Shaugh. No: 080807 + Simazine
108801 - Metolachlor

EAB Log Out Date: JUL 15 1986

Init.: CKO

To: R. Mountfort
Product Manager 23
Registration Division (TS-767)

From: Carolyn K. Offutt
Head, Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the estimated environmental concentration review of:

Reg./File No.: Record # 164,277. (Identity # 100-587.Accs # 260602)

Chemical: Metolachlor (Technical) and Simazine

Type Product: Herbicide

Product Name:

Company Name: Ciba- Geigy

Submission Purposes: Review surface water monitoring(1979-1985)

Action Code: 400

Date In: 12/20/85

EAB#: 6189-6190

Date Completed: 7/15/86

Review time 10 Days

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

Monitoring study reqested by EAB: /__/

Monitoring study voluntarily Conducted by registrant: /*/

METOLACHLOR

1. Chemical/Physical Properties

Common Name: Metolachlor
Trade Name: DUAL
Chemical Name: 2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide

Attached are the pages from the Registration Standard on Metalachlor which contain the chemical and physical properties.

2. Test Material

Technical metolachlor (manufacturing-use preparation) is comprised of a minimum of 90 to 95 percent (by weight) of the active ingredient metolachlor, i.e., 2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl) acetamide.

3. Study/Action Type

Review of voluntary metolachlor surface water monitoring results for 1979 to 1985 by Ciba-Geigy Corporation, Greensboro, North Carolina.

4. Study Identification

R.H. Ross and K. Balu. Summary of the metolachlor water monitoring data for 1975 - July 1985; Report #EIR-85024 of Ciba-Geigy Corporation. Issue Date: December 9, 1985.

5. Reviewer

Padma R. Datta, Ph.D. 7/15/86
Chemist
Exposure Assessment Branch
Hazard Evaluation Division

6. Approval

Carolyn K. Offutt 7/15/86
Section Chief
Environmental Processes and Guidelines Section
Exposure Assessment Branch
Hazard Evaluation Division

7. Conclusion

The voluntary submission of seven years of metolachlor water monitoring data, beginning in 1979 and ending in July 1985, is an adjunct to the total picture of residues of metolachlor in surface water and tap water in the United States.

Ciba-Geigy verbally mentioned its surface water monitoring plan for metolachlor to the Registration Division, but did not submit it for approval by the Agency. The data are of questionable usefulness in the absence of the following information: (1) statistical experimental design(s); (2) reasons for selection of water sampling locations; (3) basis for total number of samples; (4) reasons for duration and frequency of samples; (5) precipitation data; and (6) preliminary data on runoff obtained either by monitoring or by predictive surface water modeling (SWRRB, CREAM, etc.).

8. Recommendation

Not applicable

9. Background

Mr. Richard F. Mountfort, Product Manager (23) of the Registration Division, requested EAB to review monitoring data of technical metolachlor, EPA Registration No. 100-587 from the report "Summary of Metolachlor, Water Monitoring for 1979-July, 1985" (Report # 85024) voluntarily submitted by Drs. Ross and Balu of the Safety Evaluation Department, Agricultural Division, Ciba-Geigy Corporation, Greensboro, North Carolina.

10. Discussion

The submission contains 80 separate laboratory reports from EN-CAS Analytical Laboratories in Winston-Salem NC to Ciba Geigy; two reports on water sample collection from Environmental Protection Services, Inc., in Pensacola FL to Ciba Geigy; and a 40-page summary with ten tables and 82 references of the seven-year sampling program for metolachlor in surface water.

The Ciba Geigy monitoring from 1979 to July 1985 included selected surface water sites on the Mississippi, Missouri, Ohio, and Sacramento Rivers. Tap water originated from sites on the above-mentioned rivers, plus additional samples from St. Gabriel and Baton Rouge in Louisiana. Salt water samples came from the Gulf of Mexico. The monitoring sites are described in Table 1 of the text in the report.

The monitoring data submitted by Ciba-Geigy need clarification. The 80 laboratory reports in this submission contain control, spiked, and/or recovery data; however, GC-MS analyses from randomly selected samples as confirmation data are not included. The submission does not include (1) the exact location of the sampling sites, (2) the hydrological and geophysical characteristic data of the water sampling stations, or (3) the reasons for

selecting these sampling stations. Reference 79 includes a description of sample collection procedures for the sites in the Gulf of Mexico. (Reference 81 is a duplicate of the last part of Reference 79.) No other details of sample collection are included in the submission.

The results indicate that metolachlor residues in river water have transient peaks from 1.2 to 4.4 ppb primarily during the cropping season (spring and summer), although metolachlor was detected during every month of the year in at least one site. In fact, the highest levels, 4.2-4.4 ppb, occurred on the Mississippi River during January and February in 1984. No distinct pattern appears for metolachlor residues found in rivers; residues may be affected by a number of factors, such as timing of spraying, intensity and volume of rainfall, river volume at a sampling site, point source contamination and aquifer associated with river basin, etc. In order for the detected levels to occur in such large rivers, higher concentrations necessarily existed in some of the smaller, unmonitored tributaries.

Tap water samples were collected from municipalities. The sources of tap water were either river water or well water and are shown in Table A (reviewer-prepared summary). Detectable residues were found in tap water from Missouri River sites; none were found in tap waters whose sources were the Ohio or Sacramento Rivers. Detectable metolachlor residues were found in four tap water samples whose sources were wells in locations along the Mississippi River Basin.

Metolachlor detectable residues were detected in water samples collected from the Gulf of Mexico during 1982 to 1985.

A summary of metolachlor detectable residues in river, tap, and salt waters during 1979 to 1985 is shown in Table B (reviewer-prepared summary). Tables 1-10 of the Ciba-Geigy report (# EIR-85024) are attached for detailed information.

11. One-liner

No one-liner is in EAB's Branch file; however, the Metolachlor Registration Standard issued in September 1980 by EPA contains physical/chemical properties. The relevant pages from it are attached for information.

12. CBI Appendix

CBI materials are in the attached Tables A and B and Tables 1-10.

TABLE A

The Origin of Municipal Tap Water by Site

Site	Tap Water Origin
HR-09 - Ohio River	River
HR-13 - Missouri River	River
HR-18A - Mississippi River	Well
HR-20 - Mississippi River	Well
HR-22 - Mississippi River	Well
-- - St. Gabriel	Well
-- - Baton Rouge	Well
HR-35 - Sacramento River	River

TABLE B

Summary of Metolachlor Detectable Residues in River, Tap, and Salt Waters

Date	Site	Location	Range of Metolachlor Residues (ppb) River	Tap
05/31-06/14/83	HR-09	Ohio River	0.27-0.32	< 0.25
05/05-08/03/82	HR-13	Missouri River	0.36-1.2	0.33-1.2
06/21-07/26/83	HR-13	Missouri River	0.31-0.8	0.42-0.82
06/7-08/12/82	HR-18A	Mississippi River (Greenville, MS)	0.41-0.95	< 0.25
06/23-07/12/83	HR-18A	Mississippi River (Greenville, MS)	0.46-0.61	0.33
09/24/83	HR-18A	Mississippi River (Greenville, MS)	< 0.25	0.27
03/31/80	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.49	--
06/23/80	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.32-0.51	--
08/04/80	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.26	--
07/06-08/10/81	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.26-0.72	--
12/7-12/25/81	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.25-0.78	--
03/22-03/29/82	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.39-0.53	--
06/01-08/10/82	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.27-1.1	< 0.25
10/12-10/19/82	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.34-1.2	< 0.25
11/16/82	HR-20	Mississippi River (1 mile above Vicksburg, MS)	1.0-1.1	< 0.25
05/30-07/25/83	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.26-0.67	< 0.25
11/14/83	HR-20	Mississippi River (1 mile above Vicksburg, MS)	0.27	< 0.25

TABLE B (cont'd)

Summary of Metolachlor Detectable Residues in River, Tap, and Salt Waters

Date	Site	Location	Range of Metolachlor Residues (ppb) River	Tap
07/30/79	HR-21	Mississippi River (10 miles below Vicksburg, MS)	0.34	--
09/10-12/24/79	HR-21	Mississippi River (10 miles below Vicksburg, MS)	0.25-0.54	--
06/03-09/07/82	HR-22	Mississippi River (St. Gabriel, LA)	0.26-1.2	0.46
12/01/82	HR-22	Mississippi River (St. Gabriel, LA)	0.33	< 0.25
02/23/83	HR-22	Mississippi River (St. Gabriel, LA)	0.84	< 0.25
11/29/83	HR-22	Mississippi River (St. Gabriel, LA)	0.40	< 0.25
01/04-04/01/84	HR-22	Mississippi River (St. Gabriel, LA)	0.26-4.4	< 0.25
06/26/85	HR-22	Mississippi River (St. Gabriel, LA)	0.36, 0.46	< 0.25
09/26/83	--	St. Gabriel, LA	--	0.37
06/07-06/22/82	HR-35	Sacramento River, CA	1.3-1.8	< 0.25
02/06/84	HR-35	Sacramento River, CA	0.87	< 0.25
09/09/82	--	Gulf of Mexico	0.27-0.51	--
09/27/83	--	Gulf of Mexico	0.36-0.38	--
07/19/85	--	Gulf of Mexico	0.32	--

TABLE 1: Metolachlor Water Monitoring Sites

Code	Site Location
HR-09	Ohio River approximately one mile above confluence with Mississippi River, Illinois.
HR-13	Missouri River at highway 115 bridge near St. Charles, Missouri.
HR-18A	Mississippi River at Greenville, Mississippi
HR-20	Mississippi River approximately one mile above Vicksburg, Mississippi.
HR-21	Mississippi River approximately ten miles below Vicksburg, Mississippi.
HR-22	Mississippi River approximately eight miles above the CIBA-GEIGY plant at St. Gabriel, Louisiana.
HR-35	Sacramento River approximately one mile above confluence with San Joaquin River, California.
-	Tap water samples from St. Gabriel and Baton Rouge, Louisiana.
-	Gulf of Mexico including the mouth of the Mississippi River. Locations vary by year.

