140
Q-151	DNPH	155	150	145	143	125	108	103
Q-151	DPP[c]	156	128	108	55	45	42	16
Q-151	GLC	164	162	102	100	98	95	84
Q-151	UV[c]	167	145	124	91	69	50	19
P-10	APF	9.9	-	6.2	4.7	3.3	1.3	<0.01
P-10	DPP	10.2	-	7.9	4.6	3.1	1.0	<0.1
P-10	UV	10.1	-	7.6	5.4	2.9	0.7	<0.03
T-1.3	APF	1.25	1.14	0.78	0.04	<0.01	<0.01	<0.01
T-1.3	DNPH	1.20	1.00	0.80	<0.1	<0.1	<0.1	<0.1
T-1.3	DPP	1.30	1.18	0.56	0.19	0.15	0.13	0.11
T-1.3	UV	1.26	1.12	0.66	0.05	<0.03	<0.03	<0.03

[a]The letter denotes the water system, the numeral denotes the initial acrolein concentration (ppm)

[b]Abreviations for these methods are: m- aminophenol fluorescence (APF), dinitrophenylhydrazine colorimetry (DNPH), differential pulse polarography (DPP), gas liquid chromatography (GLC), ultraviolet spectroscopy (UV).

Table 4. Fish Bioassay Data for System T-1.3.

Time (h)[a]	Result of a 5 fish exposure
0.2	All fish died within 25 minutes
24	All fish died within 5 hours
48	All fish survived 24 hours
72	All fish survived 24 hours
192	All fish survived 24 hours
blank	All fish survived 24 hours

[a]Time the acrolein solution was allowed to age before performing the bioassay.

results). However, for one study using irrigated water treated at 1.3 ppm (T-1.3 analyses) the registrant reported that the reliability of the DPP data during the later stages of hydrolysis is questionable (since it did not parallel the bioassay results).

Conclusion

This study is considered as ancillary data.

Data reported for the analytical methods measuring acrolein directly suggest that acrolein does dissipate in natural water systems which EFB assumes were maintained under laboratory conditions. However, this study does not satisfy the aerobic aquatic metabolism study since sediment was not used in the study.

This study does not satisfy the hydrolysis data requirement. Natural water, not sterile distilled water, was used in the study.

Data reported on bioassays cannot be used to determine half-life of acrolein.

Residue data reported based on various analytical methods gave poor agreement for samples taken after 6 hours (Table 2)

The results of this study are inconclusive. Analytical methods which measure acrolein directly appear to follow the decline of biocide activity as measured by the bioassays. However, the results of bioassays cannot be used to confirm analytical results.

The study did not determine degradation products of acrolein in aqueous solutions.

The data on the sulfide scavenging properties of acrolein was not reviewed.

EFB notes this study mentions that hydrolysis of acrolein appears to produce carbonyl compounds (e.g. 5,6-dihydro-2H-pyran-3-carboxahdehyde). However, such data have not been submitted to EFB for review.

3.5 Actual use studies

These reports are a compilation of field monitoring trials in which the concentration of acrolein present in the "wave" as it moved down the irrigation canal was analyzed by differential pulse polarography.

3.5.1 Acrolein in Irrigation Waterways. Gaddis, C. W. and C. L. Kissel. Magna Corp. Proc. EWRS 6th Symposium on Aquatic Weeds. 1982. Tab 4.

3.5.2 Magna Corporation Inter-Office Memo. Acrolein Monitoring, Belridge Irrigation District. August 1, 1980. Tab 5. Paper 1.

3.5.3 Magna Corporation Inter-Office Memo. Acrolein Monitoring-Salt River Project, Grand Canal, Phoenix, Arizona. October 6, 1980. Tab 5. Paper 2.

3.5.4 Magna Corporation Inter-Office Memo. Acrolein Monitoring, Maricopa Water District Canal, Maricopa County, Arizona. Oactober 7, 1980. Tab 5 Paper 3.

3.5.5 Magna Corporation Inter-Office Memo. Acrolein Monitoring-Stine Canal Kern County, California. October 8, 1980. Tab 5. Paper 4.

3.5.6 Magna Corporation Inter-Office Memo. Magnacide H ^{R} In Imperial Irrigation District. July 31, 1981. Tab 5. Paper 5.

3.5.7 Magna Corporation Inter-Office Memo. Magnacide H ^{R} in Imperial Irrigation District-Follow Up Studies. Tab 5. Paper 6.

Conclusion

These studies are considered as ancillary data. While they show that dissipation occurs, they provide little information or data upon which EFB can evaluate the environmental fate of acrolein.

Half-lives for acrolein residues in the individual canals cannot be calculated from the data submitted. Samples were not taken to a point were residues were non-detectable.

Applications were not at the maximun use concentration (15 ppm).

Acrolein concentration was measured on site using differential pulse polarography. Most of the papers provided a calibration curve. However, no recovery of spiked samples were reported.

The authors reported that on-site analysis was preferred since samples held of any length of time showed variable results. This was attributed to the high rate of hydrolysis occurring with acrolein.

3.5.8 Magna Corporation Inter-Office Memo. Magnacide H in IID's Trifolium 14 Lateral. August 4, 1982.

Procedure

The Trifolium 14 irrigation lateral was divided into 3 sub-sections to simulate holding ponds. As water flowed into the lateral, acrolein was metered into the flow. As ponds filled, the gates were closed separating each from the other, thus, creating three static state ponds. See Figure 1.

Water samples were taken during the filling period and at time intervals from six sampling locations in the ponds. Acrolein residues were measured off-site but within 15 to 20 minutes travel time of the test site. Water samples were chilled in ice during transport. Analysis was by differential

pulse polarography (DPP). Additional analysis was conducted with a field monitoring kit using 2,4-DNPH colorimetric analysis.

Water in the ponds ranged from 1.5 to 4.5 feet in depth and about 5 feet across.

A fish bioassay study was also conducted in pond 3 by pumping water from the pond into, through, and out of an aquarium. When analysis showed acrolein levels at 1 ppm, channel catfish were placed in the tank and observed.

Results

The temperature during the test period ranged from 28.3 to 29.4°C.

The registrant reports an initial rapid build up of acrolein concentration in water. After 28 to 30 hours the acrolein levels had declined to less than 50 ppb (The level at which the author reports acrolein is non-toxic to fish). See Table 1 and Figures 3 - 8.

Results of the 2,4-DPNH colorimetric method analysis are given in Table 2. Analysis show higher levels than those analyzed by DPP. Note: In other studies using this field kit, it was noted this kit did not appear to accurately monitor levels of acrolein after several half-lives.

The more rapid decline in pond no. 1 (sample sites 1 and 2) was attributed to water leakage from the pond around the gate.

Fish bioassay showed that 3 catfish added after 30.5 hours aging were still alive 3.5 hours later (Table 3). Polarographic analysis of the water reported 0.03 ppm acrolein residues after 30.5 hours aging and 0.04 ppm after 31 hours aging. All fish added at earlier intervals died. This was attributed to acrolein toxicity. See Table 3.

Conclusion

The data presented in this study indicate that acrolein dissipates in water held in the field simulating holding ponds. However, this study alone does not provide adequate data upon which EFB can evaluate the environmental fate of acrolein.

No degradation products were identified nor was soil sediment analyzed.

The application was not at maximum use rate (15 ppm).

