CORRECTED TABLES FOR THE METHYL PARATHION ARB REPORT

Contract No: A5-169-43

UNIVERSITY OF CALIFORNIA, DAVIS

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COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES
AGRICULTURAL EXPERIMENT STATION
(916) 752-1142

DEPARTMENT OF ENVIRONMENTAL TOXICOLOGY
DAVIS, CALIFORNIA 95616

August 31, 1987

Ms. Kimi Klein
Department of Food & Agriculture
1220 N Street, Room A149
Sacramento, CA

Dear Kimi:

Please find enclosed corrected tables for the Methyl Parathion Air Resources Board Report. Not included, but should be noted, is the change in Tables 9, 10, 13 and 14. The entry for Trowbridge dated 6/11/86 should be changed from a "less than" to "B" sample pump not working.

I apologize for any inconvenience. Please call me for any further assistance.

Michael M. McChesney
Staff Research Associate

MMM:gna
Klein.1

cc: J. N. Seiber
J. E. Woodrow
L. Baker, ARB
T. Parker, ARB

Table A. Summary of Air Concentrations of Methyl Parathion

in Parts Per Trillion

	Maximum Positive	Second Highest Positive	Average Positive	Total # of Samples	# Above MDL[a]
Trowbridge	0.102	0.097	~~0.138~~ 0.069	44	10
Robbins	0.067	0.046	0.039	37	10
Maxwell	2.39	2.00	0.760	60	42
Williams	2.02	0.517	0.388	38	25
Davis	<MDL	<MDL	<MDL	32	1

Methyl Paraoxon

Trowbridge	<MDL	<MDL	<MDL	44	0
Robbins	<MDL	<MDL	<MDL	37	0
Maxwell	0.495	0.310	0.183	60	25
Williams	0.112	0.097	0.089	38	15
Davis	<MDL	<MDL	<MDL	32	0

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[a] MLD = Minimum Detection Limit. 0.02 ppt (0.2 ng/m^3) for methyl parathion and 0.05 ppt (0.5 ng/m^3) for methyl paraoxon

Table 11. Average Methyl Parathion Concentration
(ng/m^3)

DATE	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.2	C	C	C	C
5/9/86	<0.2	C	C	C	C
5/10/86	<0.2	C	C	C	C
5/12/86	0.53	0.72	6.65	1.03	<0.2
5/13/86	1.05	0.50	25.67	4.69	<0.2
5/14/86	0.54	0.50	21.53	21.75	<0.2
5/15/86	<0.2	0.37	13.80	5.56	<0.2
5/19/86	<0.2	<0.2	14.90	5.31	<0.2
5/20/86	<0.2	<0.2(A)	5.01	5.22	<0.2
5/21/86	1.10	0.22	13.97	4.74	<0.2
5/22/86	<0.2	0.25	7.72	1.45	<0.2
5/27/86	<0.2	B	2.13	1.34	<0.2
5/28/86	<0.2	<0.2	5.73	1.82	<0.2
5/29/86	<0.2	<0.2	2.84	B	<0.2
5/30/86	<0.2	<0.2	1.43	C	<0.2
6/2/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/3/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/4/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/5/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/9/86	<0.2	<0.2	<0.2	<0.2	C
6/10/86	<0.2	<0.2	<0.2	0.32	C
6/11/86	B	<0.2	0.71	0.66	C
6/12/86	0.50	<0.2	0.23	0.34	C

A: One Replicate Only
B: No Sample; Equipment Malfunction
C: No Sample Taken

Table 12. Methyl Parathion Average
(Parts Per Trillion)

DATE	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.019	C	C	C	C
5/9/86	<0.019	C	C	C	C
5/10/86	<0.019	C	C	C	C
5/12/86	0.049	0.067	0.619	0.096	<0.019
5/13/86	0.097	0.046	2.389	0.437	<0.019
5/14/86	0.050	0.046	2.004	2.024	<0.019
5/15/86	<0.019	0.034	1.284	0.517	0.018
5/19/86	<0.019	<0.019	1.387	0.494	<0.019
5/20/86	<0.019	<0.019(A)	0.466	0.486	<0.019
5/21/86	0.102	0.020	1.300	0.441	<0.019
5/22/86	<0.019	0.023	0.719	0.134	<0.019
5/27/86	<0.019	B	0.199	0.125	<0.019
5/28/86	<0.019	<0.019	0.533	0.169	<0.019
5/29/86	<0.019	<0.019	0.264	B	<0.019
5/30/86	<0.019	<0.019	0.133	C	<0.019
6/2/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/3/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/4/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/5/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/9/86	<0.019	<0.019	<0.019	<0.019	C
6/10/86	<0.019	<0.019	0.015	0.030	C
6/11/86	B	<0.019	0.066	0.061	C
6/12/86	0.046	<0.019	0.021	0.031	C

A: Only One Replicate
B: Equipment Malfunction
C: No Sample Taken

Table 15. Average Methyl Paraoxon Concentration
(ng/m^3)

DATE	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.5	C	C	C	C
5/9/86	<0.5	C	C	C	C
5/10/86	<0.5	C	C	C	C
5/12/86	<0.5	<0.5	<0.5	<0.5	<0.5
5/13/86	<0.5	<0.5	2.32	1.14	<0.5
5/14/86	<0.5	<0.5	0.83	0.75	<0.5
5/15/86	<0.5	<0.5	4.9	0.87	<0.5
5/19/86	<0.5	<0.5	1.31	<0.5	<0.5
5/20/86	<0.5	<0.5(A)	0.68	0.93	<0.5
5/21/86	<0.5	<0.5	1.41	0.98	<0.5
5/22/86	<0.5	<0.5	3.07	<0.5	<0.5
5/27/86	<0.5	B	<0.5	<0.5	<0.5
5/28/86	<0.5	<0.5	1.15	0.72	<0.5
5/29/86	<0.5	<0.5	0.65	B	<0.5
5/30/86	<0.5	<0.5	0.30	C	<0.5
6/2/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/3/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/4/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/5/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/9/86	<0.5	<0.5	<0.5	<0.5	C
6/10/86	<0.5	<0.5	<0.5	<0.5	C
6/11/86	B	<0.5	<0.5	<0.5	C
6/12/86	<0.5	<0.5	<0.5	<0.5	C

A: One Replicate Only
B: No Sample; Equipment Malfunction
C: No Sample Taken

Table 16. Methyl Paraoxon PPT Average

	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.05	C	C	C	C
5/9/86	<0.05	C	C	C	C
5/10/86	<0.05	C	C	C	C
5/12/86	<0.05	<0.05	<0.05	<0.05	<0.05
5/13/86	<0.05	<0.05	0.235	0.112	<0.05
5/14/86	<0.05	<0.05	0.084	0.074	<0.05
5/15/86	<0.05	<0.05	0.495	0.086	<0.05
5/19/86	<0.05	<0.05	0.132	<0.05	<0.05
5/20/86	<0.05	<0.05(A)	0.069	0.092	<0.05
5/21/86	<0.05	<0.05	0.142	0.097	<0.05
5/22/86	<0.05	<0.05	0.310	0.05	<0.05
5/27/86	<0.05	B	<0.05	<0.05	<0.05
5/28/86	<0.05	<0.05	0.118	0.071	<0.05
5/29/86	<0.05	<0.05	0.066	B	<0.05
5/30/86	<0.05	<0.05	<0.05	C	<0.05
6/2/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/3/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/4/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/5/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/9/86	<0.05	<0.05	<0.05	<0.05	C
6/10/86	<0.05	<0.05	<0.05	<0.05	C
6/11/86	B	<0.05	<0.05	<0.05	C
6/12/86	<0.05	<0.05	<0.05	<0.05	C

A: Only One Replicate
B: Equipment Malfunction
C: No Sample Taken

Table 17. Methyl Parathion Replicates, Averages and Standard Deviations For Maxwell Site (ng/m³)

DATE	A	B	C	AVG	STD
5/12/86	4.47	7.00	8.49	6.65	2.03
5/13/86	22.20	24.70	30.10	25.67	4.04
5/14/86	20.10	21.30	23.20	21.53	1.56
5/15/86	12.40	14.10	14.90	13.80	1.28
5/19/86	14.50	15.20	15.00	14.90	0.36
5/20/86	5.52	5.48	4.02	5.01	0.85
5/21/86	15.50	12.00	14.40	13.97	1.79
5/22/86	8.57	6.80	7.80	7.72	0.89
5/27/86	2.35	2.35	1.70	2.13	0.38
5/28/86	4.74	4.98	7.46	5.73	1.51
5/29/86	2.97	2.78	2.77	2.84	0.11
5/30/86	1.31	1.83	1.15	1.43	0.36
6/2/86	<0.2	<0.2	<0.2	---	---
6/3/86	<0.2	<0.2	<0.2	---	---
6/4/86	<0.2	<0.2	<0.2	---	---
6/5/86	<0.2	<0.2	<0.2	---	---
6/9/86	<0.2	<0.2	<0.2	---	---
6/10/86	<0.2	<0.2	0.47	---	---
6/11/86	0.710	0.712	0.705	0.71	0.00
6/12/86	<0.2	0.37	0.31	0.34	---

Table 18. Methyl Paraoxon Replicates, Averages, and Standard Deviations for Maxwell Site (ng/m³)

DATE	A	B	C	AVG	STD
5/12/86	<0.5	<0.5	<0.5	---	---
5/13/86	1.80	2.50	2.65	2.31	0.45
5/14/86	0.53	0.85	1.10	0.82	0.28
5/15/86	7.79	<0.5	6.91	4.90	4.26
5/19/86	1.41	0.51	2.01	1.71	0.76
5/20/86	0.72	0.82	0.50	0.68	0.16
5/21/86	1.86	<0.5	2.36	1.41	1.24
5/22/86	2.97	2.34	3.89	3.06	0.78
5/27/86	<0.5	<0.5	<0.5	---	---
5/28/86	1.68	1.76		1.72	---
5/29/86	0.61	0.69	0.64	0.65	0.04
5/30/86	<0.5	<0.5	0.91	---	---
6/2/86	<0.5	<0.5	<0.5	---	---
6/3/86	<0.5	<0.5	<0.5	---	---
6/4/86	<0.5	<0.5	<0.5	---	---
6/5/86	<0.5	<0.5	<0.5	---	---
6/9/86	<0.5	<0.5	<0.5	---	---
6/10/86	<0.5	<0.5	<0.5	---	---
6/11/86	<0.5	<0.5	<0.5	---	---
6/12/86	<0.5	<0.5	<0.5	---	---

State of California

Memorandum

To : Clare Berryhill, Director
Department of Food and Agriculture

Date : May 11, 1987

Subject : ARB Monitoring of Methyl Parathion

James D. Boyd
Executive Officer

From : Air Resources Board

In response to your request of February 13, 1985, the ARB has conducted air monitoring for pesticidal uses of methyl parathion. This request was made by the Department of Food and Agriculture (DFA) pursuant to Division 7, Chapter 3, Article 1.5, Section 14021. The monitoring results and additional background information are included in the summary table of this memorandum and in Attachments I, II and III. By memorandum dated December 12, 1985, your staff recommended changes to the sampling schedule. To compensate for this change in schedule, your staff requested that the methyl parathion monitoring results be submitted by April 1987. We have included those memorandums in Attachment I for your reference.