TABLE 2: Metolachlor Water Monitoring Data

Location: HR-09 - Ohio River

Date - 1982		Metolachlor (ppb) River	Metolachlor (ppb) Tap	Reference
July	7/7	<0.25	<0.25	36
	7/26	<0.25	<0.25	36
Aug.	8/13	<0.25	<0.25	36
	8/25	<0.25	<0.25	40
Sept.	9/16	<0.25	<0.25	40
	9/28	<0.25	<0.25	40
Oct.	10/18	<0.25	<0.25	40
	10/28	<0.25	<0.25	40
Nov.	11/11	<0.25	<0.25	40
Dec.	12/3	<0.25	<0.25	44
	12/23	<0.25	<0.25	44
Date - 1983				
Jan.	1/10	<0.25	<0.25	45
	1/25	<0.25	<0.25	46
Feb.	2/8	<0.25	<0.25	46
Mar.	3/28	<0.25	<0.25	48
Apr.	4/14	<0.25	<0.25	48
May	5/2	<0.25	<0.25	48
	5/19	<0.25	<0.25	50
	5/31	0.27	<0.25	50
June	6/14	0.32	<0.25	50
July	7/7	<0.25	<0.25	54
	7/18	<0.25	<0.25	54
Aug.	8/18	<0.25	<0.25	54

TABLE 2: (Continued)

Location: HR-09 - Ohio River

Date - 1983		Metolachlor (ppb) River	Tap	Reference
Sept.	9/10	<0.25	<0.25	54
	9/21	<0.25	<0.25	54
Oct.	10/12	<0.25	<0.25	54
Nov.	11/1	<0.25	<0.25	54
	11/15	<0.25	<0.25	58
	11/23	<0.25	<0.25	58
Dec.	12/10	<0.25	<0.25	58
Date - 1984				
Jan.	1/9	<0.25	<0.25	62
	1/26	<0.25	<0.25	62
Feb.	2/18	<0.25	<0.25	62
Mar.	3/6	<0.25	<0.25	62
	3/29	<0.25	<0.25	62
Apr.	4/14	<0.25	<0.25	62
	4/30	<0.25	<0.25	71
May	5/11	<0.25	<0.25	71
	5/30	<0.25	<0.25	71
June	6/12	<0.25	<0.25	71
	6/18	<0.25	<0.25	71
July	7/3	<0.25	<0.25	71
Aug.	8/6	<0.25	<0.25	71
	8/23	<0.25	<0.25	71
Sept.	9/20	<0.25	<0.25	71
Oct.	10/29	<0.25	<0.25	71

TABLE 2: (Continued)

Location: HR-09 - Ohio River

Date - 1984		Metolachlor (ppb) River	Tap	Reference
Nov.	11/18	<0.25	<0.25	71
	11/30	<0.25	<0.25	71
Dec.	12/13	<0.25	<0.25	71
Date - 1985				
Jan.	1/9	<0.25	<0.25	71
Feb.	2/19	<0.25	<0.25	71

TABLE 3: Metolachlor Water Monitoring Data

Location: HR-13 - Missouri River

Date - 1982		Metolachlor (ppb) River	Tap	Reference
May	5/5	1.2	1.2	33
June	6/2	0.60	0.58	34
	6/16	0.36	0.39	35
July	7/1	<0.25	<0.25	36
	7/21	0.54	0.46	36
Aug.	8/3	0.36	0.33	37
	8/17	<0.25	<0.25	37
Sept.	9/3	<0.25	<0.25	39
	9/20	<0.25	<0.25	39
Oct.	10/6	<0.25	<0.25	41
	10/18	<0.25	<0.25	41
Nov.	11/8	<0.25	<0.25	42
	11/29	<0.25	<0.25	42
Dec.	12/7	<0.25	<0.25	43
	12/16	<0.25	<0.25	43
Date - 1983				
Jan.	1/6	<0.25	<0.25	45
	1/20	<0.25	<0.25	45
Feb.	2/10	<0.25	<0.25	46
	2/23	<0.25	<0.25	46
Apr.	4/5	<0.25	<0.25	47
	4/19	<0.25	<0.25	47
May	5/3	<0.25	<0.25	48
	5/19	<0.25	<0.25	48
June	6/6	<0.25	<0.25	49
	6/21	0.80	<0.25	49

TABLE 3: (Continued)

Location: HR-13 - Missouri River

Date - 1983		Metolachlor (ppb) River	Tap	Reference
July	7/6	0.66	0.82	50
	7/26	0.31	0.42	50
Aug.	8/4	<0.25	<0.25	51
	8/23	<0.25	<0.25	51
Sept.	9/7	<0.25	<0.25	52
	9/30	<0.25	<0.25	52
Oct.	10/13	<0.25	<0.25	53
	10/21	<0.25	<0.25	53
Nov.	11/8	<0.25	<0.25	54
	11/18	<0.25	<0.25	54
Dec.	12/7	<0.25	<0.25	55
Date - 1984				
Jan.	1/3	<0.25	<0.25	58
	1/9	<0.25	<0.25	58
	1/26	<0.25	<0.25	58
Feb.	2/13	<0.25	<0.25	59
	2/29	<0.25	<0.25	59
Mar.	3/6	<0.25	<0.25	60
	3/22	<0.25	<0.25	60
Apr.	4/5	<0.25	<0.25	61
	4/30	<0.25	<0.25	61
May	5/11	<0.25	<0.25	63
	5/25	<0.25	<0.25	63
June	6/15	<0.25	<0.25	64
	6/27	<0.25	<0.25	64
July	7/10	<0.25	<0.25	65
	7/25	<0.25	<0.25	65

TABLE 3: (Continued)

Location: HR-13 - Missouri River

Date - 1984		Metolachlor (ppb) River	Tap	Reference
Aug.	8/14	<0.25	<0.25	66
	8/31	<0.25	<0.25	66
Sept.	9/11	<0.25	<0.25	67
	9/18	<0.25	<0.25	67
Oct.	10/10	<0.25	<0.25	68
	10/26	<0.25	<0.25	68
Nov.	11/8	<0.25	<0.25	69
	11/15	<0.25	<0.25	69
Dec.	12/14	<0.25	<0.25	70
	12/31	<0.25	<0.25	70
Date - 1985				
Jan.	1/8	<0.25	<0.25	72
	1/29	<0.25	<0.25	72
Feb.	2/6	<0.25	<0.25	73
	2/28	<0.25	<0.25	73
Apr.	4/12	<0.25	<0.25	74
May	5/15	<0.25	<0.25	75
June	6/17	<0.25	<0.25	76

TABLE 4: Metolachlor Water Monitoring Data

Location: HR-18A - Missssippi River (Greenville, MS)

Date - 1982		Metolachlor (ppb) River	Tap	Reference
May	5/5	<0.25	<0.25	33
June	6/7	0.55	<0.25	34
	6/22	0.43	<0.25	35
July	7/12	0.95	<0.25	36
	7/22	0.41	<0.25	36
Aug.	8/12	0.68	<0.25	37
	8/31	<0.25	<0.25	37
Sept.	9/10	<0.25	<0.25	39
	9/19	<0.25	<0.25	39
Oct.	10/14	<0.25	<0.25	41
	10/30	<0.25	<0.25	42
Nov.	11/22	<0.25	<0.25	42
	11/30	<0.25	<0.25	42
Dec.	12/8	<0.25	<0.25	43
	12/27	<0.25	<0.25	43
Date - 1983				
Jan.	1/6	<0.25	<0.25	45
	1/24	<0.25	<0.25	45
Feb.	2/18	<0.25	<0.25	46
	2/25	<0.25	<0.25	46
Apr.	4/8	<0.25	<0.25	47
June	6/23	0.61	<0.25	49
July	7/12	0.46	0.33	50

TABLE 4: (Continued)

Location: HR-18A - Missssippi River (Greenville, MS)

Date - 1983		Metolachlor (ppb) River	Tap	Reference
Aug.	8/15	<0.25	<0.25	51
	8/29	<0.25	<0.25	51
Sept.	9/16	<0.25	<0.25	52
	9/24	<0.25	0.27	52
Oct.	10/11	<0.25	<0.25	58
	10/28	<0.25	<0.25	53
Nov.	11/8	<0.25	<0.25	54
	11/21	<0.25	<0.25	54
Dec.	12/5	<0.25	<0.25	55
	12/28	<0.25	<0.25	55
Date - 1984				
Jan.	1/5	<0.25	<0.25	58
	1/27	<0.25	<0.25	58
Feb.	2/6	<0.25	<0.25	59
	2/28	<0.25	<0.25	59
Mar.	3/13	<0.25	<0.25	60
Apr.	4/6	<0.25	<0.25	61
	4/29	<0.25	<0.25	61
June	6/20	<0.25	<0.25	64
	6/29	<0.25	<0.25	64
July	7/9	<0.25	<0.25	65
	7/24	<0.25	<0.25	65
Aug.	8/20	<0.25	<0.25	66
	8/29	<0.25	<0.25	66