3.6 Additional actual use studies

Magnacide H monitoring Program for the State of Nebraska. Preus, M. W. and C. L. Kissel. Magna Corporation. August 31, 1982.

This report is a compilation of field monitoring trials conducted

FIGURES FROM EPA ACC. # 249308

FIGURE 1

IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14

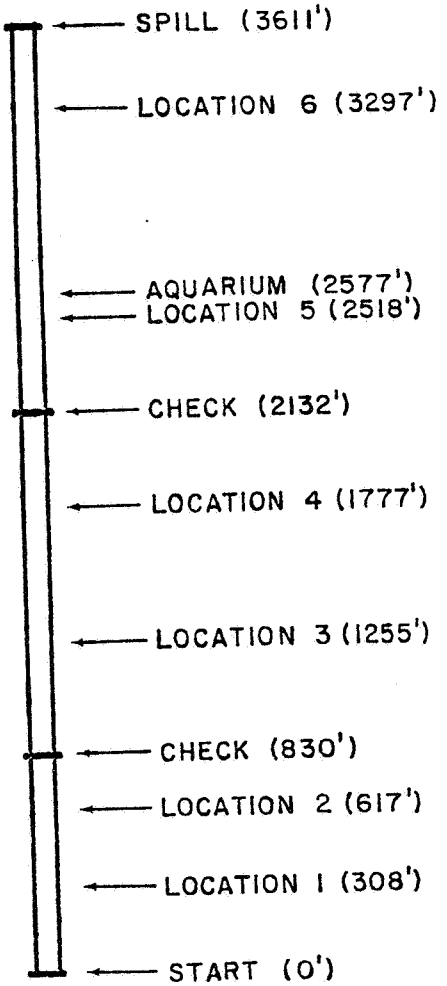


FIGURE 2
CALIBRATION CURVE IN TRIFOLIUM 14

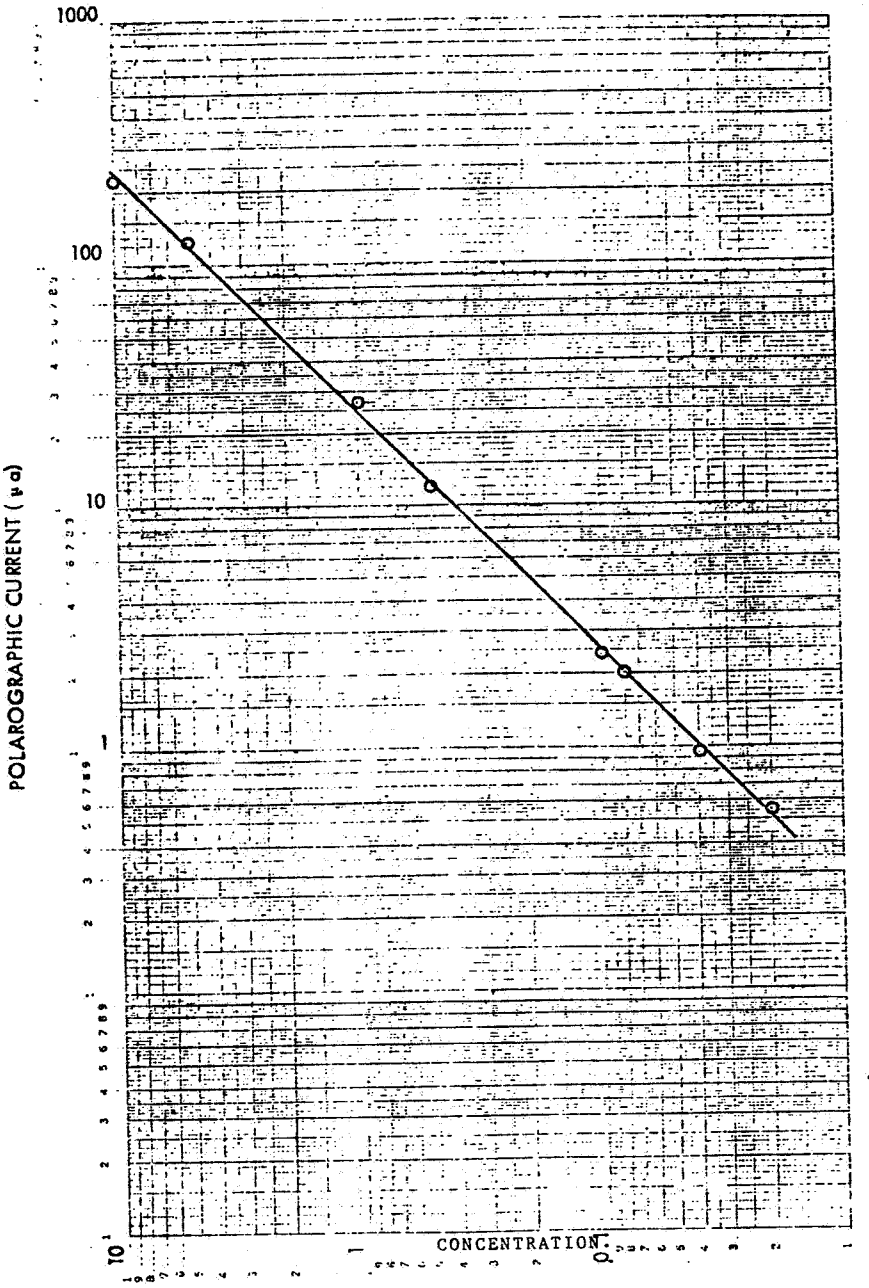


TABLE FROM EPA ACC. # 249308

TABLE 1

Acrolein Concentrations in Imperial Irrigation's Trifolium Lateral Number 14 as Determined by Differential Pulse Polarography

Location	Time (h)	Concentration (ppm)
1	0	0
1	0.5	0.5
1	1	10.5
1	1.5	9.0
1	2	11.2
1	3.5	10.3
1	4	7.7
1	6	1.7
1	8	0.068
1	12	0.065
2	0	0
2	0.5	10.7
2	1	9.6
2	1.5	8.1
2	2	8.9
2	3.5	9.9
2	4	11.2
2	6	7.7
2	8	4.0
2	12	0.02
3	0	0
3	0.5	10
3	1	5.6
3	1.5	9
3	2	9
3	3.5	8.1
3	4	6.5
3	6	7.2
3	8	5
3	12	4.5
3	16.5	4.0
3	19	3
3	23.5	2.4
3	26	0.4
3	27.5	0.28
3	28.5	0.028
4	0	0
4	0.5	10.7
4	1	7.5
4	1.5	9.4
4	2	8.5
4	3	7.5
4	3.5	6.0
4	4	5.8
4	6	5.0
4	8	5.0
4	12	3.3
4	17	2.8
4	18	3.4
4	21	2.6
4	23	2.8
4	24	1.3
4	28.5	0.02
5	0	0
5	0.5	4.4
5	1	9
5	1.5	8.6
5	2.5	8.2
5	4	6.7
5	6	4.7
5	8	4.5
5	12	3.1
5	18	2.6
5	19	2.8
5	20.5	3.2
5	23	2.5
5	23.5	1.4
5	25.5	0.16
5	26.5	0.5
5	28.5	0.02
5	30	0.02

- TABLE 1 CONTINUED -

Acrolein Concentrations in Imperial Irrigation's Trifolium Lateral Number 14 as Determined by Differential Pulse Polarography