The methyl parathion monitoring was conducted by the University of California at Davis (UCD) under contract to the ARB. Several actions were taken by ARB and UCD staff to select possible sampling sites. These actions included numerous meetings with DFA staff, telephone conversations with representatives of the Agricultural Commissioners Office of the appropriate counties, and aerial and ground surveys of possible site locations. A chronology of these events has been included as Attachment II.

Four locations in Colusa and Sutter Counties were selected as sampling sites. A background site was selected at the UCD campus. Twenty-four hour air sampling was conducted four days each week from May 12, 1986 to June 12, 1986. Sampling was conducted to coincide with methyl parathion applications to rice fields for control of fresh water shrimp. The complete results of the monitoring and analysis by UCD are included in Attachment III.

If you have questions regarding this submittal, please contact me at 5-4383 or have your staff contact Bill Loscutoff at 2-6023.

Attachments

cc: Dr. Michael Lipsett, DHS

Attachments to the Transmittal Memorandum on
Methyl Parathion Monitoring Data

April 1987

Attachment I: Correspondence Regarding Request and Transmittal of Data

Attachment II: Chronology of Events

Attachment III: UCD Report on Ambient Concentrations of Methyl Parathion

Attachment I

Correspondence Regarding Request and
Transmittal of Data

Summary Table

Sampling Results of Methyl Parathion
(in Parts Per Trillion)

Site	Maximum Positive	Second Highest Positive	Average	Total No. of Samples	No. Samples Above MDL[1/]
Methyl Parathion					
Trowbridge	0.204	0.195	0.138	22	5
Robbins	0.067	0.046	0.039	19	6
Maxwell	2.39	2.00	0.760	18	15
Williams	2.02	0.494	0.388	18	13
Davis	0.038	<MDL	<MDL	16	1
Methyl Paraoxon					
Trowbridge	<MDL	<MDL	<MDL	22	0
Robbins	<MDL	<MDL	<MDL	19	0
Maxwell	0.193	0.160	0.088	20	7
Williams	0.106	0.091	0.084	18	6
Davis	<MDL	<MDL	<MDL	16	0

1/ MDL = Minimum Detection Limit = 0.02 ppt (0.2 ng/m^3) for methyl parathion and 0.05 ppt (0.5 ng/m^3) for methyl paraoxon.

emorandum

: Gordon Duffy, Chairman
Air Resources Board
1102 Q Street
Sacramento, CA 95814

RECEIVED
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Date : February 13, 1985

Place : Sacramento

: Department of Food and Agriculture

ect: Department Selection of First Candidate Pesticide for Evaluation in 1984-85 Under Tanner AB 1807/AB 3219 - Toxic Air Contaminants

The Department has completed the selection process for the first candidate pesticide from the list of pesticides sent to you on July 26, 1984. This letter is a formal request to the State Air Resources Board to begin documenting levels of airborne emissions and levels of public exposure to the pesticides parathion and methyl parathion.

Discussions between our staffs have resulted in the agreement that a complete documentation of levels throughout all seasons of usage will require up to a fifteen (15) month timeframe. Therefore, we will require this data on or before May 13, 1986.

My staff will be in contact with yours to identify usage areas and patterns as well as supply technical information on analytical procedures currently used by our Department.

Clare Berryhill
Director
(916) 445-7126

cc Stanley Cubanski, Acting Director, DPS
Emil Mrak, Chairman/Scientific Review Committee

emorandum

: Bill Loscutoff
Chief
Toxic Pollutants Branch
Air Resources Board
1102 Q Street
Sacramento, CA 95814

Date : December 12, 1985

Place : Sacramento

: Department of Food and Agriculture - 1220 N Street
Sacramento, CA 95814

: Extension of the Ethyl Parathion Sampling Period

In view of recent changes in our recommended sampling schedule, we feel February 15, 1987, and April 15, 1987 would now be appropriate for your submittal of ethyl and methyl parathion monitoring data, respectively. In the case of ethyl parathion, this is an extension of nine months to insure that initial monitoring effects are successful in view of the two distinct but widely spaced periods of recommended monitoring (Attachment).

Also, because the EPA may withdraw the federal pesticide registrations of both ethylene dichloride (EDC) and carbon tetrachloride on January 1, 1986, and because ARB monitoring of canceled compounds will not be required, supplemental schedule changes may follow the EPA determination.

If you have any questions, please feel free to contact Peter Stoddard at 324-8916.

Ronald Oshima
Branch Chief
Environmental Monitoring and
Pest Management, Room A-149
(916) 324-8921

Attachment

cc: Lori Johnston
Peter Venturini
Bob Barham
Peter Stoddard

DEC 17 1985

State of California

Memorandum

To : William Loscutoff, Chief
Toxic Pollutants Branch
Air Resources Board
1102 Q Street
Sacramento, CA 95814

Date : December 24, 1985

Place : Sacramento

From : Department of Food and Agriculture - 1220 N Street
Sacramento, CA 95814

Subject : ARB Monitoring for Methyl Parathion (Reference 2315)

Methyl parathion is an organic phosphate insecticide-acaricide that has been in use since the late 1940s. It is an active ingredient in 106 currently registered products and is formulated into dusts, granules, wettable powders and emulsifiable concentrates. Emulsifiable concentrate formulations are preferred for field and row crops. Methyl parathion has no appreciable use in orchards and most products are not registered for use on orchard crops. Products which contain both ethyl and methyl parathion receive substantial use in the Imperial Valley.

Methyl parathion is sold under many different trade names, such as: Bac E-M Parathion 6-3, Durham Methyl Parathion Granules 2, Methyl Parathion 25W, Helena Gunter 6-3, Helena Hels-Mate, Methyl Parathion 5 EC, Metaspsray 5E, Pencap-M Microencapsulated Insecticide, Puregro Methyl Parathion 4E, Soilserv Metaphos 50, Red-Top Trion 6 Spray and Barricade Emulsifiable Concentrate Insecticide. Such products are used on many row and field crops, some of which may receive multiple applications on an as needed basis. Depending on crop and application rate, commodities treated with methyl parathion may not be harvested for one to three weeks following treatment.

Since methyl parathion is highly toxic to mammals (LD_{50} oral 9-14 mg/kg), a 24 hours field reentry interval is mandated, and if over 1# of active ingredient is applied, a 14 day reentry interval is required. Methyl parathion has a shorter residual life than ethyl parathion, but is said to control a broader range of insect pests. This material's low cost accounts for much of its popularity. For many insects-pests, other materials have replaced methyl parathion because of insect resistance and a desire to maintain beneficial insect populations.

Methyl parathion is a category one restricted material and may only be used under permit and use conditions administered by the County Agricultural Commissioner. Regulatory procedures require users to file a pesticide use report with the county when this material is applied. The annual Pesticide Use Report published by the CDFA is based on these individual reports to the counties. Table 1, Methyl

SURNAME

Parathion Use, summarizes use report data for 1982, 1983, 1984. Table 2, Methyl Parathion Use Pattern, contains information on application rates, tank mixtures, application methods and timing, and counties with major crop acreages which require methyl parathion application.

Recommendation:

Use patterns for this pesticide suggest that sampling would be most productive in May-June when methyl parathion is used in rice. Therefore, we recomend that you monitor as follows:

County	Crop	Month
Colusa, Sutter	Rice	May or June

Ronald J. Oshima
Branch Chief
Environmental Monitoring &
Pest Management, Room A-149
(916) 324-8921

Attachments

cc: Peter Venturini
Bob Barham
Peter Stoddard

TABLE 1. METHYL PARATHION USE

	1982		1983		1984	
	Total Pounds Ai		Total Pounds Ai		Total Pounds Ai	
	247,898 1/		170,886 1/		229,605 1/	
		% Use		% Use		% Use
Rice	101,342	40.9	53,407	31.3	73,583	32
Alfalfa	28,348	11.4	31,315	18.3	35,846	15.6
Tomato	24,927	10.1	14,714	8.6	18,698	8.1
Lettuce	18,840	7.5	18,831	11.0	18,122	7.9
Cotton	18,037	7.3	9,076	5.3	17,818	7.8
Artichoke	10,517	4.2	10,062	5.9	17,251	7.5
Sugarbeet 2/	10,570	4.3	12,005	7.0	16,923	7.4
Onion	5,169	2.1	3,374	2.0	6,881	3.0
	CUMULATIVE %	87.9	CUMULATIVE %	89.4	CUMULATIVE %	89.3