TABLE 4: (Continued)

Location: HR-18A - Missssippi River (Greenville, MS)

Date - 1984		Metolachlor (ppb) River	Tap	Reference
Sept.	9/12	<0.25	<0.25	67
	9/26	<0.25	<0.25	67
Oct.	10/3	<0.25	<0.25	68
	10/23	<0.25	<0.25	68
Nov.	11/18	<0.25	<0.25	69
	11/28	<0.25	<0.25	69
Dec.	12/6	<0.25	<0.25	70
	12/27	<0.25	<0.25	70
Date - 1985				
Jan.	1/7	<0.25	<0.25	72
	1/27	<0.25	<0.25	72
Feb.	2/12	<0.25	<0.25	73
	2/25	<0.25	<0.25	73

TABLE 5: Metolachlor Water Monitoring Data

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1980		Metolachlor (ppb) River	Reference
Jan.	1/7	<0.25	8
	1/12	<0.25	8
	1/21	<0.25	8
	1/28	<0.25	8
Feb.	2/4	<0.25	9
	2/11	<0.25	9
	2/18	<0.25	9
	2/25	<0.25	9
Mar.	3/3	<0.25	10
	3/10	<0.25	10
	3/17	<0.25	10
	3/24	<0.25	10
	3/31	0.49	11
Apr.	4/7	<0.25	11
	4/14	<0.25	11
	4/21	<0.25	11
	4/28	<0.25	12
May	5/5	<0.25	12
	5/12	<0.25	12
	5/19	<0.25	12
	5/26	<0.25	12
June	6/2	<0.25	13
	6/9	<0.25	13
	6/16	<0.25	13
	6/23	0.32-0.51	13
	6/30	<0.25	13
July	7/7	<0.25	13
	7/14	<0.25	13
	7/21	<0.25	13
	7/28	<0.25	13
Aug.	8/4	<0.25, 0.26	13
	8/10	<0.25	13
	8/18	<0.25	13
	8/25	<0.25	13

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1980		Metolachlor (ppb) River	Reference
Sept.	9/1	<0.25	13
	9/8	<0.25	14
	9/15	<0.25	14
	9/22	<0.25	14
	9/29	<0.25	14
Oct.	10/6	<0.25	15
	10/13	<0.25	15
	10/20	<0.25	15
	10/27	<0.25	15
Nov.	11/3	<0.25	16
	11/10	<0.25	16
	11/17	<0.25	16
	11/24	<0.25	16
Dec.	12/1	<0.25	17
	12/8	<0.25	17
	12/15	<0.25	17
	12/22	<0.25	17
	12/29	<0.25	17
Date - 1981			
Jan.	1/5	<0.25	18
	1/12	<0.25	18
	1/19	<0.25	18
	1/26	<0.25	18
Feb.	2/2	<0.25	19
	2/9	<0.25	19
	2/16	<0.25	19
	2/23	<0.25	19
Mar.	3/2	<0.25	20
	3/9	<0.25	20
	3/16	<0.25	20
	3/23	<0.25	20
	3/30	<0.25	20

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1981		Metolachlor (ppb) River	Reference
Apr.	4/6	<0.25	21
	4/13	<0.25	21
	4/20	<0.25	21
	4/27	<0.25	21
May	5/4	<0.25	22
	5/11	<0.25	22
	5/18	<0.25	22
	5/25	<0.25	22
June	6/1	<0.25	23
	6/8	<0.25	23
	6/15	<0.25	23
	6/22	<0.25	23
	6/29	<0.25	23
July	7/6	0.55, 0.57	24
	7/13	0.63, 0.72	24
	7/20	0.31, 0.39	24
	7/27	<0.25, 0.26	24
Aug.	8/3	0.29	25
	8/10	0.29	25
	8/17	<0.25	25
	8/24	<0.25	25
	8/31	<0.25	25
Sept.	9/7	<0.25	26
	9/14	<0.25	26
	9/21	<0.25	26
	9/28	<0.25	26
Oct.	10/5	<0.25	27
	10/12	<0.25	27
	10/19	<0.25	27
Nov.	11/9	<0.25	28
	11/16	<0.25	28
	11/23	<0.25	28
	11/30	<0.25	28

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1981		Metolachlor (ppb) River	Tap	Reference
Dec.	12/7	0.28		29
	12/14	<0.25		29
	12/21	<0.25		29
	12/25	0.25, 0.78		29
Date - 1982				
Jan.	1/4	<0.25		30
	1/11	<0.25		30
	1/18	<0.25		30
	1/25	<0.25		30
Feb.	2/1	<0.25		31
	2/8	<0.25		31
	2/15	<0.25		31
	2/22	<0.25		31
Mar.	3/1	<0.25		32
	3/8	<0.25		32
	3/15	<0.25		32
	3/22	0.53		32
	3/29	0.39		32
Apr.	4/5	<0.25		32
	4/12	<0.25		32
	4/19	<0.25		32
	4/26	<0.25		32
May	5/3	<0.25	<0.25	32
	5/10	<0.25	<0.25	32
	5/17	<0.25	<0.25	32
	5/24	<0.25	<0.25	32
June	6/1	0.58	<0.25	34
	6/8	1.1	<0.25	34
	6/15	0.80	<0.25	35
	6/22	0.59	<0.25	35
	6/29	1.0	<0.25	35

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1982		Metolachlor (ppb) River	Tap	Reference
July	7/6	0.27	<0.25	36
	7/13	0.28	<0.25	36
	7/20	0.66	<0.25	36
	7/27	0.49	<0.25	36
Aug.	8/3	0.70	<0.25	37
	8/10	0.39	<0.25	37
	8/17	<0.25	<0.25	37
	8/24	<0.25	<0.25	37
	8/31	<0.25	<0.25	37
Sept.	9/7	<0.25	<0.25	39
	9/14	<0.25	<0.25	39
	9/21	<0.25	<0.25	39
	9/28	<0.25	<0.25	39
Oct.	10/5	<0.25	<0.25	41
	10/12	0.34	<0.25	41
	10/19	1.2	<0.25	41
	10/26	<0.25	<0.25	41
Nov.	11/2	<0.25	<0.25	42
	11/9	<0.25	<0.25	42
	11/16	1.1, 1.0	<0.25	42,43
	11/23	<0.25	<0.25	42
	11/30	<0.25	<0.25	43
Dec.	12/7	<0.25	<0.25	43
	12/14	<0.25	<0.25	43
	12/21	<0.25	<0.25	43
	12/28	<0.25	<0.25	43
Date - 1983				
Jan.	1/4	<0.25	<0.25	45
	1/11	<0.25	<0.25	45
	1/18	<0.25	<0.25	45
	1/24	<0.25	<0.25	45
	1/31	<0.25	<0.25	45

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1983		Metolachlor (ppb) River	Tap	Reference
Feb.	2/7	<0.25	<0.25	46
	2/14	<0.25	<0.25	46
	2/21	<0.25	<0.25	46
	2/28	<0.25	<0.25	46
Apr.	4/4	<0.25	<0.25	47
	4/11	<0.25	<0.25	47
	4/18	<0.25	<0.25	47
	4/25	<0.25	<0.25	47
May	5/2	<0.25	<0.25	48
	5/9	<0.25	<0.25	48
	5/16	<0.25	<0.25	48
	5/23	<0.25	<0.25	48
	5/30	0.26	<0.25	48
June	6/3	<0.25	<0.25	49
	6/13	0.29	<0.25	49
	6/20	0.41	<0.25	49
	6/27	<0.25	<0.25	50
July	7/4	0.33	<0.25	50
	7/11	0.46	<0.25	50
	7/18	0.45	<0.25	50
	7/25	0.67	<0.25	50
Aug.	8/1	<0.25	<0.25	51
	8/8	<0.25	<0.25	51
	8/15	<0.25	<0.25	51
	8/22	<0.25	<0.25	51
	8/29	<0.25	<0.25	51

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1983		Metolachlor (ppb) River	Tap	Reference
Sept.	9/5	<0.25	<0.25	52
	9/12	<0.25	<0.25	52
	9/19	<0.25	<0.25	52
	9/26	<0.25	<0.25	52
Oct.	10/3	<0.25	<0.25	53
	10/10	<0.25	<0.25	53
	10/17	<0.25	<0.25	53
	10/24	<0.25	<0.25	53
	10/31	<0.25	<0.25	54
Nov.	11/7	<0.25	<0.25	54
	11/14	0.27	<0.25	54
	11/21	<0.25	<0.25	54
Dec.	12/5	<0.25	<0.25	55
	12/12	<0.25	<0.25	55
	12/19	<0.25	<0.25	55
	12/26	<0.25	<0.25	55
Date - 1984				
Jan.	1/2	<0.25	<0.25	58
	1/9	<0.25	<0.25	58
	1/16	<0.25	<0.25	58
	1/23	<0.25	<0.25	58
	1/30	<0.25	<0.25	59
Feb.	2/6	<0.25	<0.25	59
	2/13	<0.25	<0.25	59
	2/20	<0.25	<0.25	59
	2/27	<0.25	<0.25	59
Mar.	3/5	<0.25	<0.25	60
	3/12	<0.25	<0.25	60
	3/17	<0.25	<0.25	60