Location	Time (h)	Concentration (ppm)
6	0	0
6	0.5	1.2
6	1	8.5
6	1.5	7.6
6	2	6.7
6	2.5	7.7
6	3.5	6.4
6	4	5.5
6	6	4.0
6	8	4.5
6	12	2.6
6	18	2.7
6	19	2.4
6	21	2.6
6	23	0.7
6	24.5	0.34
6	26	0.55
6	28.5	0.1
6	30	< 0.02
Aquarium	25.5	0.5
Aquarium	26	0.33
Aquarium	26.5	0.11
Aquarium	27	0.13
Aquarium	27.5	0.15
Aquarium	28	0.24
Aquarium	30.5	0.03
Aquarium	31	0.04

TABLE 2

Acrolein in Imperial Irrigation's Trifolium Lateral 14 as Determined by DNPH Colorimetry

Location	Time (h)	Concentration (ppm)
1	0	0
1	0.5	12
1	1	12
1	1.5	12
1	2	12
1	3.5	12
1	4	12
1	6	4
1	8	< 0.5
1	12	< 0.5
2	0	0
2	0.5	12
2	1	12
2	1.5	12
2	2	12
2	3.5	12
2	4	12
2	6	12
2	8	8
2	12	< 0.5
3	0	0
3	0.5	12
3	1	12
3	1.5	12
3	2	12
3	3.5	12
3	4	11
3	6	12
3	8	11
3	12	12
3	18	8
3	19	6
3	21	6
3	23.5	5
4	0	0
4	0.5	12
4	1	12
4	1.5	12
4	2	12
4	3.5	11
4	4	10
4	6	11
4	8	8
4	12	8
4	18	8
4	19	8
4	21	8
4	23.5	8
5	0	0
5	0.5	12
5	1	12
5	1.5	12
5	2	12
5	3.5	11
5	4	11
5	6	11
5	8	8
5	12	8
5	19	8
5	21	7
5	23.5	6
5	24.5	5
5		5

- TABLE 2 CONTINUED -

Acrolein in Imperial Irrigation's Trifolium Lateral 14 and Determined by DNPH Colorimetry

Location	Time (h)	Concentration (ppm)
6	0	0
6	0.5	12
6	1	12
6	1.5	12
6	2	12
6	3.5	12
6	4	11
6	6	9
6	8	8
6	12	8
6	18	6
6	19	6
6	21	6
6	23.5	4
6	25	4