SOURCE: 1982, 1983, 1984 Pesticide Use Reports

1/ Active ingredient

2/ Public Health use for 1982=3.1%, 1983=2%, 1984=1.2%

TABLE 2. METHYL PARATHION USE PATTERN

Crop	Application Rate in Ai/Ac[1/]	Tank Mixture	Application Method	Application Timing	Counties with Highest Acreages[2/]
Rice	1/4#-1/2#	3-7 gal water	Aircraft	May	Colusa, Butte, Sutter, Glenn, Yolo
Alfalfa	1/3# to 1#	3-7 gal water	Aircraft	VARIES Imperial, Feb-Mar Kern, Mar-Apr	Imperial, Tulare, Kern Fresno, Siskiyou
		20-50 gal water	BOOM SPRAYER		
Tomato	1/2# to 1-1/2#	3-7 gal water	Aircraft	July-Aug	Fresno, Yolo, San Joaquin, Suter, Solano
		20-50 gal water	BOOM SPRAYER		
Lettuce (head & leaf)	1/2# to 1#	3-7 gal water	Aircraft	No Monterey Use Imperial, Sept-Oct	Monterey, Imperial, Fresno, Riverside
		20-50 gal water	BOOM SPRAYER		
Cotton	1/2# to 1-1/2#	3-7 gal water	Aircraft	Imperial, Sept-Oct San Joaquin, July-Aug	Fresno, Kern, Kings, Tulare, Merced, Madera Imperial
		20-50 gal water	BOOM SPRAYER		
Artichoke	1#	3-7 gal water	Aircraft	VARIES Highest use Sept Oct	Monterey, San Mateo Santa Cruz, Santa Barbara
		20-50 gal water	BOOM SPRAYER		
Sugarbeet	1/3# to 1/2#	3-7 gal water	Aircraft	VARIES Imperial, Sept-Oct	Imperial, San Joaquin, Solano, Yolo, Fresno
		20-50 gal water	BOOM SPRAYER		
Onion	1/2# to 7/8#	3-7 gal water	Aircraft	Minor use throughout season Kern, May-June	Fresno, Kern, Imperial, Riverside, San Joaquin
		20-50 gal water	BOOM SPRAYER		

1/ Pounds active ingredient per acre
2/ Ranked in descending order, 1984 base year

Source: 1984 California Crop & Livestock Reporting Service: County Agricultural Commissioner Report

Attachment II

Chronology of Events

ATTACHMENT II

Methyl Parathion Monitoring

Chronology of Major Events

Date	Event
June 28, 1984	Initial meeting of ARB and DFA staff regarding pesticide monitoring. ARB/DFA staff continue to meet on a monthy or bi-weekly basis depending on need.
July 26, 1984	DFA transmits list of Candidate Pesticides.
February 13, 1985	DFA requests ARB to monitor methyl parathion.
December 12, 1985	DFA requests the results of methyl parathion monitoring to be submitted by April 1987.
December 24, 1985	DFA transmits monitoring recommendation to ARB.
February 24, 1986	UCD submits draft work statement for methyl parathion monitoring.
March 27, 1986	UCD submits modified work statement.
April 18, 1986	ARB signs contract with UCD to conduct air sampling, including methyl parathion.
May 12, 1986	Sampling begins at all sites.
June 12, 1986	Sampling ends at all sites.
April 17, 1987	UCD submits final report to ARB.

Attachment III

UCD Report on Ambient Concentrations
of Methyl Parathion

FINAL REPORT TO THE AIR RESOURCES BOARD

PILOT ANALYSIS OF METHYL PARATHION IN AIR

CONTRACT # A5-169-43

DATE: APRIL 17, 1987

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Summary

Twenty-four hour air sampling for methyl parathion (O,O-dimethyl O-p-nitrophenyl phosphorothioate) was conducted at Trowbridge and Robbins in Sutter County, at Maxwell and Williams in Colusa County, and at a background site at the University of California in Davis (Figure A). Samples were also analyzed for the major transformation product, methyl paraoxon (O,O-dimethyl O-p-nitrophenyl phosphate). Three hour samples were collected at Maxwell on the Monday of each week.

Sampling was begun at all sites on May 12, 1986, and continued for four days each week until June 12, 1986. The sampling dates were during the time of year when methyl parathion was applied to rice fields for control of fresh water shrimp.

The highest concentrations of methyl parathion (2.39 parts per trillion) were found at the Maxwell site; the average of all samples at this site was 0.760 ppt. The Williams site had an average concentration approximately one-half that of the Maxwell site. Only two of the fourteen three hour sampling periods gave results above the minimum detectible limit. The highest three hour sample concentration was 0.69 ppt. The results are summarized in Table A.

Figure A. Air Sampling Locations

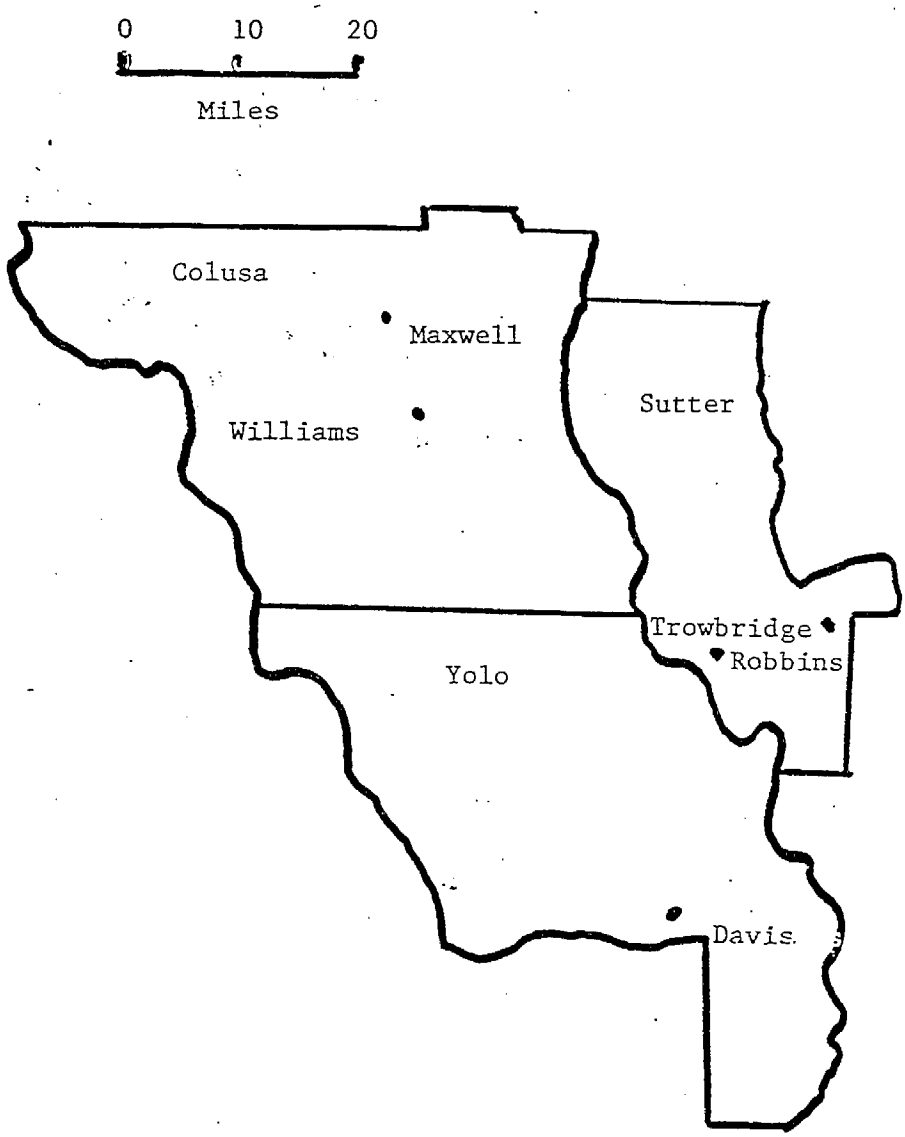


Table A. Summary of Air Concentrations of Methyl Parathion in Parts Per Trillion

	Maximum Positive	Second Highest Positive	Average	Total # of Samples	# Above MDL[a]
Trowbridge	~~0.204~~ .102	0.195	~~0.138~~ .069	22	5
Robbins	0.067	0.046	0.039	19	6
Maxwell	2.39	2.00	0.760	18	15
Williams	2.02	~~0.494~~ .517	0.388	18	13
Davis	0.038	<MDL	<MDL	16	1
		Methyl Paraoxon			
Trowbridge	<MDL	<MDL	<MDL	22	0
Robbins	<MDL	<MDL	<MDL	19	0
Maxwell	0.193	0.160	0.088	20	7
Williams	0.106	0.091	0.084	18	6
Davis	<MDL	<MDL	<MDL	16	0

[a] MLD = Minimum Detection Limit. 0.02 ppt (0.2 ng/m^3) for methyl parathion and 0.05 ppt (0.5 ng/m^3) for methyl paraoxon