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1984		Metolachlor (ppb) River	Tap	Reference
Apr.	4/2	<0.25	<0.25	61
	4/9	<0.25	<0.25	61
	4/16	<0.25	<0.25	61
	4/23	<0.25	<0.25	61
	4/30	<0.25	<0.25	63
May	5/7	<0.25	<0.25	63
	5/14	<0.25	<0.25	63
	5/21	<0.25	<0.25	63
	5/28	<0.25	<0.25	63
June	6/4	<0.25	<0.25	64
	6/11	<0.25	<0.25	64
	6/18	<0.25	<0.25	64
	6/25	<0.25	<0.25	64
July	7/2	<0.25	<0.25	65
	7/9	<0.25	<0.25	65
	7/16	<0.25	<0.25	65
	7/23	<0.25	<0.25	65
	7/31	<0.25	<0.25	65
Aug.	8/6	<0.25	<0.25	66
	8/13	<0.25	<0.25	66
	8/20	<0.25	<0.25	66
	8/27	<0.25	<0.25	66
Sept.	9/3	<0.25	<0.25	67
	9/10	<0.25	<0.25	67
	9/17	<0.25	<0.25	67
	9/24	<0.25	<0.25	67
Oct.	10/1	<0.25	<0.25	68
	10/8	<0.25	<0.25	68
	10/15	<0.25	<0.25	68
	10/22	<0.25	<0.25	68
	10/29	<0.25	<0.25	68

TABLE 5: (Continued)

Location: HR-20 - Mississippi River (1 mile above Vicksburg, MS)

Date - 1984		Metolachlor (ppb) River	Tap	Reference
Nov.	11/5	<0.25	<0.25	69
	11/12	<0.25	<0.25	69
	11/19	<0.25	<0.25	69
	11/26	<0.25	<0.25	69
Dec.	12/3	<0.25	<0.25	70
	12/10	<0.25	<0.25	70
	12/17	<0.25	<0.25	70
	12/24	<0.25	<0.25	70
	12/31	<0.25	<0.25	69
Date - 1985				
Jan.	1/7	<0.25	<0.25	72
	1/14	<0.25	<0.25	72
	1/21	<0.25	<0.25	72
	1/28	<0.25	<0.25	72
Feb.	2/4	<0.25	<0.25	73
	2/11	<0.25	<0.25	73
	2/18	<0.25	<0.25	73
	2/25	<0.25	<0.25	73
Apr.	4/1	<0.25	<0.25	74
	4/15	<0.25	<0.25	74
	4/29	<0.25	<0.25	74
May	5/13	<0.25	<0.25	75
	5/27	<0.25	<0.25	75
June	6/10	<0.25	<0.25	76
	6/24	<0.25	<0.25	76

TABLE 6: Metolachlor Water Monitoring Data

Location: HR-21 - Mississippi River (Vicksburg, MS) 10 miles below

Date - 1979		Metolachlor (ppb)	Reference
April	4/23	<0.25	1
	4/30	<0.25	1
May	5/7	<0.25	1
	5/14	<0.25	1
	5/21	<0.25	2
	5/28	<0.25	2
June	6/4	<0.25	2
	6/11	<0.25	2
	6/18	<0.25	3
	6/25	<0.25	3
July	7/2	<0.25	3
	7/9	<0.25	3
	7/16	<0.25	3
	7/23	<0.25	4
	7/30	<0.25, 0.34	4
Aug.	8/6	<0.25	4
	8/13	<0.25	4
	8/20	<0.25	4
	8/27	<0.25	5
Sept.	9/3	<0.25	5
	9/10	<0.25, 0.35	5
	9/17	<0.25	5
Oct.	10/22	0.28, 0.54	6
	10/29	<0.25, 0.31	6
Nov.	11/5	<0.25	6
	11/12	<0.25	6
	11/19	<0.25	6
	11/26	<0.25, 0.25	7
Dec.	12/3	<0.25	7
	12/10	<0.25	7
	12/17	<0.25, 0.30	7
	12/24	0.32, 0.44	7
	12/31	<0.25	7

TABLE 7: Metolachlor Water Monitoring Data

Location: HR-22 - Mississippi River (St. Gabriel, LA)

Date - 1982		Metolachlor (ppb) River	Tap	Reference
June	6/3	1.2	<0.25	34
	6/15	1.2	0.46	35
July	7/1	<0.25	<0.25	36
	7/15	<0.25	<0.25	36
	7/27	0.41	<0.25	36
Aug.	8/12	0.44	<0.25	37
	8/25	<0.25	<0.25	37
Sept.	9/7	0.26	<0.25	39
	9/21	<0.25	<0.25	39
Oct.	10/6	<0.25	<0.25	41
	10/19	<0.25	<0.25	41
Nov.	11/2	<0.25	<0.25	42
Dec.	12/1	0.33	<0.25	44
	12/14	<0.25	<0.25	44
	12/28	<0.25	<0.25	44
Date - 1983				
Jan.	1/10	<0.25	<0.25	45
Feb.	2/3	<0.25	<0.25	46
	2/23	0.84	<0.25	46
Apr.	4/25	<0.25	<0.25	47
May	5/16	<0.25	<0.25	48

TABLE 7: (Continued)

Location: HR-22 - Mississippi River (St. Gabriel, LA)

Date - 1983		Metolachlor (ppb) River	Tap	Reference
Nov.	11/4	<0.25	<0.25	54
	11/29	0.40	<0.25	58
Dec.	12/12	<0.25	<0.25	55
Date - 1984				
Jan.	1/4	4.4	<0.25	58
	1/17	0.32	<0.25	58
Feb.	2/1	<4.2	<0.25	59
	2/16	0.26	<0.25	59
Mar.	3/6	<0.25	<0.25	60
	3/22	0.59	<0.25	60
Apr.	4/4	0.34	<0.25	61
	4/18	<0.25	<0.25	61
May	5/8	<0.25	<0.25	63
	5/21	<0.25	<0.25	63
June	6/7	<0.25	<0.25	64
July	7/2	<0.25	<0.25	65
Aug.	8/23	<0.25	<0.25	66
Sept.	9/11	<0.25	<0.25	67
	9/26	<0.25	<0.25	67
Oct.	10/16	<0.25	<0.25	68
	10/31	<0.25	<0.25	68
Nov.	11/26	<0.25	<0.25	69
Dec.	12/18	<0.25	<0.25	70

TABLE 7: (Continued)

Location: HR-22 - Mississippi River (St. Gabriel, LA)

Date - 1985		Metolachlor (ppb) River	Tap	Reference
Jan.	1/9	<0.25	<0.25	72
Feb.	2/19	<0.25	<0.25	73
Apr.	4/12	<0.25	<0.25	74
May	5/15	<0.25	<0.25	75
June	6/26	0.36, 0.46	<0.25	76

TABLE 8: Metolachlor Tap Water Monitoring Data

Location: St. Gabriel & Baton Rouge

Date - 1983		Metolachlor (ppb) Tap Water St. Gabriel	Baton Rouge	Reference
Feb.	2/24	<0.25	<0.50	46
Apr.	4/25	<0.25	<0.25	47
May	5/16	<0.25	<0.25	48
Nov.	11/4	<0.25	<0.25	54
	11/29	<0.25	<0.25	58
Dec.	12/12	<0.25	<0.25	55
Date - 1984				
Jan.	1/4	<0.25	<0.25	58
	1/17	<0.25	<0.25	58
Feb.	2/1	<0.25	<0.25	59
	2/16	<0.25	<0.25	59
Mar.	3/6	<0.25	<0.25	60
	3/22	<0.25	<0.25	60
Apr.	4/4	<0.25	<0.25	61
	4/18	<0.25	<0.25	61
May	5/8	<0.25	<0.25	63
	5/21	<0.25	<0.25	63
June	6/7	<0.25	<0.25	64

TABLE 8: (Continued)

Location: St. Gabriel & Baton Rouge

Date - 1983		Metolachlor (ppb) or Tap Water St. Gabriel	Baton Rouge	Reference
July	7/2	<0.25	<0.25	65
Aug.	8/23	<0.25	<0.25	66
Sept.	9/11	<0.25	<0.25	67
	9/26	0.37	<0.25	67
Oct.	10/16	<0.25	<0.25	68
	10/31	<0.25	<0.25	68
Nov.	11/26	<0.25	<0.25	69
Dec.	12/17	<0.25	<0.25	70
Date - 1985				
Jan.	1/9	<0.25	<0.25	72
Feb.	2/19	<0.25	<0.25	73
Apr.	4/12	<0.25	<0.25	74
May	5/15	<0.25	<0.25	75
June	6/26	<0.25	<0.25	76