FIGURE 3

ACROLEIN IN IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14, LOCATION 1

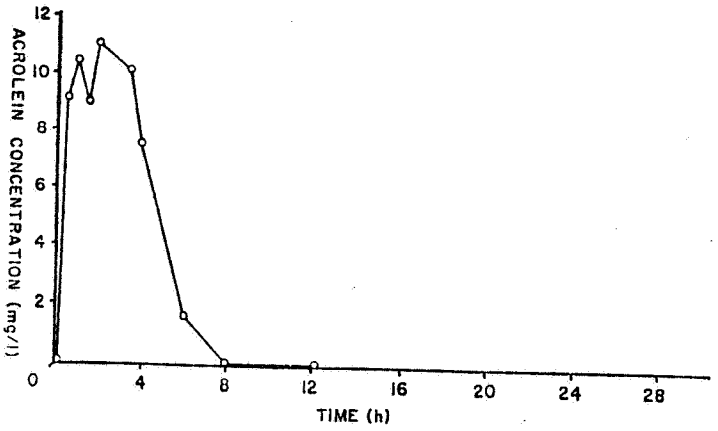


FIGURE 4

ACROLEIN IN IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14, LOCATION 2

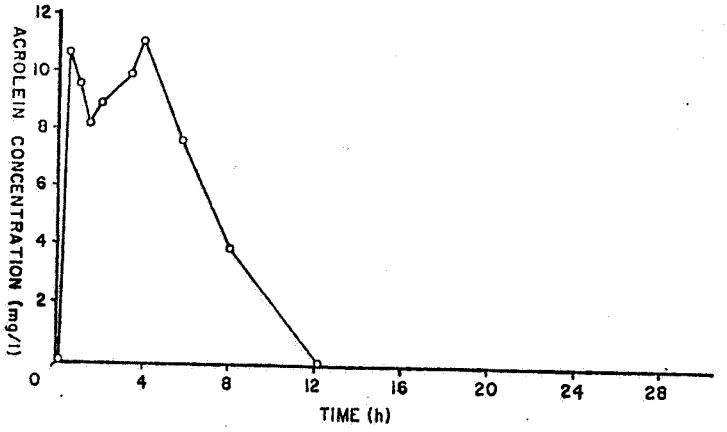


FIGURE 5

ACROLEIN IN IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14, LOCATION 3

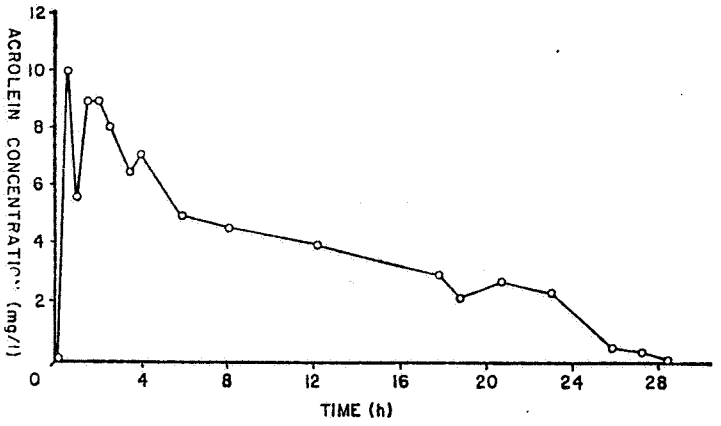


FIGURE 6

ACROLEIN IN IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14, LOCATION 4

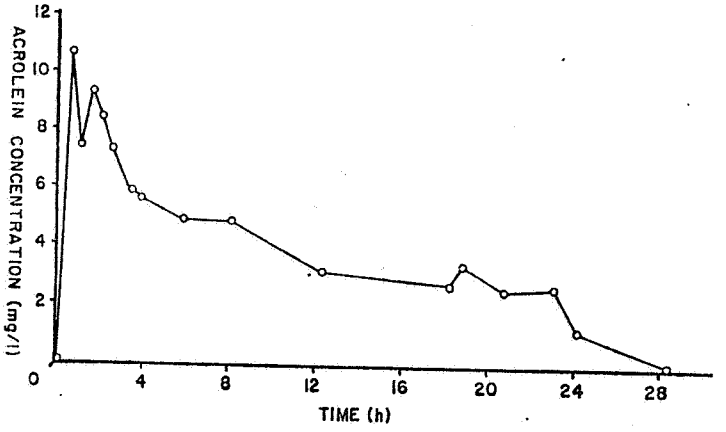


FIGURE 7

ACROLEIN IN IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14, LOCATION 5

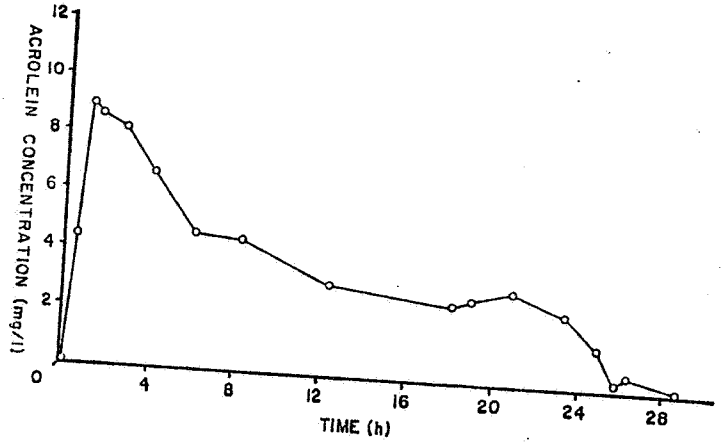


FIGURE 8

ACROLEIN IN IMPERIAL IRRIGATION'S
TRIFOLIUM LATERAL 14, LOCATION 6

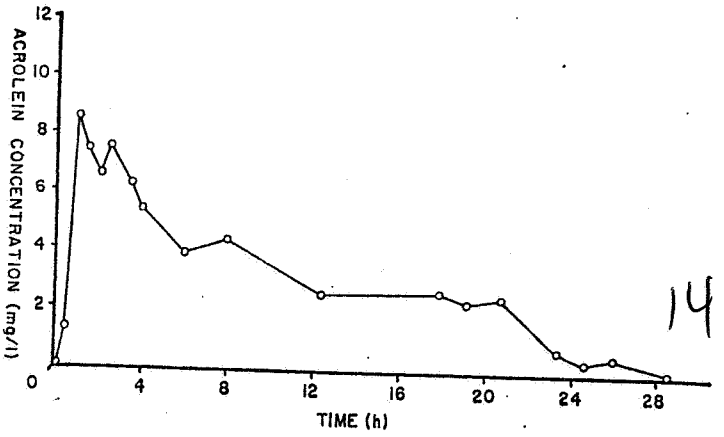


TABLE FROM EPA ACC. #249308

TABLE 3

CALIFORNIA DEPARTMENT OF FISH AND GAME AQUARIUM DATA(1)

FISH/COMMENTS	TIME (h)	TEMP °C	DISSOLVED OXYGEN PPM (2)	Added Magna D. MAGNACIDE H PPM (3)
ADD 1 CCF	18.75	-	6.5	(2.6 at site 5)
1 MORTALITY	19.75	28.5	6.4	
NO MORE FISH ADDED UNTIL ACROLEIN CONC. APPROACHES 1 PPM IN POND 3				
ADD 1 CCF	25.5	31.5	6.2	0.5
1 MORTALITY	26.2	31.5	6.4	0.33
ADD 1 CCF	27	31.7	5.7	0.13
CCF ALIVE	27.5	32.8	5.3	0.15
AERATION OF AQUARIUM STARTED				
1 MORTALITY, ADD 1 CCF	28	33.1	5.7	0.24
1 MORTALITY, ADD 3 CCF	28.5	33.5	5.9	--
ALL CCF ALIVE	29.0	33.6	5.1	--
ALL CCF ALIVE	29.5	33.8	4.4	--
3 MORTALITY, ADD 3 CCF	30	33.5	4.5	--
ALL CCF ALIVE	30.5	34.0	4.3	0.03
ALL CCF ALIVE	31.0	34.0	4.3	0.04
ALL CCF ALIVE	31.5	33.7	4.5	--
ALL CCF ALIVE	32.0	33.7	4.0	--
ALL CCF ALIVE	32.5	33.3	5.2?	--
ALL CCF ALIVE	33	33.2	3.8	--

(1) DATA SUPPLIED BY JOHN NELSON CDF&G

(2) OXYGEN MEASURED IN AQUARIUM

(3) RELATIVE MAGNA DATA

CCF = CHANNEL CATFISH 6-8" LONG

in Nebraska to support a special local need (SLN) registration for the use under a state registration with a 36 hour holding period (rather than the 6 day period on the current national label).

3.6.1 Magnacide H in the Ainsworth District Bone Canal

Procedure

Magnacide H was metered into the Bone Canal of the Ainsworth Irrigation District for a concentration 0.5 mg/L.

This canal divides into two laterals 0.9 miles from the application site. The Airport Lateral travels 16 miles before draining into a creek. The Bone Lateral drains into a pond after 25.5 miles. At 3.8 miles the Sand Draw Lateral splits from the Bone Lateral and travels an additional 11.8 miles. The Bone Lateral can drain into a creek at 8.7 and 17.1 miles. See Figure 9.

Water samples were taken at approximately 150-200 yard below application site, at the Bone/Airport Lateral split and at points down these two arteries. Water velocity was 1.1 miles per hour.

Analysis was by differential pulse polarography. Sensitivity of the method was listed as down to 0.01 mg/L. DPNH colorimetric method sensitivity was to 0.5 mg/L.

Results

The authors report that acrolein was found at 7.3 miles from the application site (FAS) in the Bone Lateral at 0.14 mg/L but was not detected at 10.4 miles or any other point down stream. In the Airport Lateral, acrolein was reported present at 4.1 miles FAS at 0.26 mg/L and at 0.03 mg/L at 6.2 miles FAS. It was non-detectable at 11.4 miles FAS. See Tables 4 and 5.

The authors report these data suggest a nine hour lifetime for acrolein in this canal system.

3.6.2 Magnacide H in the Bostwick District Franklin Main Canal

Procedure

Magnacide H was metered into the Franklin Main Canal of the Bostwick District for a concentration of 1.9 $\pm$ 0.1 mg/L. The canal is 45 miles long and drains into a river. Sampling points were located at 8, 16, 25 and 33 miles FAS. See Figure 10.

TABLE, GURE FROM EPA ACC. # 249,208

MAGNACIDE H MEASUREMENTS IN AINSWORTH
DISTRICT: BONE LATERAL

Table 4

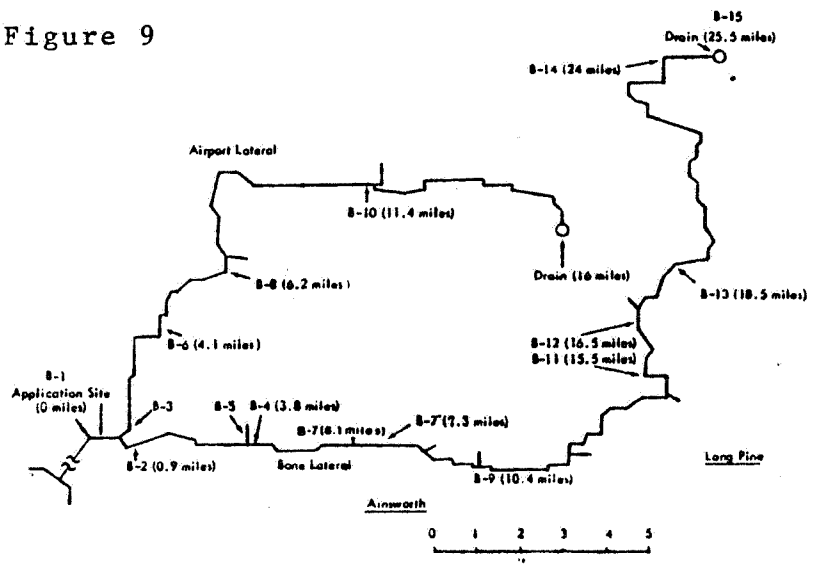
Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarograph	Colorimetric
B-1	0810	69	0	0
B-1	0914	69	0.5	>0
B-1	0924	69	0.47	>0
B-1	1020	69	0	0
B-2	0930	69	0	-
B-2	1000	69	0.45	-
B-2	1030	69	0.44	-
B-2	1125	70	0.075	-
B-2	1200	70	0	-
B-4	1036	69	0	-
B-4	1115	69	0.071	-
B-4	1215	69	0.29	-
B-4	1235	69	0.28	-
B-4	1315	69	0.14	-
B-4	1345	69	0	-
B-5	1116	69	0.08	-
B-5	1215	69	0.24	-
B-5	1235	69	0.26	-
B-5	1317	69	0.1	-
B-5	1405	70	0	-
B-7	1400	69	0.20	-
B-7	1432	69	0.21	-
B-7	1507	70	0.14	-
B-7	1612	70	0	-
B-7'	1405	70	0	-
B-7'	1440	70	0.05	-
B-7'	1510	70	0.17	-
B-7'	1608	70	0.12	-
B-7'	1730	71	0	-
B-9	1730	72	0	-
B-9	1746	73	0	-
B-9	1945	73	0	-
B-9	2000	73	0	-
B-9	2020	73	0	-
B-11	0801	-	0	-
B-12	0802	-	0	-
B-13	0806	-	0	-
B-14	0810	-	0	-
B-15	0820	0	0	-