INTRODUCTION

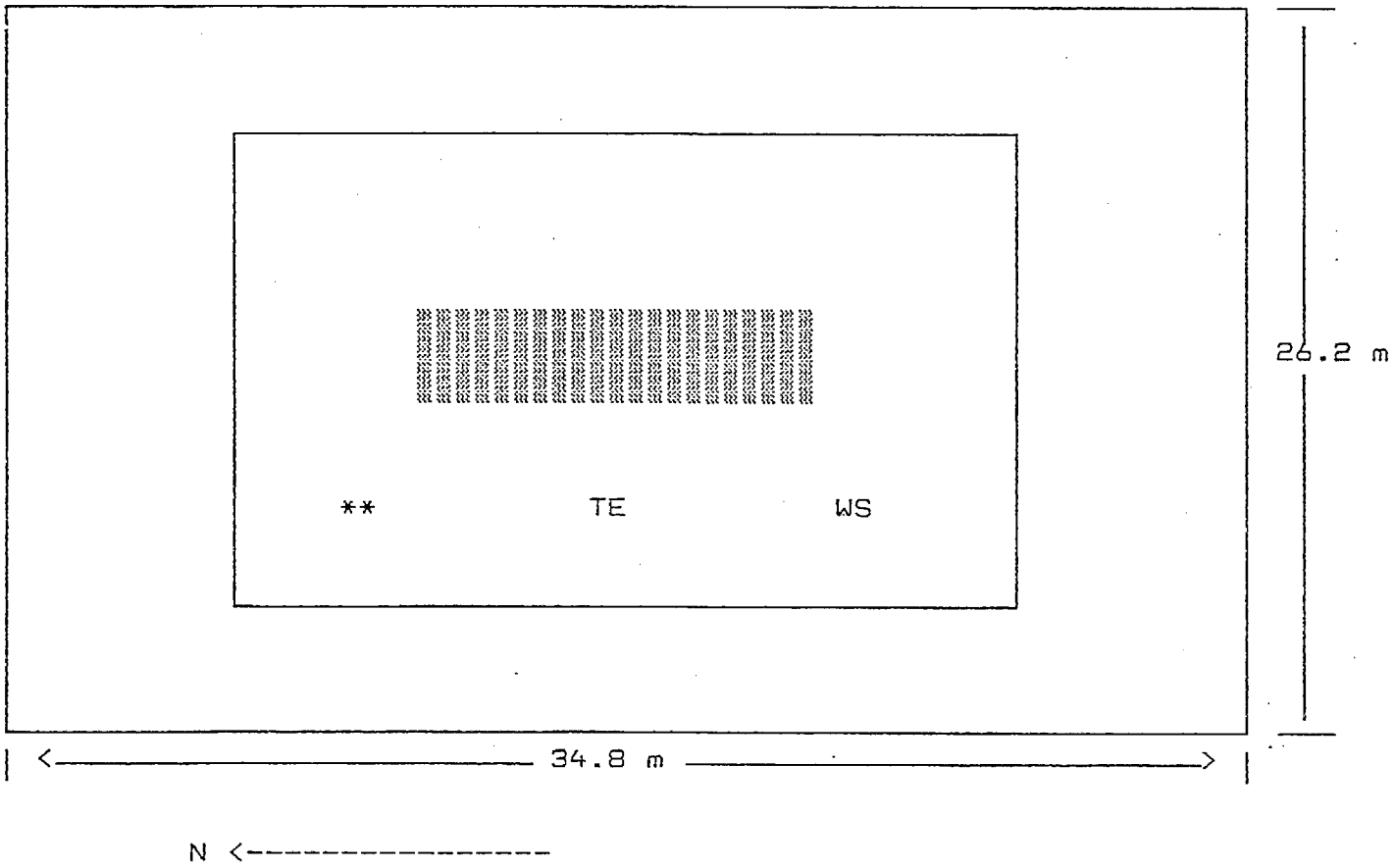
This report provides information on experimental methods and analytical data for air sampling done at two sites each in Colusa and Sutter Counties during May and June 1986. The purpose of the study was to obtain information on the airborne residue concentrations of methyl parathion and its metabolite, methyl paraoxon, from uses on rice in these two counties, as measured at the four sites. A background site was located on the University of California, Davis Campus.

EXPERIMENTAL

Sites: Four sites were selected; two each in Colusa County and two each in Sutter County. Maxwell High School and Williams City Hall were selected as the Colusa County sites (Figures 1-4) while Robbins Elementary School and East Nicolaus High School in Trowbridge were the sites for Sutter County (Figures 5-8). All four sites met the siting criteria set forth by the ARB and were approved by ARB project officers Lynn Baker and Tom Parker. Duplicate samplers were placed on the roofs at Trowbridge, Robbins and Williams. Triplicate samples were obtained at Maxwell. The utility shed behind the Department of Environmental Toxicology at U. C. Davis (Figure 9 and 10) was utilized as the background site.

Sampling: Equipment used for field sampling is summarized in Table 1. The sampling apparatus consisted of a 2 meter x 0.0127 m aluminum rod attached to a ring stand. A 2 m cross bar was attached to the rod about 1.67 m above the base of the ring stand. Teflon sampling cups, 4 cm in diameter X 12 cm deep, were capped to prevent sunlight from entering (opening in the cap was 1.1 cm). Samplers were attached to each end of the crossbar via laboratory clamps (figure 11). Guy wires anchored the samplers during windy conditions.

Figure 1. Roof Diagram for Maxwell HS



** SAMPLERS

TE TRAPPING EFFICIENCIES APPARATUS

WS METEOROLOGICAL INSTRUMENTATION

▒ AIR CONDITIONING UNIT

Figure 2. Area Map for Maxwell

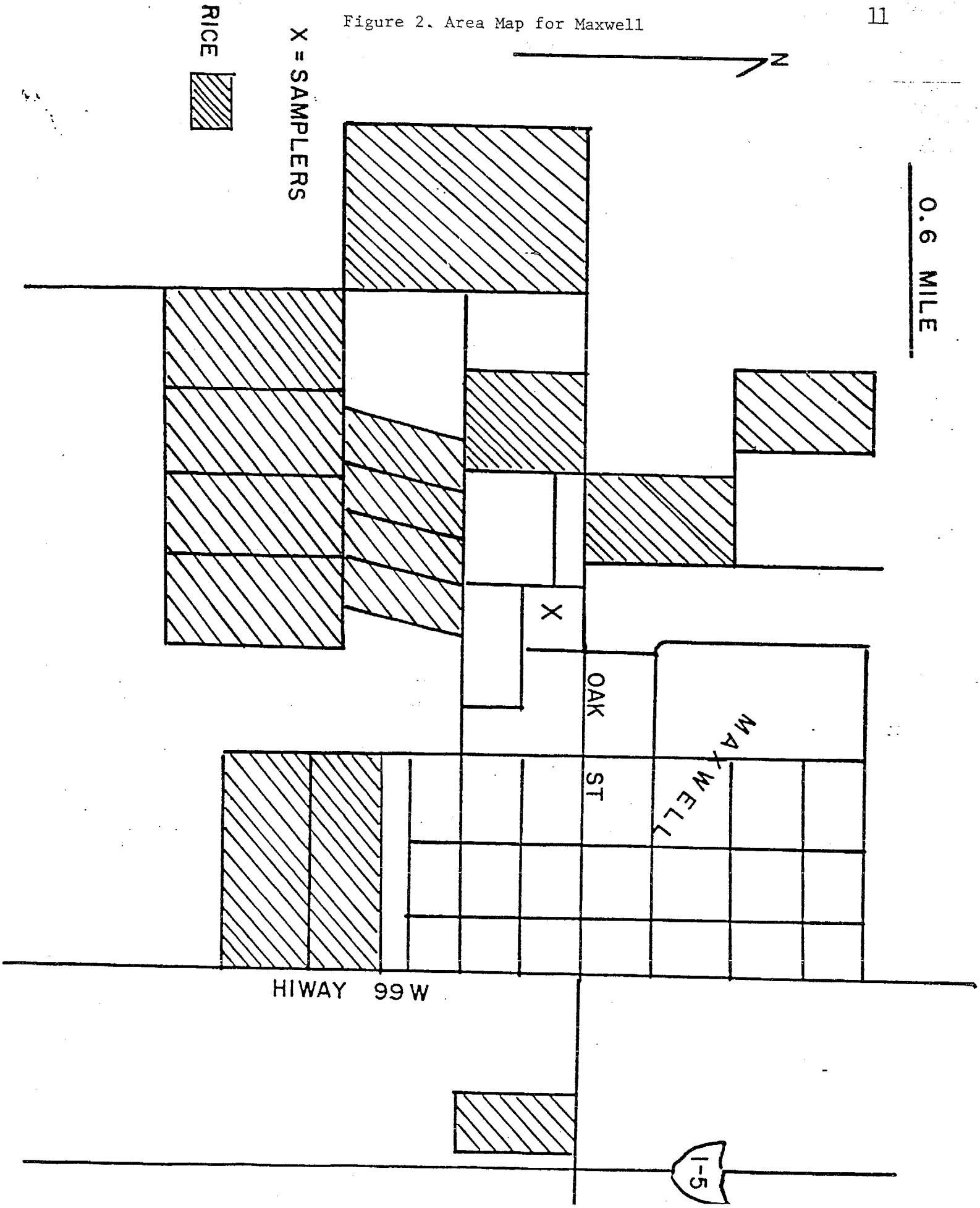
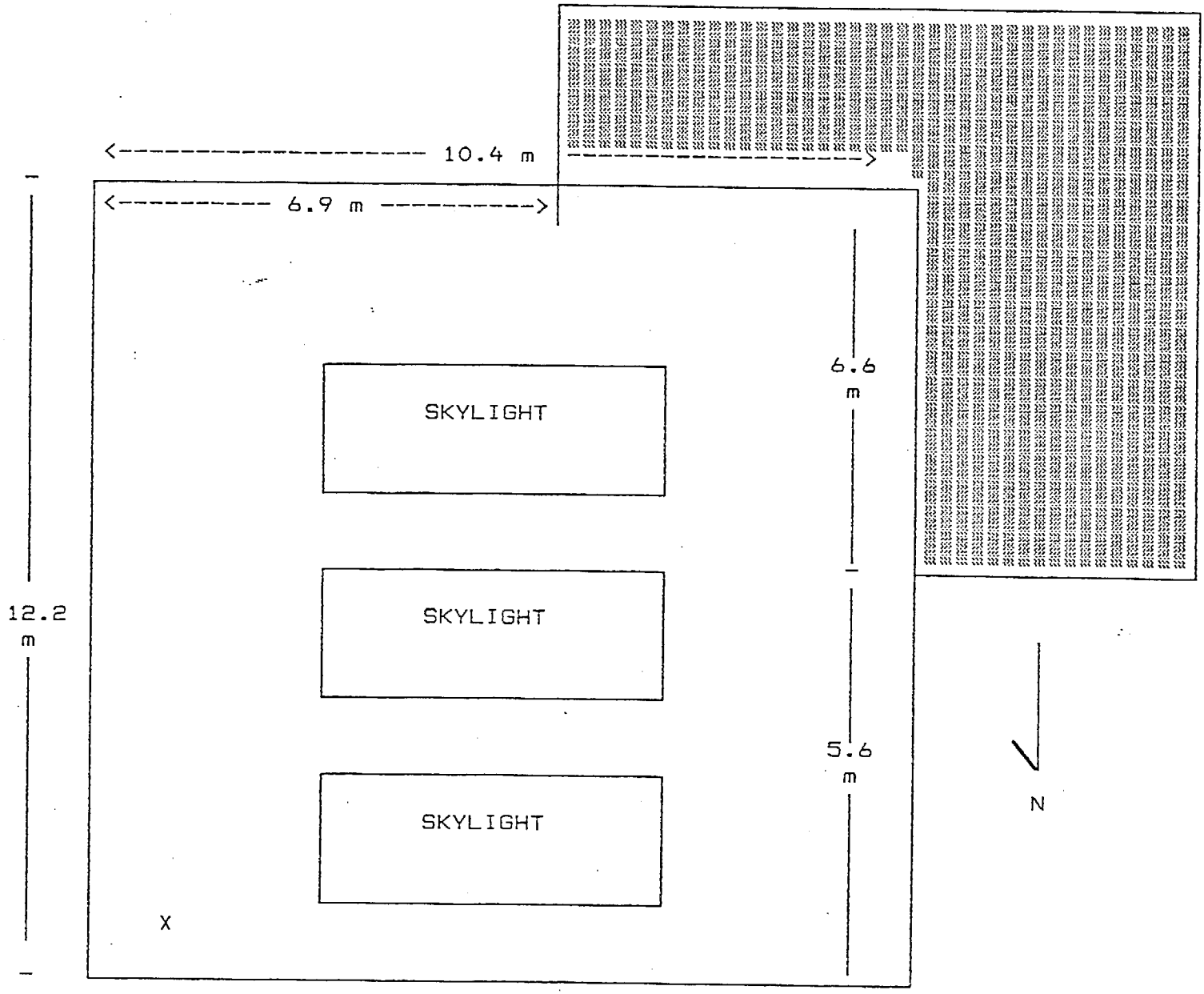