TABLE 9: Metolachlor Water Monitoring Data

Location: HR-35 - Sacramento River

Date - 1982		Metolachlor (ppb) River	Tap	Reference
May	5/24	<0.25	<0.25	33
June	6/7	1.3	<0.25	35
	6/22	1.8	<0.25	35
July	7/12	<0.25	<0.25	36
	7/22	<0.25	<0.25	36
Aug.	8/5	<0.25	<0.25	37
	8/23	<0.25	<0.25	37
Sept.	9/7	<0.25	<0.25	39
	9/27	<0.25	<0.25	39
Oct.	10/11	<0.25	<0.25	41
	10/25	<0.25	<0.25	41
Nov.	11/9	<0.25	<0.25	42
	11/22	<0.25	<0.25	44
Dec.	12/27	<0.25	<0.25	44
Date - 1983				
Jan.	1/17	<0.25	<0.25	45
Feb.	2/14	<0.25	<0.25	46
Apr.	4/14	<0.25	<0.25	47
	4/20	<0.25	<0.25	47
May	5/2	<0.25	<0.25	48
	5/16	<0.25	<0.25	48
June	6/6	<0.25	<0.25	49
	6/20	<0.25	<0.25	49

TABLE 9: (Continued)

Location: HR-35 - Sacramento River

Date - 1983		Metolachlor (ppb) River	Tap	Reference
July	7/5	<0.25	<0.25	50
	7/18	<0.25	<0.25	50
Aug.	8/1	<0.25	<0.25	51
	8/16	<0.25	<0.25	51
Sept.	9/5	<0.25	<0.25	52
	9/19	<0.25	<0.25	58
Oct.	10/3	<0.25	<0.25	53
	10/17	<0.25	<0.25	53
Nov.	11/7	<0.25	<0.25	58
	11/22	<0.25	<0.25	58
Dec.	12/5	<0.25	<0.25	55
	12/19	<0.25	<0.25	55
Date - 1984				
Jan.	1/3	<0.25	<0.25	58
	1/16	<0.25	<0.25	58
Feb.	2/6	0.87	<0.25	59
	2/20	<0.25	<0.25	59
Mar.	3/5	<0.25	<0.25	60
	3/19	<0.25	<0.25	60
Apr.	4/3	<0.25	<0.25	61
	4/15	<0.25	<0.25	61
May	5/7	<0.25	<0.25	63
	5/21	<0.25	<0.25	63
June	6/4	<0.25	<0.25	64
	6/18	<0.25	<0.25	64
July	7/2	<0.25	<0.25	65
	7/16	<0.25	<0.25	65

TABLE 9: (Continued)

Location: HR-35 - Sacramento River

Date - 1983		Metolachlor (ppb) River	Tap	Reference
Aug.	8/6	<0.25	<0.25	66
	8/20	<0.25	<0.25	66
Sept.	9/6	<0.25	<0.25	67
	9/17	<0.25	<0.25	67
Oct.	10/1	<0.25	<0.25	68
	10/15	<0.25	<0.25	68
Nov.	11/6	<0.25	<0.25	69
	11/19	<0.25	<0.25	69
Dec.	12/3	<0.25	<0.25	70
	12/17	<0.25	<0.25	70
Date - 1985				
Jan.	1/7	<0.25	<0.25	77
	1/24	<0.25	<0.25	77
Feb.	2/4	<0.25	<0.25	77
	2/18	<0.25	<0.25	77
Mar.	3/4	<0.25	<0.25	77
	3/25	<0.25	<0.25	77
Apr.	4/9	<0.25	<0.25	77
	4/29	<0.25	<0.25	77
May	5/13	<0.25	<0.25	77
	5/28	<0.25	<0.25	77
June	6/10	<0.25	<0.25	78
	6/24	<0.25	<0.25	78
July	7/8	<0.25	<0.25	78
	7/22	<0.25	<0.25	78

TABLE 10: Metolachlor Gulf Water Monitoring Data

Location: Gulf of Mexico

Date	River	1	2	3	4	5	6	7	8	9	10	Ref.
1982												
Sept. 9/9	0.27	<0.25	<0.25	<0.25	<0.25	0.51	<0.25	<0.25	<0.25	<0.25	<0.25	38
1983												
Sept. 9/27	<0.25	<0.25	<0.25	0.36	0.38	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	56
1984												
Sept. 9/25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	57
1985												
April 4/10	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	79, 80
July 7/19, 30	-	<0.25	<0.25	<0.25	<0.25 0.32	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	81, 82

Color: Technical Metolachlor is white to tan. The color of each Emulsifiable Concentrate was not reported.

Odor: Technical Metolachlor is odorless. The odor of each Emulsifiable Concentrate was not reported.

Solubility: The solubility of Technical Metolachlor was reported to be:
In water - 530 ppm at 20°C
In organic solvents -
Insoluble in 1,2-ethanediol (ethylene glycol)
Insoluble in 1,2-propanediol (propylene glycol)
Miscible with dimethylbenzene (xylene)
Miscible with methylbenzene (toluene)
Miscible with N,N-dimethylformamide
Miscible with 2-methoxyethanol (methyl cellosolve)
Miscible with 2-butoxyethanol (butyl cellosolve)
Miscible with 1,2-dichloroethane (ethylene dichloride)
Miscible with cyclohexanone

Stability: For Technical Metolachlor, the half-life of a 0.25% aqueous solution at 100°C is 30 hours at pH 3, 18 hours at pH 7, and 1.5 hours at pH 10.

Octanol/Water Partition Coefficient: No octanol/water partition coefficient has been reported for Technical Metolachlor.

Physical State: Both Technical and Emulsifiable Concentrate Metolachlor products are in liquid form at room temperature.

Specific Gravity: The specific gravity of Technical Metolachlor is 1.085 (+/- 0.005) at 20°C. The specific gravity of the six pound active ingredient per gallon Emulsifiable Concentrate is 1.04 (+/- 0.005) at 20°C, and the specific gravity of the eight pound per gallon Emulsifiable Concentrate is 1.11 (+/- 0.005) at 20°C.

Boiling Point: At 0.001 mm Hg, the boiling point of Technical Metolachlor is 100°C. For the six pound per gallon Emulsifiable Concentrate (EC), it is 118°C, and for the eight pound per gallon, it is 140 to 160°C.

Vapor Pressure: For the Technical, the vapor pressure is about 10^{-5} mm Hg at 20°C. For the six pound per gallon EC, the vapor pressure was reported to be 0.05 to 1.0 mm Hg at 20°C, and for the eight pound per gallon EC, it was 0.05 mm Hg at 20°C.

pH: The pH of a 10% solution of six pound active ingredient per gallon Emulsifiable Concentrate is between 7 and 8, and that of an eight pound per gallon EC is between 6 and 8.

Storage Stability: Results of ongoing studies show that Technical Metolachlor is stable for a minimum of one year at room temperature. The shelf life of both concentrations of the Emulsifiable Concentrate is estimated to be a minimum of 5 years.

Flammability: No data were available on the flammability of the Technical. The flash point of the six pound per gallon Emulsifiable Concentrate was found to be 118°F (Setaflash C.C.T.), and that of the eight pound per gallon was found to be 185 (+/- 5)°F (TCC).

Oxidizing or Reducing Action: No data were available for the Technical, but the Emulsifable Concentrates were reported to be clearly non-reactive.

Explosiveness: Again no data were available about the Technical. A study on the explosiveness of the six pound per gallon Emulsifiable Concentrate has shown that the material is thermally stable at 200°C, can be processed or handled at temperatures up to 150°C, (under normal use and application practices) does not form (nor does its vapor form) explosive mixtures, and is not shock sensitive. The study on the eight pound per gallon EC is currently in progress.

Miscibility: Both Emulsifiable Concentrate formulations form a stable emulsion with water.

Viscosity: No data were available on the viscosity of the Technical. The six pound per gallon Emulsifiable Concentrate has a viscosity of 15.6 (+/- Ø.3) CS at 25°C. The eight pound per gallon, a viscosity of 12Ø (+/- 5) CD at 25°C.

Corrosion Characteristics: No data were available on the corrosiveness of the Technical. For the Emulsifiable Concentrates, however, it was discovered that the six pound per gallon formulation was not corrosive to steel or tin, while the eight pound per gallon did show a slight corrosiveness.

Dielectric Breakdown Voltage: As long as Metolachlor is not registered for industrial weed control, it will not be used around high power electrical machinery, and a dielectric breakdown voltage test will not be needed.

SIMAZINE

1. Chemical/Physical Properties

Common Name: Simazine
Trade Name: Princep
Chemical Name: 2-chloro-4,6-bis(ethylamino)-s-triazine

2. Test Material

Simazine

3. Study/Action Type

Review of voluntary surface water monitoring data on simazine (1975, 1983, 1984, and 1985) by Ciba-Geigy.

4. Study Identification

Summary of the Simazine Surface Water Monitoring for 1975 - July 1985, Ciba-Geigy Report # EIR-85021; R.H. Ross and K. Balu; Issue date: December 6, 1985; (Accession No. 260601).

5. Reviewer

Padma R. Datta, Ph.D. Carolyn K. Offutt for 9/30/86
Chemist
Exposure Assessment Branch
Hazard Evaluation Division

6. Approval

Carolyn K. Offutt Carolyn K. Offutt 9/30/86
Section Chief
Environmental Processes and Guidelines Section
Exposure Assessment Branch
Hazard Evaluation Division

7. Conclusion

Simazine was monitored in water samples taken from 25 locations on the Mississippi River and various tributaries, 8 locations on several watersheds in Alabama, Florida, Texas, and California and several locations in the Gulf of Mexico.