MAGNACIDE H MEASUREMENTS IN AINSWORTH
DISTRICT: AIRPORT LATERAL

Table 5

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarograph	Colorimetric
B-1	0810	69	0	0
B-1	0914	69	0.5	>0
B-1	0924	69	0.47	>0
B-1	1020	69	0	0
B-3	0931	69	0	-
B-3	1002	69	0.44	-
B-3	1032	69	0.42	-
B-3	1127	70	0.11	-
B-3	1201	70	0	-
B-6	1205	70	0	-
B-6	1225	70	0	-
B-6	1325	71	0.26	-
B-6	1420	72	0.16	-
B-6	1500	72	0	-
B-8	1543	72	0	-
B-8	1625	72	0.034	-
B-8	1715	72	0	-
B-10	1801	72	0	-
B-10	1900	75	0	-
B-10	1955	-	0	-
B-10	2030	-	0	-
B-10	2145	-	0	-
B-10	2232	-	0	-
B-10	2346	-	0	-

Figure 9



Water flowing through furrows in a bean field 1.7 miles FAS was also sampled. Treated water was diverted from the canal, through the irrigation emitter, into the field and was allowed to reach the end of the furrows.

Analysis was by differential pulse polarography. Method sensitivity was reported to be 0.005 mg/L (levels to 0.001 mg/L could be observed). DNPH colorimteric method could not detect levels below 0.5 mg/L.

Results

The authors report that acrolein was found 16 miles FAS at 0.07 mg/L and at non-detectable levels at other points FAS. See Table 6.

Acrolein levels decreased as the water moved toward the end of the furrow.

The authors report the data suggest a 19 hour lifetime for acrolein in this canal system. Also, the data suggest that field diversion could serve as a means of dissipation of acrolein residues. See Table 7.

3.6.3 Magnacide H in the Farmers Irrigation District Laterals No. 2165 and 2832.

Procedure

Magnacide H was metered into two laterals, No. 2165 and 2832.

Lateral 2165: Magnicide H was metered into the lateral at a concentration of 3.2 mg/L. Lateral 2165 is 6.5 miles long and spills into a fish-bearing drain which continues and empties into Nine Mile Creek. At the 3.5 mile mark, the lateral traverses a series of 4 drops, each about 3 vertical feet. See Figures 11 and 12.

Water samples were taken 2 miles (F-2), 3.5 and 3.6 miles (F-3 and F-4, before and after the falls) and at 5.1 and 5.9 miles FAS. Samples were also taken 50 yards into the drain and 150 yards into Nine Mile Creek.

Lateral 2832: Magnacide H was metered into the lateral at a concentration of 4.9 mil/l. Lateral 2832 is 3 miles long and drains into a non-fish bearing canal. The water travels one mile before spilling into fish-bearing water.

Water samples were taken 150 yards down FAS, 0.9 miles (F-9), 2.0 (F-10) and 3.0 (F-11) miles FAS. A sample was also taken 1/4 mile into the canal.

TABLE, FIGURE FROM EPA ACC. # 249308

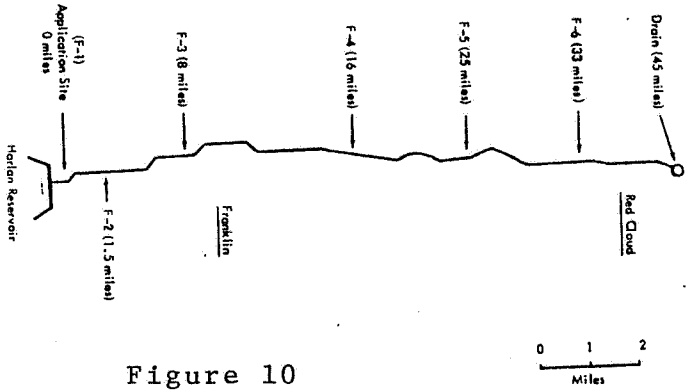


Figure 10

/ Table 6

MAGNACIDE H MEASUREMENTS IN THE BOSTWICK DISTRICT: FRANKLIN MAIN CANAL

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
FM-1	0918	73	0	0
FM-1	0945	73	2.0	2
FM-1	1036	72	1.7	1.8
FM-1	1145	72	1.55	1.8
FM-1	1230	72	1.85	1.8
FM-1	1315	72	0	0
FM-2	1117	72	1.6	1.8
FM-3	1316	72	0	0
FM-3	1540	74	1.5	1.5
FM-3	1715	74	1.1	1.5
FM-3	1830	74	0	0
FM-4	2030	-	0	0
FM-4	2130	-	0.07	> 0
FM-4	2230	-	0.07	> 0
FM-4	2325	-	0.06	> 0
FM-4	2425	-	0.02	0
FM-5	0253	-	0	-
FM-5	0400	-	0	-
FM-5	0505	-	0	-
FM-5	0600	-	0	-
FM-6	1000	72	0	-
FM-6	1100	73	0	-
FM-6	1150	73	0	-
FM-6	1230	73	0	-

Table 7

Crop Furrow Dissipation Study:

Bean Field located 1.7 miles Downstream of the Magnacide H Application in the Franklin Main Canal of the Bostwick Irrigation District.

Distance from Emitter (miles)	Magnacide H Concentration (mg/l)
0	1.4
0.038	0.8
0.075	0.2
0.112	0.044
0.15	< 0.01

Analysis of acrolein was by differential pulse polarography, with sensitivity to 0.005 mg/l. The DNPH colorimetric kit could measure acrolein to 0.5 mg/l.

Results

Lateral 2165: The author reports that acrolein was detected in the drain (6 miles FAS) at 0.04 mg/L (due to high dilution, 20X). It appeared that 0.6 mg/L was lost from the water in the lateral as it passed through the drops, presumably due to aeration. See Table 8.

Lateral 2832: The author report that approximately 1 mg/L acrolein was detected in the lateral prior to draining into the canal. Howerver, due to the dilution (70X), no acrolein was detected in the canal itself. See Table 9.