Figure 3. Roof Diagram for Williams City Hall



X SAMPLER

PART OF BUILDING ABOUT 3.7 m ABOVE SAMPLER ROOF

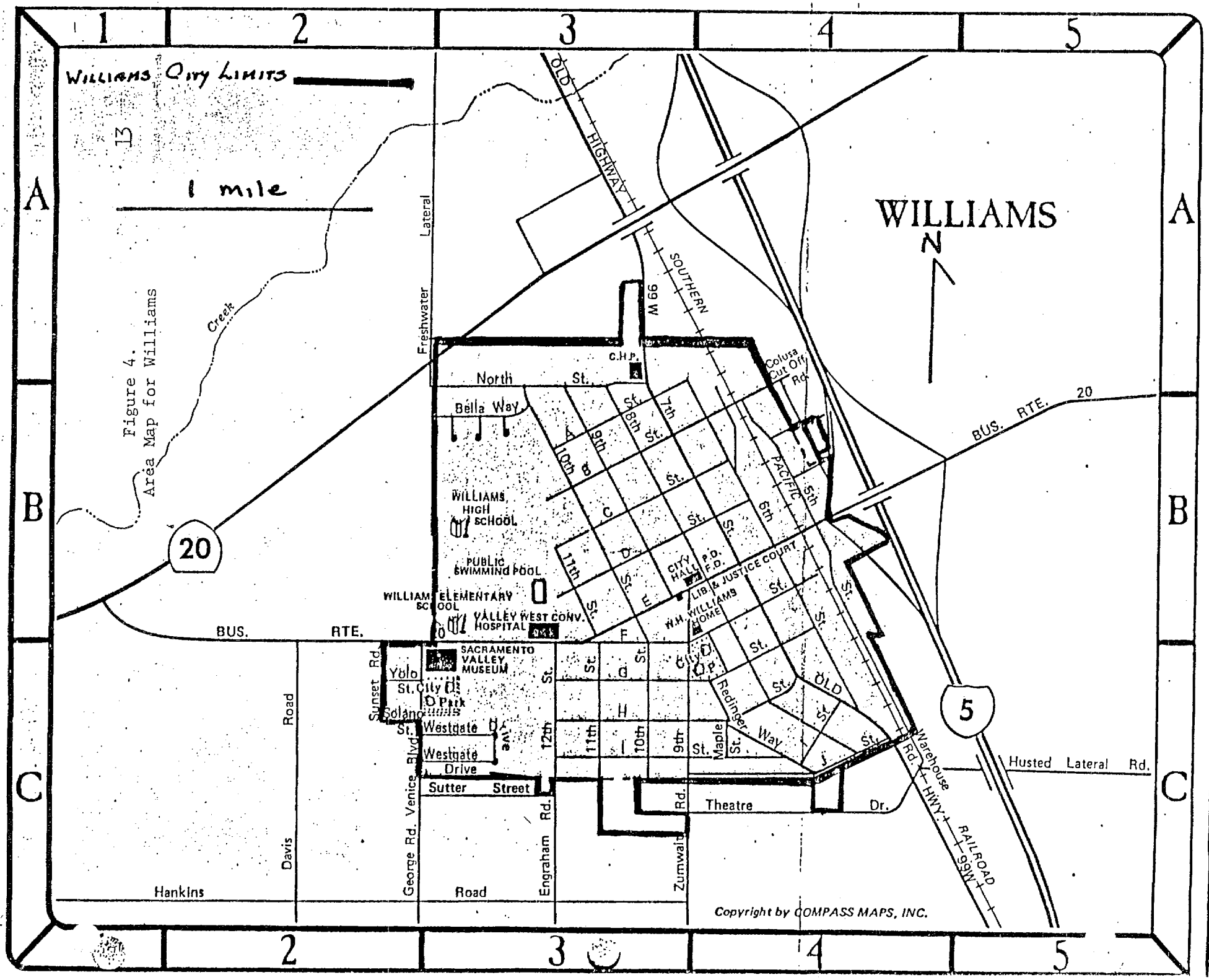
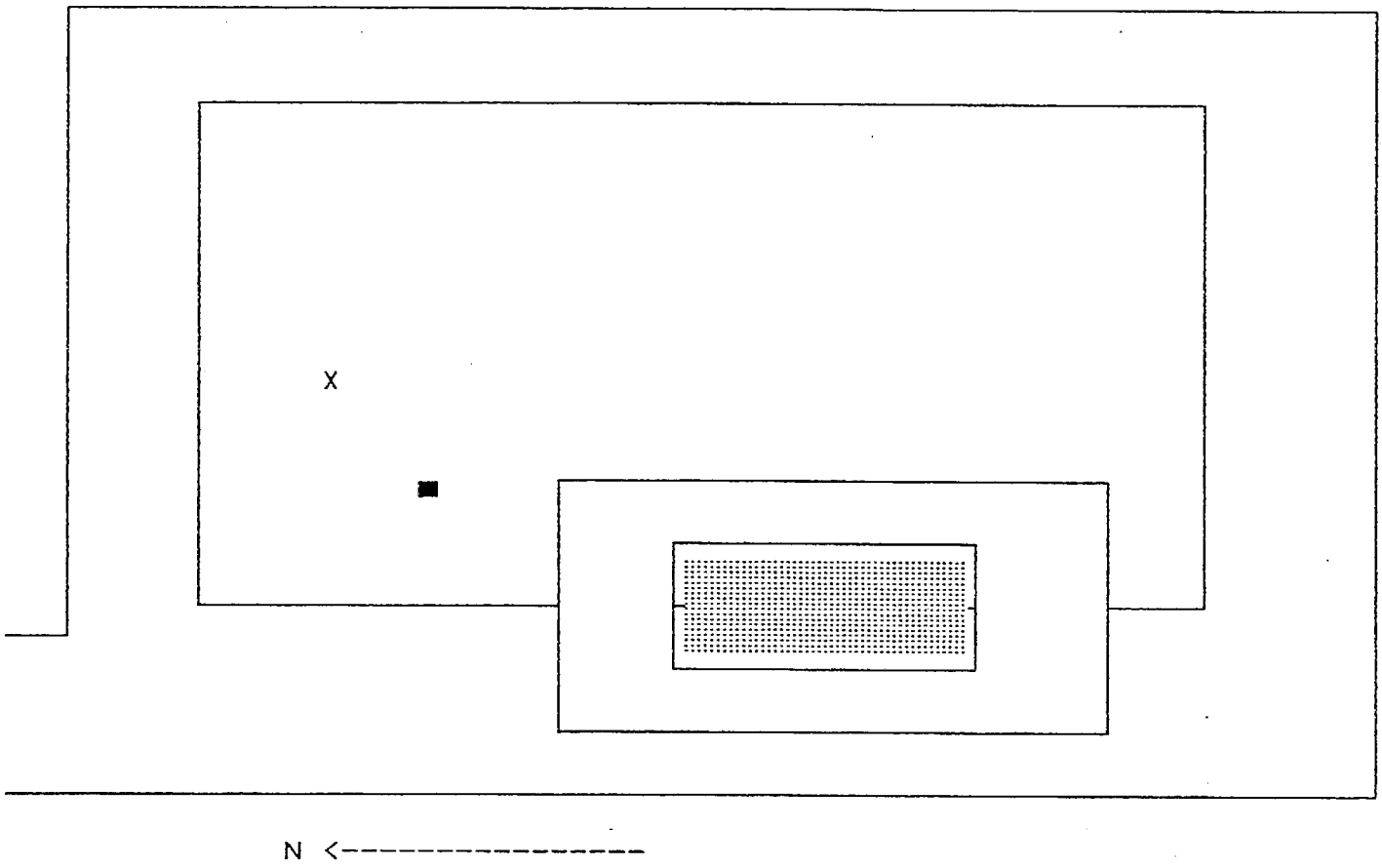

WILLIAMS CITY LIMITS
1 mile
WILLIAMS
N
Figure 4.
Area Map for Williams
Creek
Freshwater
Lateral
OLD
HIGHWAY
SOUTHERN
99 W
C.H.P.
North St.
Bella Way
Colusa Cut Off Rd.
BUS. RTE. 20
PACIFIC
WILLIAMS HIGH SCHOOL
PUBLIC SWIMMING POOL
WILLIAMS ELEMENTARY SCHOOL
VALLEY WEST CONV. HOSPITAL
CITY HALL
P.D.
F.D.
LIB. & JUSTICE COURT
W.H. WILLIAMS HOME
SACRAMENTO VALLEY MUSEUM
City Park
Yolo St.
Solano St.
Sunset Rd.
Westgate Drive
Sutter Street
Venice Rd.
George Rd.
Davis Road
Hankins Road
Engraham Rd.
Zumwalt Rd.
Theatre Dr.
Redinger Way
Maple St.
Warehouse Rd.
HWY. 99W
RAILROAD
Husted Lateral Rd.
20
5
Copyright by COMPASS MAPS, INC.