The Ciba-Geigy report contains analytical results for simazine residues in about 300 samples. Almost half of the samples were taken in 1983, 1984, and 1985 at two sites on the Sacramento River in California and in the Gulf of Mexico. The remaining samples were taken in 1975 at these sites and at 32 other sites (representing an average of 5 samples per site).

The surface water monitoring data of simazine from 1975, 1983, 1984, and 1985 show that the residue levels were generally < 1 ppb with seasonal peaks up to 2.76 ppb, with one reporting of 135 ppb, following simazine application in the field. There were no simazine residues in the Gulf of Mexico, with the exception of Mobile Bay.

Ciba-Geigy verbally mentioned its surface water monitoring plan for simazine to the Registration Division, but did not submit it for approval by the Agency. These data are of questionable usefulness in the absence of the following information: (1) statistical experimental design(s); (2) reasons for selection of water sampling locations; (3) basis for total number of samples; (4) reasons for duration and frequency of samples; (5) rainfall or precipitation data; and, (6) preliminary data on runoff obtained either by monitoring or by predictive surface water modeling (SWRRB, CREAM, etc.).

8. Recommendation

Not applicable

9. Background

Mr. Richard F. Mountfort, Product Manager #23 of the Registration Division, requested the Exposure Assessment Branch (EAB) to review voluntarily submitted monitoring data of technical simazine, EPA Registration No. 100-541, from the report "Summary of the Simazine Surface Water Monitoring for 1975 to July 1985" (Report # EIR 85021) submitted by Drs. Ross and Balu of the Safety Evaluation Department, Agricultural Division, Ciba-Geigy Corporation, Greensboro, North Carolina.

10. Discussion

The submission contains (1) 22 separate laboratory reports from Ciba-Geigy laboratories, (2) 22 separate laboratory reports to Ciba-Geigy from EN-CAS Analytical Laboratories in Winston-Salem, NC, (3) 2 reports to Ciba Geigy on water collection from Environmental Protection

Systems, Inc., in Pensacola, Florida, and (3) a 28-page summary with 8 tables and 46 references of the 4 years of sampling for simazine in surface water.

In 1975, a monitoring program for the Mississippi River drainage, as well as several rivers in Alabama, California, Texas, and Florida, was initiated by Ciba-Geigy. Several sites were monitored on a regular basis for products other than simazine. Selected water samples were analyzed in 1975, 1983, 1984, and 1985 for simazine, the active ingredient in Princep®. In 1975, simazine was analyzed in water samples from 34 sites. These 34 sites were selected to represent fields where Princep is sprayed for weed control. Table 1 describes the 34 sites where water samples were collected and analyzed for simazine. Figure 1 shows the location of simazine monitoring sites. (Table 1 includes no listing for HR-19 and HR-29, but Table 8 references HR-29 as Mobile Bay.) Both Table 1 and Figure 2 are from the Ciba-Geigy report.

Summary of Sample Collection Procedure

An attempt was made to collect water samples repeatedly from the same cross-section of the river. In general, 10 samples from a depth of about 1 foot were collected at evenly-spaced intervals across the entire width of a stream. All water samples from one cross-section were thoroughly mixed in a clean 5-gallon container and the composite was then subsampled by filling 1-quart tin containers. The Ciba-Geigy summary states that the samples from the Gulf of Mexico were taken from helicopter or boat; however, the report (Reference 45) from Environmental Protection Systems, Inc. in Pensacola, Florida, states that the samples were taken from the deck of a boat. In 1985 the Gulf of Mexico samples were taken at 3 depths at each station.

Detection Limits of Analytical Methods

The GLC analytical methods of Ciba-Geigy and EN-CAS laboratories are acceptable to this Agency. A detection limit of 0.1 ppb was used by Ciba-Geigy in 1975. Beginning in 1983, an analytical method with a detection limit of 0.25 ppb was used by EN-CAS laboratory.

Analytical Results

-The 1975 simazine monitoring data for 12 sites on various tributaries of the Mississippi River show that: (1) for the sites monitored from May to August or September, two transient peaks occurred, one in May and another in July or August; (2) the range of quantifiable simazine levels was from 0.11 to 0.39 ppb with some additional reportings up to < 2.5 ppb; (3) 17 of the 29 reported residues of simazine are identified with "<", meaning possible interference; and (4) no detectable residues were found in 4 of the 12 locations including the Skunk River, the Missouri River above St. Joseph and again near St. Louis, and the Arkansas River. For details refer to the attached Table 2 from the Ciba-Geigy report which summarizes the results from various tributaries of the Mississippi River in 1975.

The level of simazine residues at 10 sites at various locations in the Mississippi River was low (0.11 to < 1.0 ppb). Quantifiable residues were found in 3 of the 16 reported residue values (0.11 to 0.14 ppb) and 13 samples had "<" indicating the presence of possible interference. Simazine was not reported at 3 of 10 sites including 2 sites near Memphis and the site at Venice prior to emptying into the Gulf of Mexico. For details refer to attached Table 3 from the Ciba-Geigy report.

The 1975 surface water monitoring data for simazine in the three sites from Alabama for the 3-month (June, July, and August) monitoring period reported low levels (0.15 to 2.76 ppb) of simazine with an additional reporting of 135 ppb in July at one site on the Tombigbee River. The reporting of 135 ppb may not represent simazine residues because Reference 11 of the Ciba-Geigy report indicates analyses for six samples at the same site on the same day (July 22, 1975) with results of < 0.2, < 0.33, 0.85, 1.33, < 12, 135. Otherwise, the highest levels of 2.16 to 2.76 ppb were reported in June in all three sites monitored. Table 4 from the Ciba-Geigy report presents the detailed summary of Alabama data in 1975.

The monitoring data from one location in Florida and four locations in Texas show no residues of simazine except < 0.11 ppb at Brazos River, Texas site. The "<" suggests the presence of interference and the level is very close to the detection limit of 0.1 ppb. The summaries are reported in the attached Tables 5 and 6 from the Ciba-Geigy report.

In California, the Sacramento River was monitored in 1975, 1983, 1984, and 1985. There were two reported residues of simazine of < 0.5 and 0.18 ppb, in June and mid-August 1975, respectively, and one reporting of 0.33 ppb in November 1983. All other data values were less than the detection limit. All tap water data are less than the detection limit (0.25 ppb), except for 0.27 ppb in December 1983. In 1975, the San Joaquin River was also monitored. The data show low level transient peaks in May and August with simazine concentrations of 0.27 and 0.12 ppb, respectively. The attached Table 7 from the Ciba-Geigy report provides detailed information on California monitoring data.

Simazine residues were not found in the Gulf of Mexico around the mouth of the Mississippi River in 1983, 1984, or 1985. One simazine residue value of < 0.2 ppb was reported in July 1975. There was a reporting of 0.35 ppb in Mobile Bay on May 29, 1975. The attached Table 8 from the Ciba-Geigy report summarizes the monitoring data from the Gulf of Mexico, including the sampling in Mobile Bay in May 1975.

Table 8 for the Gulf of Mexico should be revised:

The concentrationa are assumed to be in ppb; the table should indicate it.

No site number is indicated for Table 8. The table should indicate that the Gulf of Mexico sampling area is Site HR-25 for all locations in the Gulf of Mexico, except Mobile Bay which is identified in Table 8 as Site HR-29.

Table 8 lists analytical results for 10 stations for each sampling time.

Ref. 3 supports a duplicate anaalysis of one 5/29/75 marine water sample from Site HR-25 (not HR-29 as in Table 8) with results of 0.35 and 0.35 ppb (not 0.35 and 0.36 as in Table 8). There is no indication that it is from Mobile Bay.

Ref. 3 does not support analytical results from each of 10 stations on 5/29/75.

Ref. 10 only supports a duplicate analysis of one 7/15/75 marine wwater sample from Site HR-25 with analytical results of <0.1 ppb on one analysis and <0.2 ppb on the second analysis.

Ref. 10 does not support analytical results from each of 10 stations on 7/15/75.

Ref. 44 and 27 support a single analysis for each of the 10 locations; i.e., only one depth of sampling.

Ref. 42 indicates that the April 1985 sampling occurred on April 10, 11, 12, 1985.

Ref. 42 and 45 support sampling at 3 depths at each of the 10 locations.

11. One-liner .

Attached

12. CBI Appendix

Figure 1 and Tables 1-8 of this Ciba-Geigy report (# EIR -85021) are attached.