The authors report the acrolein lifetime in Laterals No. 2165 and 2832 were 10 hours and 6 hours, respectively.

Note: EFB notes the author mentions the usual practice in the District is to close the Laterals during application and drain the treated water into a field.

3.6.4 Magnacide H in the Frenchman-Cambridge District Red Willow Canal

Procedure

Magnacide H was metered into the Red Willow Canal in two locations. The Canal is 24 miles long and drains into a dry creek which eventually joins the Republican River. See Figure 13.

The initial application, 2.4 ± 0.2 mg/L, was made 24 miles upstream from the drain. The second application, 2.1 ± 0.2 mg/L, applied about 4 hours later was located 9 miles downstream from the first application.

Water samples were taken 100 yards down from the initial application site, at the location of the second application and at the drain (into the dry creek).

Analysis was by differential pulse polarography, at a detection limit of 0.01 mg/L. The DNPH colorimetric method could not detect acrolein below 0.1 mg/L.

Results

The author reports that the lifetime of the first application is 23 hours. It never reached the drain. Acrolein was found at 0.4 mg/L at the drain from the second application. The lifetime of the second application is reported to be 18 hours. See Table 10.

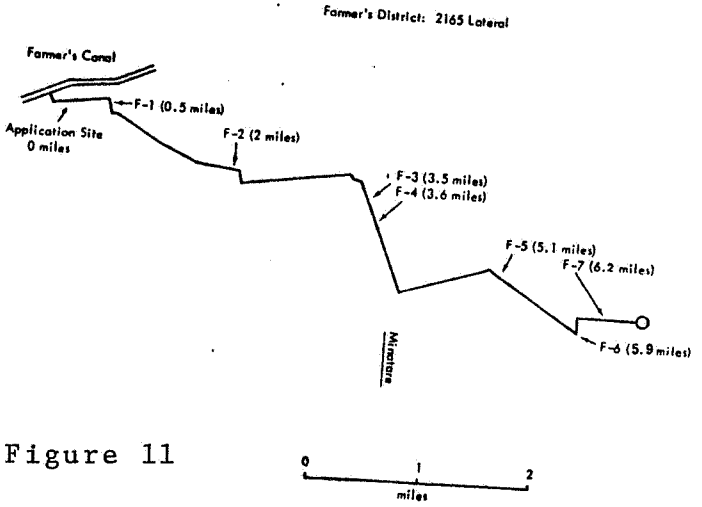


Figure 11

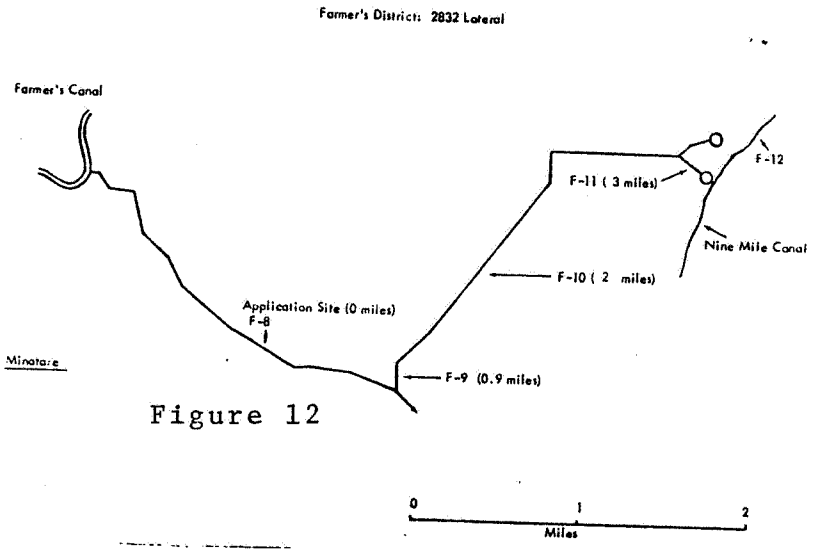


Figure 12

Table 8

MAGNACIDE H MEASUREMENTS IN FARMER'S DISTRICT: 2165 LATERAL

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
F-1	0800	65	0	0
F-1	0826	65	2.8	2.8
F-1	0904	66	3.2	2.8
F-1	0945	66	3.5	3.6
F-1	1120	66	3.2	2.8
F-1	1215	66	0	0
F-2	0910	66	0	0
F-2	0955	66	3.0	2.8
F-2	1025	66	3.0	2:8
F-3	1030	66	0	0
F-3	1055	67	2.95	2.8
F-3	1145	68	2.6	2.4
F-3	1242	70	2.8	2.8
F-4	1032	66	0	0
F-4	1055	67	0.3	> 0
F-4	1145	68	2.2	2.2
F-4	1247	70	2.3	2.2
F-5	1150	70	0	0
F-5	1255	71	1.65	1.8
F-5	1340	71	1.6	1.8
F-5	1417	71	1.6	1.8
F-6	1430	70	0.033	0
F-6	1525	70	0.78	>0
F-6	1615	68	0.91	>0
F-6	1705	68	0.66	>0
F-7	1530	67	0.054	0
F-7	1620	66	0.03	0
F-7	1710	65	0.042	0

Table 9

MAGNACIDE H MEASUREMENTS IN FARMER'S DISTRICT: 2832 LATERAL

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
F-8	1250	68	0	0
F-8	1317	68	4.8	4.8
F-8	1400	68	5.0	5.4
F-9	1323	68	0	0
F-9	1402	68	4.0	4.4
F-9	1453	68	4.6	4.4
F-9	1600	68	3.7	3.6
F-10	1420	68	0	0
F-10	1502	69	2.7	2.2
F-10	1602	69	3.0	3.6
F-10	1645	69	2.8	3.6
F-11	1650	-	0	-
F-11	1730	-	0	-
F-11	1818	-	0.98	-
F-11	1843	-	1.15	-
F-12	1732	-	0	-
F-12	1820	-	0.014	-
F-12	1846	-	0.020	-

TABLE, FIGURES FROM EPA ACC. # 249308

The author reports that no measurements were made in the dry creek. Most likely, no dilution would occur in the dry creek. Any residues would be dissipated before draining into the Republican River.

3.6.5 Magnacide H in Frenchman-Cambridge District Meeker Canal

Procedure

The Meeker Canal is 39 miles long leading from a reservoir and empties into the Republican River. See Figure 14.

Magnacide H was applied at three locations along the Canal. The initial application of 2.45 $\pm$ 0.25 mg/L was made at the base of the reservoir. The second and third applictions were located 23 miles and 31 miles downstream, respectively.

Water was sampled 100 yards downstream from the initial application site. The passage of the first application was measured at the second application site and the passage of the first two applications was measured at the third application site. The final sampling site was at the drain junction of the Canal and Republican River.

Analysis was by differential pulse polarography with detection limit of 0.01 mg/L. The DNPH colorimetric method had detection limit of 0.1 mg/L.

Results

The authors report that residues of the first and second applications did not reach the drain sampling site. The lifetimes were found to be 27 hours for the first application and 24 hours for the second. See Table 11.

Also, acrolein residues of 0.4 mg/L concentration was found at the drain sampling site as a result of the third application. The authors report that the half-life for the third application is 16 hours or less. See Table 1.