Figure 5. Roof Diagram for Robbins School



■ STAIRWELL

▒ AIR CONDITIONING UNIT

X AIR SAMPLING UNIT

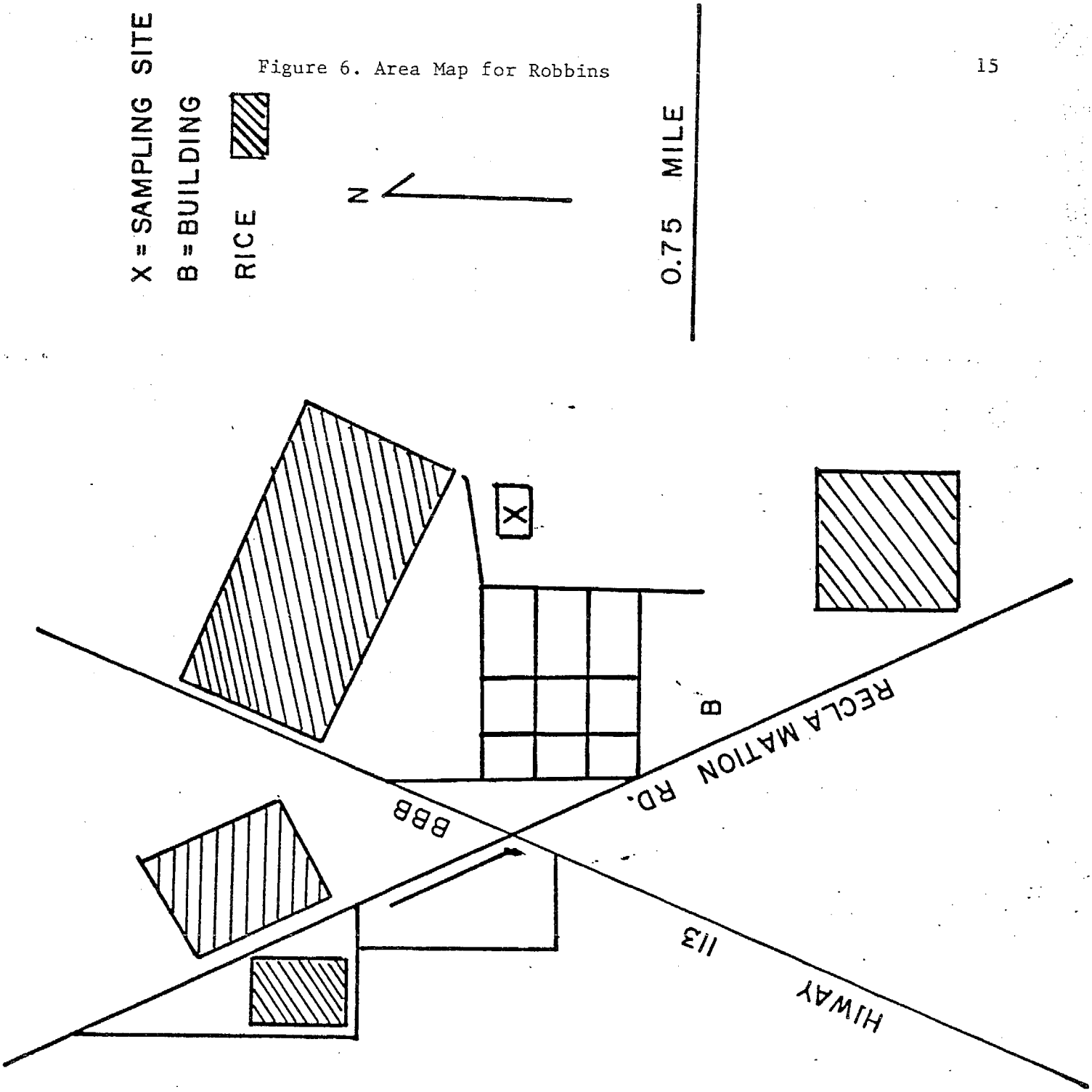
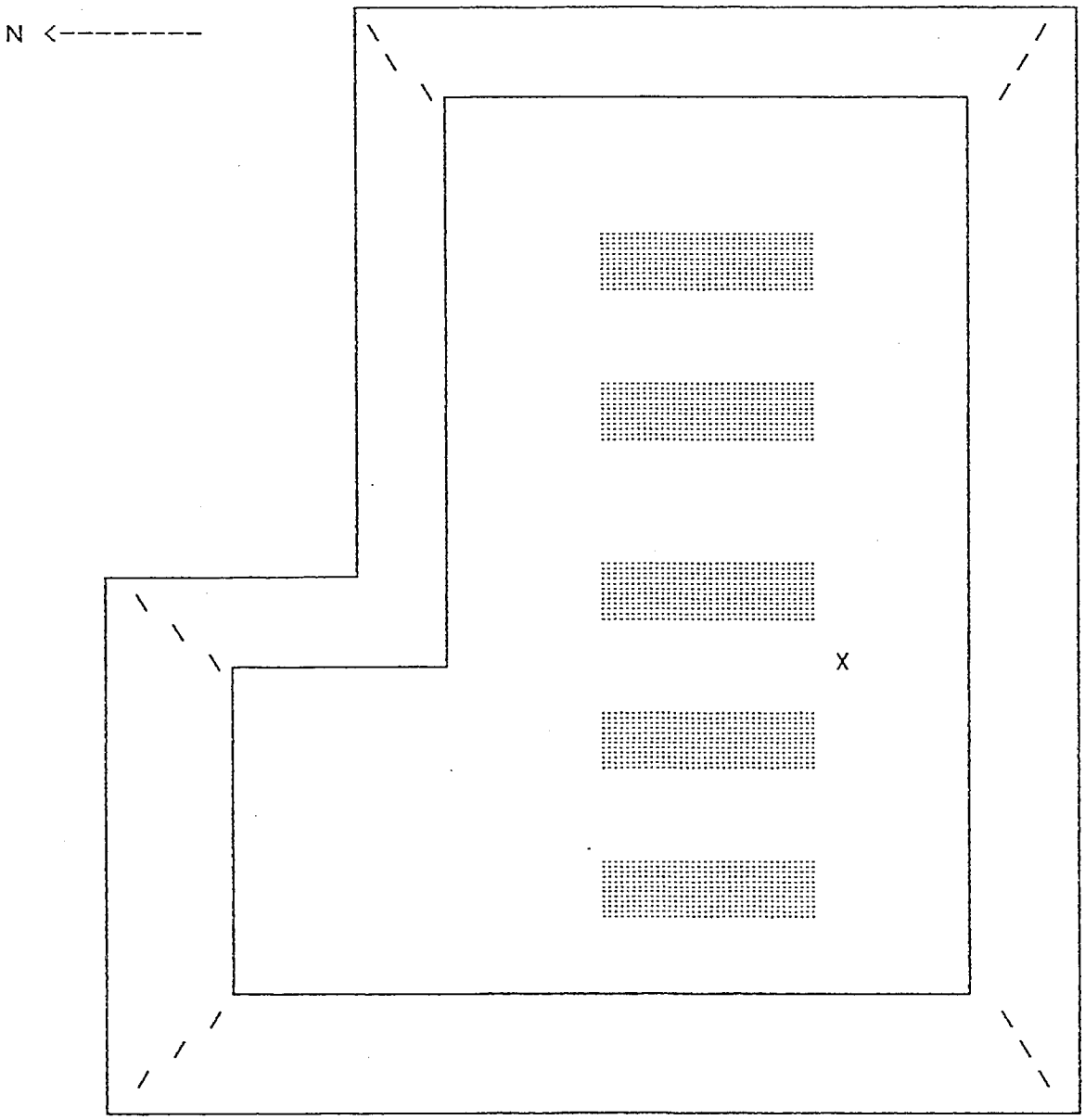