88156:Padma:C.Disk:KENCO:4/16/86:eg:vo
R:87837:Datta:C.Disk:KENCO:8/26/86:tar:vo

FIGURE 1: Simazine Monitoring Sites

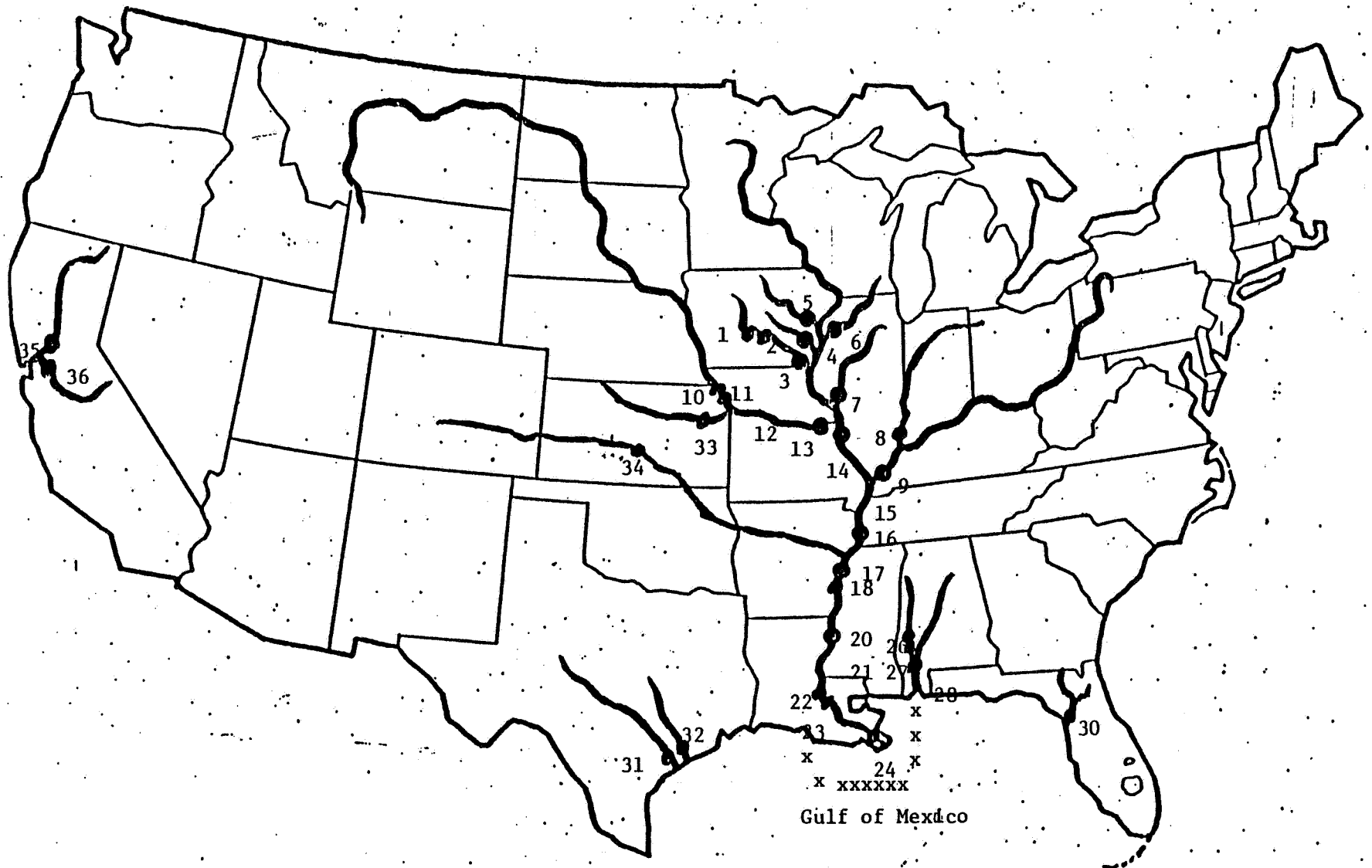

TABLE 1: Water Monitoring Sites for Simazine

Code	Site Location
HR-01	Des Moines River approximately one mile above Des Moines, Iowa.
HR-02	Des Moines River approximately ten miles below Des Moines, Iowa.
HR-03	Des Moines River approximately one mile above confluence with Mississippi River, Iowa.
HR-04	Skunk River approximately one mile above confluence with Mississippi River.
HR-05	Iowa River approximately one mile above confluence with Mississippi River.
HR-06	Rock River approximately one mile above confluence with Mississippi River, Illinois.
HR-07	Illinois River approximately ten miles above confluence with Mississippi River, Illinois.
HR-08	Wabash River approximately one mile above confluence with Mississippi River, Illinois.
HR-09	Ohio River approximately one mile above confluence with Mississippi River, Illinois.
HR-10	Missouri River approximately one mile above St. Joseph, Missouri.
HR-11	Missouri River approximately ten miles below St. Joseph, Missouri.
HR-12	Missouri River approximately one mile west of Kansas City.
HR-13	Missouri River at highway 115 bridge near St. Charles, Missouri.
HR-14	Mississippi River above St. Louis, Missouri near the Chain of Rocks Bridge.
HR-15	Mississippi River approximately ten miles above Memphis, Tennessee.

TABLE 1: Water Monitoring Sites for Simazine (Continued)

Code	Site Location
HR-16	Mississippi River approximately ten miles below Memphis, Tennessee.
HR-17	Mississippi River approximately one mile above Helena, Arkansas.
HR-18	Mississippi River approximately ten miles below Helena, Arkansas.
No 19 HR-20	Mississippi River approximately one mile above Vicksburg, Mississippi.
HR-21	Mississippi River approximately ten miles below Vicksburg, Mississippi.
HR-22	Mississippi River approximately eight miles above the CIBA-GEIGY plant at St. Gabriel, Louisiana.
HR-23	Mississippi River approximately ten miles below the plant at St. Gabriel, Louisiana.
HR-24	Mississippi River prior to entering the Gulf of Mexico near Venice, Louisiana.
HR-25	Gulf of Mexico - Several sites depending on sampling time.
HR-26	Tombigbee River approximately two miles above the CIBA-GEIGY plant at McIntosh, Alabama.
HR-27	Tombigbee River approximately one mile below the plant at McIntosh, Alabama.
HR-28	Alabama River below the Tombigbee confluence about 1 mile above fork, Alabama.
No 29 HR-30	Suwannee River approximately one mile above entry point into Gulf of Mexico, Florida.
HR-31	Colorado River approximately one mile above entry point into Gulf of Mexico, Texas.
HR-32	Brazos River approximately one mile above entry point into Gulf of Mexico, Texas.

TABLE 1: Water Monitoring Sites for Simazine (Continued)

Code	Site Location
HR-33	Republican River approximately one mile above confluence with Missouri River, Kansas.
HR-34	Arkansas River approximately one mile above Wichita, Kansas.
HR-35	Sacramento River approximately one mile above confluence with San Joaquin River, California.
HR-36	San Joaquin River approximately one mile above confluence with Sacramento River, California.

TABLE 2: Surface Water Monitoring Data for Simazine in t Mississippi River Tributaries.

Date - 1975		Simazine (ppb)	Reference
Location:	HR-01 - Des Moines River (1 mile above Des Moines)		
July	7/7	0.34	9
	7/21	<0.3	13
Aug.	8/8	<0.1	18
	8/18	<0.1	19
Oct.	10/18	<0.1	22
Location:	HR-02 - Des Moines River (10 miles below Des Moines)		
July	7/7	<0.1	9
	7/21	0.14	13
Aug.	8/8	<0.1	18
	8/18	<0.1	19
Oct.	10/18	<0.1	22
Location:	HR-03 - Des Moines River (Mississippi Confluence)		
May	5/15	<2.5	1
	5/12	<1.25	1
	5/19	<0.1	2
June	6/2	<0.2	5
	6/9	<0.6	7
	6/23	<0.5	8
July	7/7	0.35	14
	7/21	<0.1	12
Aug.	8/4	<0.10	21
	8/8	<0.1	18
	8/18	<0.1	17
Sept.	9/3	<0.1	21

TABLE 2: Surface Water Monitoring Data for Simazine in the Mississippi River Tributaries (Continued)

Date - 1975		Simazine (ppb)	Reference
Location:	HR-04 - Skunk River (Mississippi Confluence)		
May	5/10	<0.1	1
Aug.	8/2	<0.1	18
	8/16	<0.1	19
Location:	HR-05 - Iowa River (Mississippi Confluence)		
May	5/10	0.16	1
Aug.	8/2	<0.1	18
	8/16	<0.1	19
Location:	HR-06 - Rock River (Mississippi Confluence)		
May	5/26	0.14	2
June	6/23	<0.5	8
July	7/21	<0.1	12
Aug.	8/4	0.33	14
	8/18	<0.1	17
Sept.	9/2	<0.1	21
Location:	HR-07 - Illinois River (Mississippi Confluence)		
July	7/25	<0.1	13
Aug.	8/6	0.12	16
	8/22	0.12	17
Sept.	9/4	<0.1	20

TABLE 2: Surface Water Monitoring Data for Simazine in the Mississippi River Tributaries (Continued)

Date - 1975		Simazine (ppb)	Reference
Location:	HR-08 - Wabash River (Ohio Confluence)		
June	6/24	<0.6	7
July	7/22	<0.1	12
Aug.	8/5	0.22	14
	8/19	<0.1	17
Sept.	9/2	<0.1	21
Location:	HR-09 - Ohio River (Mississippi Confluence)		
May	5/14	<0.1	1
	5/28	<0.1	2
July	7/9	<0.35	9
Aug.	8/6	<0.1	13
	8/20	0.11	17
Sept.	9/4	<0.13	21
Location:	HR-10 - Missouri River (1 mile above St. Joseph)		
July	7/7	<0.1	9
Aug.	8/4	<0.1	16
	8/25	<0.1	19

TABLE 2: Surface Water Monitoring Data for Simazine in the Mississippi River Tributaries (Continued)

Date - 1975		Simazine (ppb)	Reference
Location:	HR-11 - Missouri River (10 miles below St. Joseph)		
May	5/12	<0.56	1
June	6/2	<0.1	5
	6/16	<0.6	7
July	7/15	<0.3	12
	7/28	0.39	14
Aug.	8/20	0.22	17
Oct.	10/20	<0.1	22
Location:	HR-12 - Missouri River Kansas City		
June	6/7	<0.2	6
Aug.	8/3	<0.1	13
	8/18	<0.1	18
Sept.	9/1	<0.1	20
Location:	HR-13 - Missouri River (near St. Louis)		
July	7/25	<0.1	13
Aug.	8/6	<0.1	16
	8/22	<0.1	19
Sept.	9/4	<0.1	20

TABLE 2: Surface Water Monitoring Data for Simazine in the Mississippi River Tributaries (Continued)

Date - 1975		Simazine (ppb)	Reference
Location:	HR-33 - Kansas River, KS		
June	6/7	<0.2	6
Aug.	8/3	<0.5	13
	8/18	<0.12	18
Sept.	9/1	<0.10	20
Location:	HR-34 - Arkansas River, KS		
June	6/9	<0.1	6
Aug.	8/6	<0.1	16
	8/23	<0.1	18
Sept.	9/2	<0.1	20
Oct.	10/6	<0.1	22

TABLE 3: Surface Water Monitoring Data for Simazine Mississippi River.