3.7.6 Magnacide H in Loup Basin District Farwell Main Canal

Procedure

The Farwell Main Canal splits into the Farwell Main Canal and the Lower Farwell Main. Further on the Lower Farwell Main Canal splits into the Lower Farwell Main and the 2.2R Lateral. The Farwell Main Canal splits into the Farwell Main Canal and the 26.5 Lateral. See Figure 15.

Magnacide H was metered into the Farwell Main Canal at a 3.8 $\pm$ 0.2 mg/L concentration 0.5 miles upstream from the initial split.

TABLES, FIGURES FROM EPA ACC. 249308

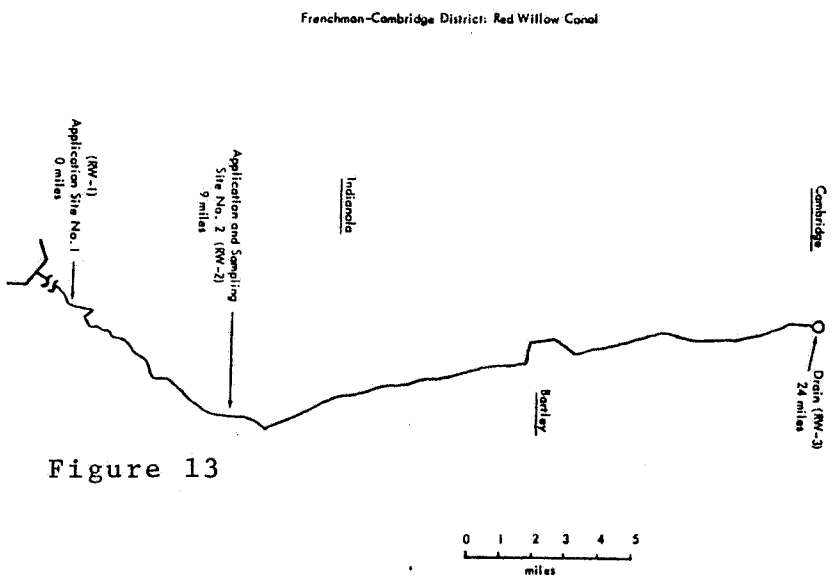


Figure 13

Table 10

MAGNACIDE H MEASUREMENTS IN THE FRENCHMAN-CAMBRIDGE DISTRICT: RED WILLOW CANAL

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
RW-1	0736	65	0	0
RW-1	0848	65	2.2	2.6
RW-1	0938	66	2.6	3.0
RW-1	1018	68	2.2	2.6
RW-1	1145	68	0	0
RW-2	1150	66	0	0
RW-2	1227	68	2.3	2.6
RW-2	1310	72	1.9	1.8
RW-2	1350	70	1.95	1.8
RW-2	1440	71	1.9	1.8
RW-2	1530	70	0	0
RW-2	1630	70	0	0
RW-2	2010	-	0.86	1.4
RW-2	2100	-	0.98	2.0
RW-2	2215	-	0.78	1.4
RW-2	2430	-	0	0
RW-3	2030	-	0	-
RW-3	2330	-	0	-
RW-3	0130	-	0	-
RW-3	0320	-	0	-
RW-3	0530	-	0	-
RW-3	0725	-	0	-
RW-3	0845	-	0	-
RW-3	1000	-	0.29	>0
RW-3	1057	-	0.41	>0
RW-3	1109	-	0.33	>0

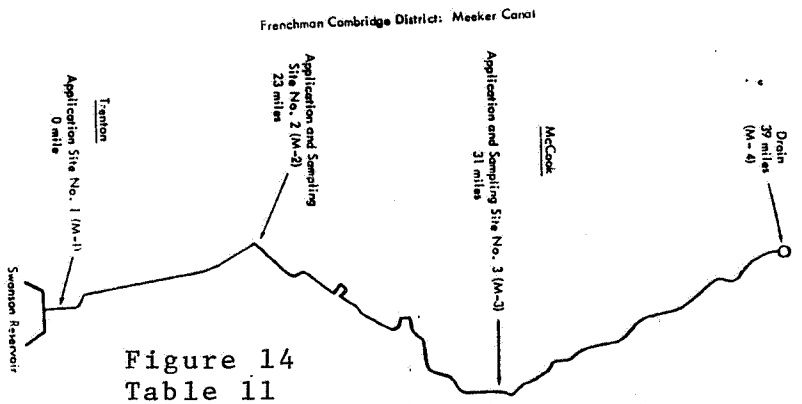


Figure 14

Table 11

MAGNACIDE H MEASUREMENTS IN THE FRENCHMAN-CAMBRIDGE DISTRICT: MEEKER CANAL.

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
M-1	0625	74	0	0
M-1	0655	74	2.05	1.8
M-1	0735	73	2.7	2.8
M-1	0912	74	2.6	2.1
M-1	0930	74	0	0
M-2	1005	73	0	0
M-2	1145	74	3.8	3.6
M-2	1225	75	2.25	2.4
M-2	1315	74	2.8	2.6
M-2	1330	74	0	0
M-2	1930	-	0	0
M-2	2130	-	1.1	1.5
M-2	2230	-	1.2	1.5
M-2	2330	-	0.9	1.2
M-2	0030	-	0	0
M-3	1400	71	0	0
M-3	1430	70	2.8	3.0
M-3	1520	71	2.25	2.6
M-3	1545	72	2.5	2.8
M-3	1715	71	0	0
M-3	1730	-	0	0
M-3	2130	-	0.1	>0
M-3	2200	-	1.2	1.6
M-3	2305	-	1.1	1.6
M-3	0015	-	0.5	0.6
M-3	0130	-	0	0
M-3	0520	-	0.085	>0
M-3	0545	-	0.21	>0
M-3	0630	-	0.23	>0
M-3	0745	-	0.14	>0
M-3	0830	-	0	0
M 4	2045	-	0	0
M-4	0155	-	0.41	>0
M-4	0255	-	0.13	>0
M-4	0330	-	0	0
M-4	0615	-	0	-
M-4	0730	-	0	-
M-4	0805	-	0	-

Water was sampled at various locations along the Canal and Laterals.

Dissipation of Magnacide was monitored in corn field furrows. At a point 0.1 mile downstream form pont F-4 on the Farwell Main Canal, water was allowed to flow through irrigation emitters and completely down the field furrows. Water was sampled as it flowed through the furrows.

Acrolein was measured by differential pulse polarography at detection limit of 0.01 mg/L. The DNPH method had detectable limit of 0.5 mg/L.

Results

The author reports that Magnacide H had a lifetime of 27 hours in this system. See Table 12.

The author reports that the herbicide was detected at the drain of the Lower Farwell Main (4.9 miles FAS) and at the drain of the Farwell Main Canal (9 miles FAS) at concentrations of 1.0 mg/L and 0.3 mg/L, respectively. See Table 13.

Acrolein was found 50 yards into the drain of the Lower Farwell Main at 0.06 mg/L and was non-detectable 50 yards into the drain of the Farwell Main Canal.

Acrolein residues declined in the corn field furrows from a concentration of 2.3 mg/L to 0.62 mg/L after 0.2 miles of furrow. See Table 14.