Figure 6. Area Map for Robbins

Figure 7. Roof Diagram for East Nicolaus HS



= AIR CONDITIONING UNIT

X = AIR SAMPLING UNIT

Figure 8. Area Map for Trowbridge

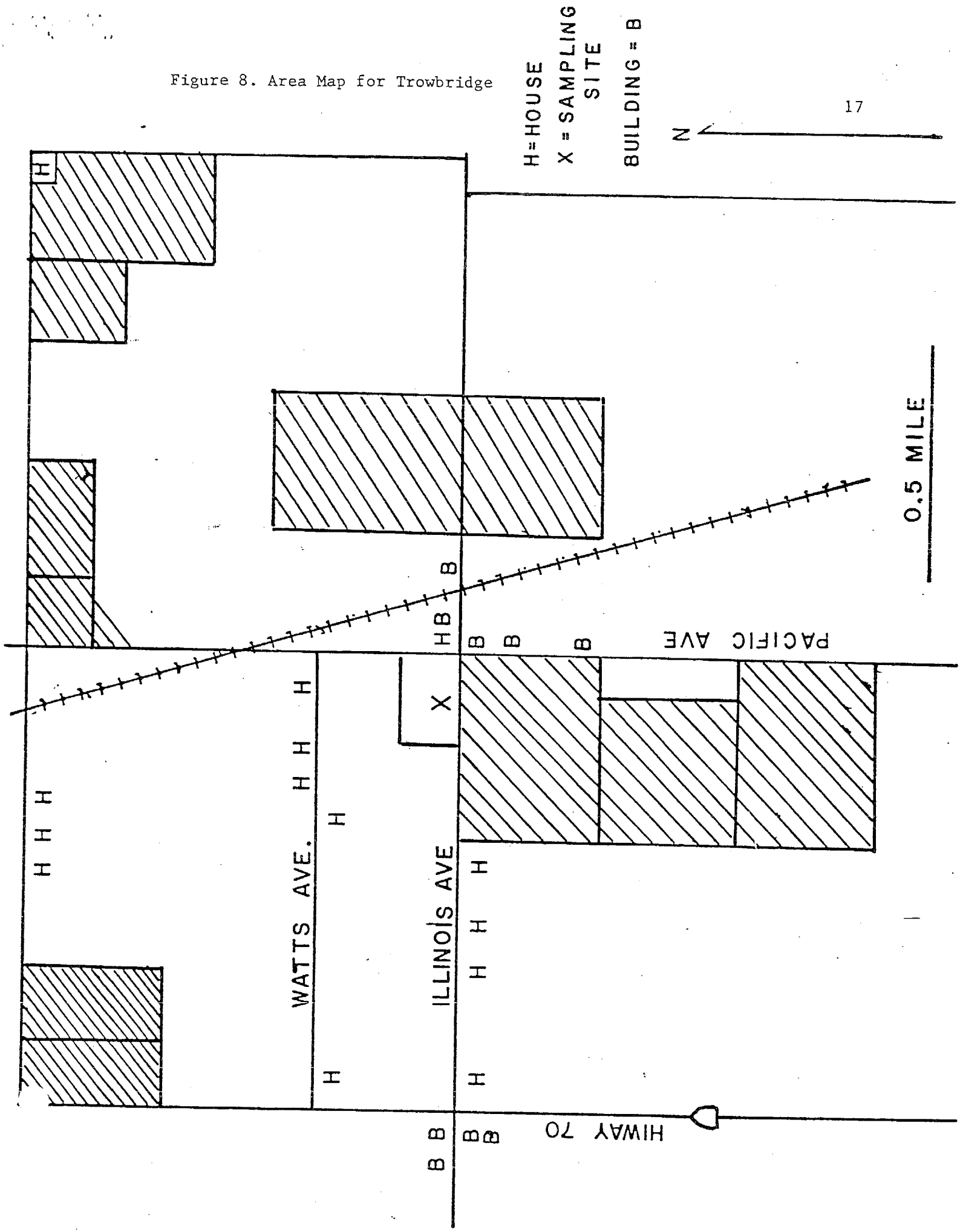


Figure 9. Roof Diagram of Background Sampler

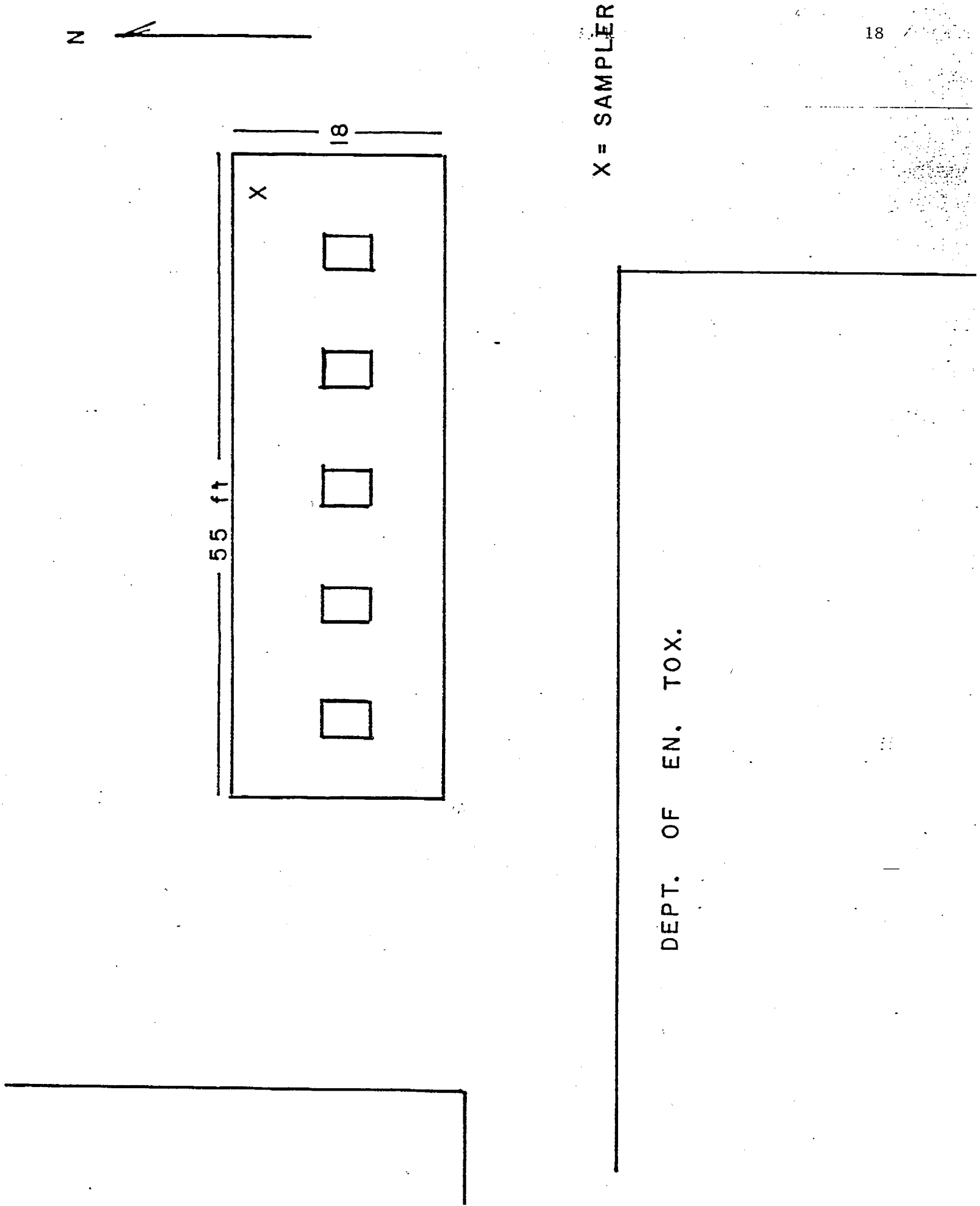


Figure 10. Area Map of U C Davis

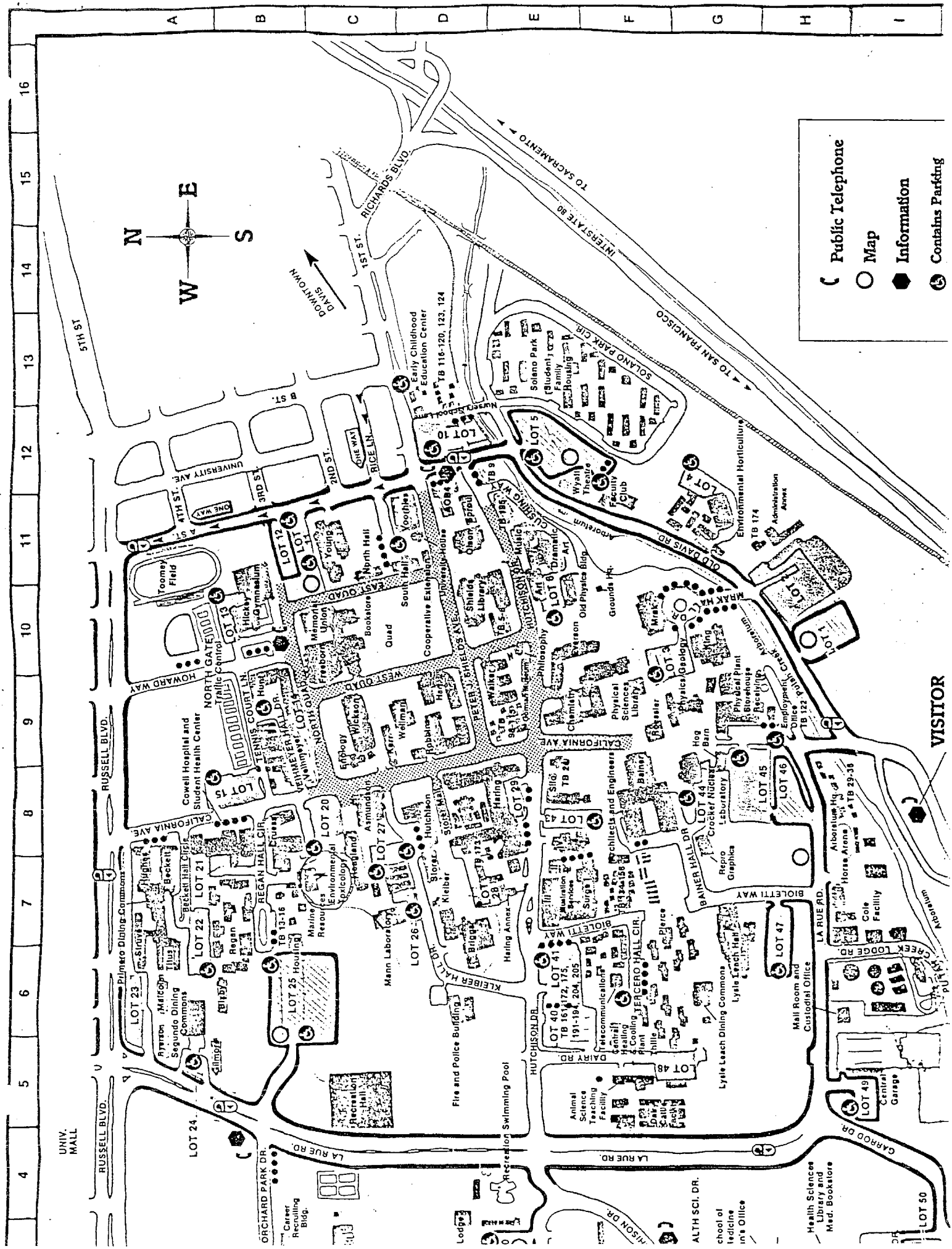


Table 1. List of Equipment for Field Work

1. Wind Profile Register system, model 104-LED-LM-DC

   CWT-1791 Thornthwaite and associates; Elmer, NJ

2. Microdatalogger model CR-21X Campbell Scientific, Logan Utah

3. Temperature probe , Model 107 Campbell Scientific, Logan, UT

4. High Volume air samplers, Model U-1/AT, BGI, Inc., Waltham, MA

5 High volume air samplers, Bendix Co., Baltimore, MD

6. XAD-4 Resin, Rohm and Hass, Philadelphia, PA

7. Low volume sampling cups (Gas dry hydrocarbon traps) Chemical Research Supplies, Inc, Addison Ill

8 Methanol, Acetone, Resi-grade, Baker Chemical Co.

9 Rotameter, model F-1500, Gilmont Instruments, Inc. Great Neck, NY

Sampling cups were connected to a high volume air sampling pump via Tygon tubing (1 cm i.d. x 1 mm wall x 1.25 cm o.d.). The pump was modified with either a 3 or 5 port manifold that allowed an air flow of approximately 50 lpm. Inline flow meters were installed at the request of ARB. One sampler at each site was labeled "B" and is the designated "primary sampler" as outlined in the ARB protocol. The "A" sampler is the duplicate sample. Cups were rinsed with pesticide grade acetone, dried then charged with 60 ml of XAD-4 resin. Glass wool was placed on top of the resin. This prevented dishing of the resin bed caused by the vortex created by air flows in a capped sampler.