Date - 1975		Simazine (ppb)	Reference
Location:	HR-14 - Mississippi River (St. Louis)		
May	5/7	<0.1	1
	5/23	<0.1	2
June	6/25	<0.5	8
July	7/25	0.14	14
Aug.	8/6	0.13	14
	8/22	<0.1	17
Sept.	9/4	<0.1	20
Location:	HR-15 - Mississippi River (10 miles above Memphis)		
Aug.	8/6	<0.1	16
	8/19	<0.1	18
Sept.	9/2	<0.1	20
Location:	HR-16 - Mississippi River (10 miles below Memphis)		
May	5/7	<0.1	1
Aug.	8/6	<0.1	16
	8/19	<0.1	17
Sept.	9/2	<0.1	21

TABLE 3: Surface Water Monitoring Data for Simazine in the Mississippi River (Continued)

Date - 1975		Simazine (ppb)	Reference
Location:	HR-17 - Mississippi River (1 mile above Helena, Arkansas)		
July	7/9	<0.25	9
Aug.	8/6	<0.1	14
	8/21	<0.1	19
Sept.	9/3	<0.1	21
Oct.	10/7	<0.1	22
Location:	HR-18 - Mississippi River (10 mi. below Helena, Arkansas)		
July	7/9	<0.5	9
Aug.	8/6	<0.1	16
	8/21	<0.1	19
Sept.	9/3	<0.1	21
Oct.	10/7	<0.1	22
Location:	HR-20 - Mississippi River (1 mile above Vicksburg)		
May	5/10	<0.1	1
	5/31	<0.2	6
July	7/12	<0.1, <0.63	12,9
Aug.	8/9	<0.1	17
	8/23	<0.1	19

TABLE 3: Surface Water Monitoring Data for Simazine in the Mississippi River (Continued)

Date - 1975		Simazine (ppb)	Reference
Location:	HR-21 - Mississippi River (10 miles below Vicksburg)		
May	5/10	0.11	1
		<0.1	
June	6/21	<0.5	8
	6/26	<0.1	14
July	7/12	<0.1	12
Aug.	8/9	<0.1	17
	8/23	<0.1	20
Location:	HR-22 - Mississippi River, St. Gabriel		
May	5/21	<0.5	4
	5/28	<0.1	4
July	7/9	<0.65	9
Aug.	8/6	<0.1	16
	8/22	<0.1	19
Location:	HR-23 - Mississippi River, St. Gabriel		
May	5/28	<0.5	4
June	6/12	<0.6	7
	6/19	<0.6	7
July	7/22	<1.0	11
Aug.	8/6	<0.1	14
	8/22	<0.2	17

TABLE 3: Surface Water Monitoring Data for Simazine in the Mississippi River (Continued)

Date		Simazine (ppb)	Reference
Location: HR-24 - Mississippi River (Above Gulf)			
Date - 1975			
May	5/29	<0.1	4
July	7/15	<0.1	12,16
Aug.	8/27	<0.1	18
Date - 1983			
Sept.	9/27	<0.25	44
Date - 1984			
Sept.	9/25	<0.25	27
Date - 1985			
April	4/10	<0.25	42,43

TABLE 4: Surface Water Monitoring Data for Simazi
Alabama

Date - 1975		Simazine (ppb)	Refer
Location:	HR-26 - Tombigbee River (1 mile above McIntosh)		
June	6/3	2.36	6
July	7/22	<0.2	11
Aug.	8/27	0.15	20
Location:	HR-27 - Tombigbee River (1 mile below McIntosh)		
June	6/3	2.76	6
July	7/22	<0.2-135	11
Aug.	8/27	0.87	20
Location:	HR-28 - Alabama River		
June	6/3	2.16	6
July	7/22	0.3	11
Aug.	8/27	0.5	19

TABLE 5: Surface Water Monitoring Data for Simazine in Florida

Date - 1975		Simazine (ppb)	Reference
Location:	HR-30 - Suwannee River, Florida		
May	5/28	<0.1	2
June	6/11	<0.1	6
July	7/9	<0.1	9
Aug.	8/6	<0.1	16
	8/20	<0.1	18
Sept.	9/4	<0.1	20
Oct.	10/4	<0.1	22

TABLE 6: Surface Water Monitoring Data for Simazine in Texas

Date - 1975		Simazine (ppb)	Reference
Location:	HR-31 - Colordao River, Texas		
June	6/8	<0.1	6
Aug.	8/3	<0.1	13
Sept.	9/1	<0.1	20
Oct.	10/5	<0.1	22
Location:	HR-32 - Brazos River, Texas		
May	5/12	<0.1	1
July	7/8	<0.1	9
Aug.	8/4	<0.1	16
	8/17	<0.1	18
	8/18	<0.1	19
Sept.	9/2	<0.11	21

TABLE 7: Surface Water Monitoring Data for Simazine in California

Date		Simazine (ppb) River	Tap	Reference
Location: HR-35 - Sacramento River				
Date - 1975				
May	5/24	<0.1		2
June	6/25	<0.5		8
July	7/11	<0.1		9
Aug.	8/2	<0.1		13
	8/15	0.18		18
Sept.	9/2	<0.1		20
Oct.	10/7	<0.1		22
Date - 1983				
Aug.	8/1	<0.25	<0.25	23
	8/16	<0.25	<0.25	23
Sept.	9/5	<0.25	<0.25	24
	9/19	<0.25	<0.25	28
Oct.	10/3	<0.25	<0.25	25
	10/17	<0.25	<0.25	25
Nov.	11/7	<0.25	<0.25	28
	11/22	0.33	<0.25	28
Dec.	12/5	<0.25	0.27	26
	12/19	<0.25	<0.25	26
Date - 1984				
Jan.	1/3	<0.25	<0.25	28
	1/16	<0.25	<0.25	28
Feb.	2/6	<0.25	<0.25	29
	2/20	<0.25	<0.25	29

TABLE 7: Surface Water Monitoring Data for Simazine in California (Continued)

Date - 1984 (Cont.)		Simazine (ppb) River	Tap	Reference
Mar.	3/5	<0.25	<0.25	30
	3/19	<0.25	<0.25	30
Apr.	4/3	<0.25	<0.25	31
	4/15	<0.25	<0.25	31
May	5/7	<0.25	<0.25	32
	5/21	<0.25	<0.25	32
June	6/4	<0.25	<0.25	33
	6/18	<0.25	<0.25	33
July	7/2	<0.25	<0.25	34
	7/16	<0.25	<0.25	34
Aug.	8/6	<0.25	<0.25	35
	8/20	<0.25	<0.25	35
Sept.	9/6	<0.25	<0.25	36
	9/17	<0.25	<0.25	36
Oct.	10/1	<0.25	<0.25	37
	10/15	<0.25	<0.25	37
Nov.	11/6	<0.25	<0.25	38
	11/19	<0.25	<0.25	38
Dec.	12/3	<0.25	<0.25	39
	12/17	<0.25	<0.25	39
Date - 1985				
Jan.	1/7	<0.25	<0.25	40
	1/24	<0.25	<0.25	40
Feb.	2/4	<0.25	<0.25	40
	2/18	<0.25	<0.25	40
Mar.	3/4	<0.25	<0.25	40
	3/25	<0.25	<0.25	40

TABLE 7: Surface Water Monitoring Data for Simazine in California (Continued)

Date - 1985 (Cont.)		Simazine (ppb) River	Tap	Reference
Apr.	4/9	<0.25	<0.25	40
	4/29	<0.25	<0.25	40
May	5/13	<0.25	<0.25	40
	5/28	<0.25	<0.25	40
June	6/10	<0.25	<0.25	41
	6/24	<0.25	<0.25	41
July	7/8	<0.25	<0.25	41
	7/22	<0.25	<0.25	41

Location: HR-36 - San Joaquin River

Date - 1975				
May	5/24	0.27		2
June	6/9	0.13		7
	6/25	<0.1, <0.2		8
July	7/21	<0.1		12
Aug.	8/2	0.12		15
	8/15	<0.1		17
Sept.	9/1	<0.1		20
Oct.	10/7	<0.1		22