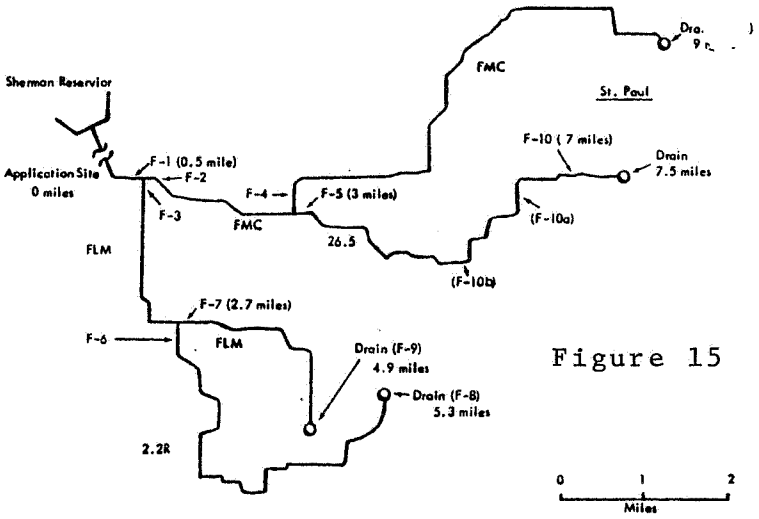


Figure 15

MAGNACIDE H MEASUREMENTS IN LOUP BASIN
DISTRICT: FARWELL MAIN CANAL

Table 12

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
F-1	0650	70	0	0
F-1	0830	70	2.0	2.4
F-1	0933	72	3.6	3.6
F-1	1026	71	4.0	3.9
F-1	1125	72	3.7	3.6
F-1	1200	71	0	0
F-2	0740	70	0	0
F-2	0832	71	2.0	2.4
F-2	0935	72	3.3	3.6
F-2	1012	72	3.7	4.2
F-2	1122	72	3.9	3.9
F-2	1202	71	0	0
F-3	0742	70	0	0
F-3	0834	71	1.7	2.4
F-3	0936	72	3.2	3.6
F-3	1031	72	3.5	4.2
F-3	1126	72	3.8	3.9
F-4	1242	72	0	0
F-4	1435	73	2.1	2.4
F-4	1555	74	3.0	3.0
F-4	1715	74	2.35	2.4
F-4	1830	74	0	0
F-5	1243	72	0	0
F-5	1437	73	2.1	2.4
F-5	1558	74	2.9	3.0
F-5	1717	74	2.6	2.8
F-6	1253	73	0	0
F-6	1610	75	1.45	2.2
F-6	1705	73	2.6	3.0
F-6	1815	73	2.35	2.6

MAGNACIDE H MEASUREMENTS IN LOUP BASIN
DISTIRCT: FARWELL MAIN CANAL

Table 13

Sample Point	Time 24 h Clock	Temp, °F	Magnacide H (mg/l) Polarographic	Colorimetric
F-7	1420	73	0	0
F-7	1610	74	1.35	2.1
F-7	1706	73	2.7	3.0
F-7	1817	73	3.1	3.0
F-7	1930	-	0.03	0
F-8	0010	-	0	-
F-8	0250	-	0	-
F-8	0455	-	0	-
F-8	0653	-	0	-
F-8	0820	-	0	-
F-8	1012	-	0	-
F-8	1320	-	0	-
F-8a	1315	-	0	-
F-8b	1305	-	0	-
F-9	2400	-	0	0
F-9	0230	-	0.052	0
F-9	0455	-	0.72	>0
F-9	0550	-	1.05	1.2
F-9	0638	-	0.9	>0
F-10	0005	-	0	-
F-10	0305	-	0	-
F-10	0505	-	0	-
F-10	0700	-	0	-
F-10	0830	-	0	-
F-10	1020	-	0	-
F-10	1150	-	0	-
F-10	1335	-	0	-
F-10a	1330	-	0	-
F-10b	1327	-	0	-
F-11	0840	-	0	-
F-11	0950	-	0.13	-
F-11	1115	-	0.31	0
F-11	1220	71	0.16	-

Table 14

Crop Furrow Dissipation Study:
Corn Field Located 3.1 miles Downstream of Magnacide H Application in the Farwell Main Canal of the Loup Basin Irrigation District.

Distance from Emitter (miles)	Magnacide H Concentration (mg/l)
0	2.3
0.07	2.0
0.13	1.3
0.2	0.62

TABLES, FIGURES FROM EPA ACC. # 249308

Summary of Results From the Additional Actual Use Studies

Review Section	District	Length of canal* (Miles)	Initial conc. (ppm)	Level found**	Reported life times (Hours)
3.6.1	Ainsworth Airport	16	0.5	ND @ 11.4 mi.	9
	Bone	26	-	ND @ 10.4 mi.	9
3.6.2	Bostwick	45	1.9	ND @ >16 mi.	19
3.6.3	Farmers 2165	6.5	3.2	0.04 ppm @ 6 mi.	10
	2832	3.0	4.9	1.0 ppm @ 3 mi.	16
3.6.4	Frenchman-Red Willow	24	2.4	ND @ 24 mi.	23
	(2 appl.)	15	2.1	0.4 ppm @ 15 mi.	18
3.6.5	Frenchman-Meeker	39	2.45	ND @ 39 mi.	27
	(3 appl.)	16	"	ND @ 16 mi.	22
		8	"	0.4 ppm @ 8 mi.	16
3.6.6	Loup-LFM	4.9	3.8	1.0 ppm @ 4.9 mi.	27
	" -FMC	9	-	0.3 ppm @ 9 mi.	27

*Distance from application site to last reported sampling site
**Distance from application site.

Conclusions

While data show that acrolein dissipated, the studies alone do not provide adequate information upon which EFB can evaluate the environmental fate of acrolein.

Applications were not at maximum use rates.

Soil sediment was not analyzed nor were degradation products identified.

4.0 EXECUTIVE SUMMARY

4.1 The enviromental fate of acrolein is not adequately understood.

4.2 The field monitoring studies that were submitted here show that the parent compound, acrolein, dissipates in the aquatic environment. However, these studies alone are not adequate for EFB to determine the environmental fate of acrolein and/or its degradation products.

4.3 EFB files indicate that no environmental fate data have ever been submitted to support this registered use of acrolein.

4.4 Additional data needed to support the proposed label revision include:

Hydrolysis study
Photolysis study
Soil metabolism study
Soil adsorption study
Fish accumulation study

4.5 Since field diversion could serve as a means of dissipation of acrolein residues, a field soil dissipation study will be required to assess the environmental fate of acrolein residues.

4.6 A rotational crop study will be necessary to determine if rotational crops take up acrolein residues as a result of crops grown in fields where treated water was diverted.

4.7 A field dissipation study conducted using the maximum use rate in a typical use area will also be necessary. Water should be diverted to a holding pond and sampled for residues.

4.8 Comments on the specific studies submitted for review are:

4.8.1 Recovery data should be provided for the differential pulse polarographic analytical method as used in analysis of acrolein in the field monitoring trials.

4.8.2 Degradation products must be identified since disappearance of parent alone is not adequate to determine environmental fate of a compound.

4.8.3 The discrepancies between the different analytical methods should be explained.

4.9 The registrant should be directed to the environmental fate guidelines for procedures and reporting requirements for conducting the above studies.

Clinton Fletcher
Review Section No. 1
Environmental Fate Branch
Hazard Evaluation Divison