The sampler was turned on, leaked checked and air flow measured.

The first site, East Nicolaus HS, was serviced by 6 am while the last, Williams, was completed by 9:30 am. Samplers were operated from Monday to Friday mornings for 24 hour period. Sampling cups were covered with aluminum foil when not in use.

Maxwell HS was selected as the analytical site because of the proximity of the school to the edge of town and because it was surrounded on 3 sides by rice fields. Triplicate samplers and meteorological equipment were set in place on the roof of the gym (Table 2 & 3). An apparatus to check the trapping of methyl parathion was also set up. Sampling periods were shortened to 3 hours, for at least 2 periods, instead of 24 hours periods on Mondays. One high volume air sample was taken on Monday.

Low volume flow rates were adjusted to 40 to 60 liters per minute, depending on the number of ports on the manifold on each high

volume sampler and the constrictions of the in-line rotometers. Care had to be taken to not cut off too much air circulation to the high volume air pump otherwise the pump would overheat and the samples lost.

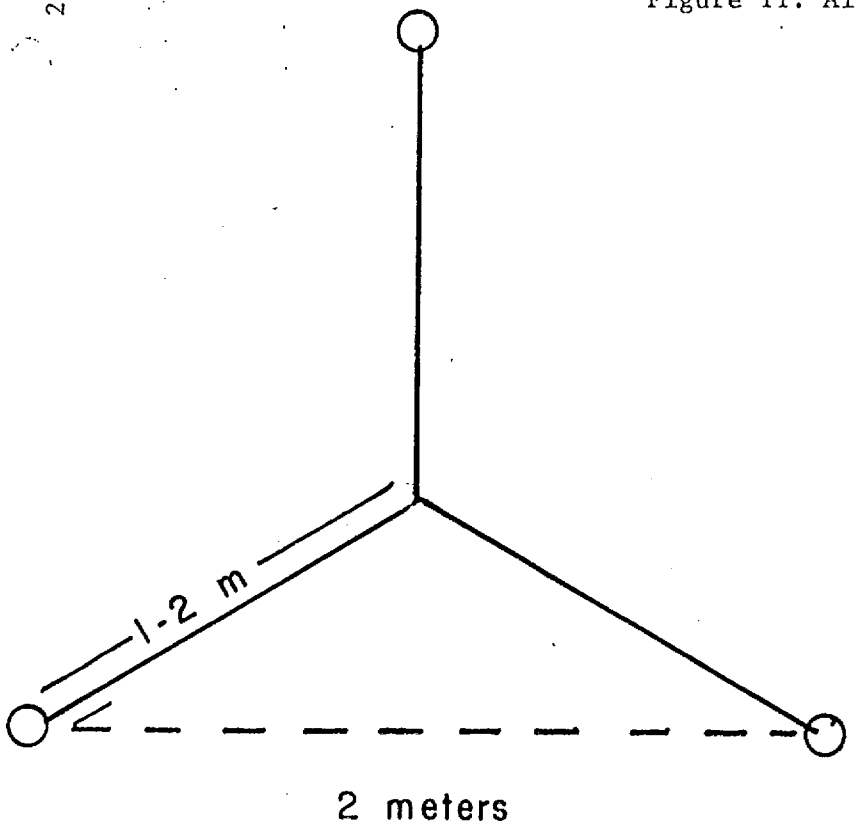
Air flows were measured at the beginning of each sampling period and at the end by attaching a flowmeter via Tygon tubing and a rubber stopper to the entrance of the sampling cup. The total air volume for the period was calculated by taking the average of the two rotameter readings and multiplying by the calibration equation for the rotameter, 0.850 X reading - 1.2, to convert flow rates to liters per minute, then multiplying by the sampling period duration for total air volume.

Meteorological Data: Other meteorological data was obtained from the California Irrigation Management Information System (CIMIS) for Colusa City and Nicolaus. The Colusa data is probably too far from monitoring sites to be useful. However, the Nicolaus data should be valid for the East Nicolaus HS site and possibly Robbins.

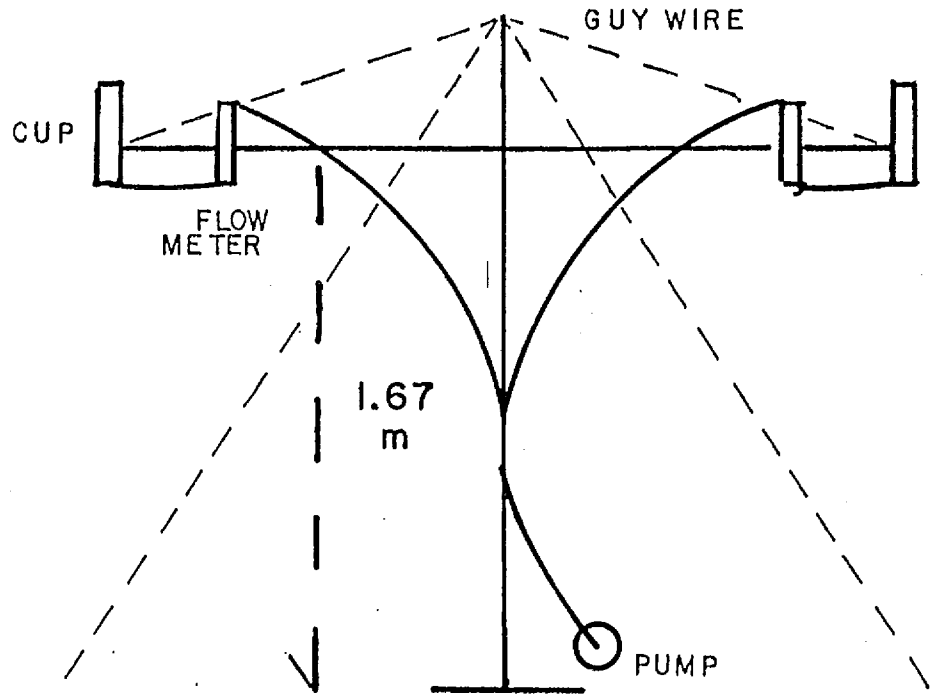
Use Data: Methyl parathion use data was obtained from pesticide use reports for both Colusa and Sutter Counties. Because of the overwhelming amount of data for the entire county, only selected data from townships within the regions of the sites were used. For example, Maxwell is split by the townships of T.17NR.3 W. and T.16NR.3 W. Therefore, the data from those townships plus the data from T.15NR.3 W., Williams, were analyzed.(Appendix A, Figures 16

and 17). Methyl parathion usage in Sutter County was minimal probably due the lack of water shrimp as a pest problem. Only three applications were reported during the months of May and June in Sutter County.

Figure 11. Air Sampling Mast Schematic



MAXWELL TOP VIEW



SAMPLER UNIT

Table 2. Height of Meteorological Instrumentation Above Roof Top

At Maxwell High School

Temperature probe	1.15 m
High anemometer	1.46 m
Low anemometer	0.99 m
Wind direction	1.82 m

Table 3. Location of Instruments on Maxwell Gym Roof

Heights of sampling cups above roof	CUP	HEIGHT
	A	1.65 m
	B	1.73 m
	C	1.65 m

Distance of sampling station to weather station: 8.8 m

Distance of sampling station to air conditioner: 5.5 m

Air conditioner dimensions:		
	height	1.78 m
	length	6.0 m
	width	3.1 m

LAB ANALYSIS

Extraction of Samples: The XAD - 4 resin from high and low volume air samples was extracted in the following manner: For low volume samples, 90 ml of ethyl acetate was added to the resin in a 250 ml Erlenmeyer flask and then swirled for 30 min. The solvent was decanted and filtered through Whitman number one filter paper into a 500 ml sample storage container. Fresh solvent(60 ml) was added to the flask and then swirled for 15 minutes. The solvent was then transferred and 50 ml more of fresh solvent was added and the flask was swirled once more for 10 minutes. For high volume samples, the initial volume of ethyl acetate was 150 ml while successive aliquots were 100 ml. The size of the flask was 500 ml. Samples were concentrated on a steam bath using a Kuderna Danish apparatus to approximately 6 ml. Further reduction of solvent, if necessary, was accomplished using a 3-ball micro Snyder column and volumes adjusted for analysis.

Gas Chromatography: Methyl parathion and the oxon of methyl parathion were analyzed on a Hewlett Packard 5710A with a nitrogen-phosphorous detector. The column was a 30 m x 0.31 mm DB-5 WCOT fused silica megabore with 0.25 micron film thickness. Flows for helium, air and hydrogen gases were 6, 70 and 5.5, ml/min respectively. Temperatures for injector, column and detector were 250, 210 and 250 °C, respectively.

A Tracor MT-220 with a flame photometric detector and a phosphorous filter(526 nm) was also used for methyl parathion analysis when there was a question of interference or need of confirmation for those samples that approached the limit of detection. The column was a 6 ft. x 1/8 inch 3 % OV - 210 on 80-100 mesh Chrom W HP. Flow rates, in ml/min, for nitrogen(carrier), air and hydrogen were 55, 80 and 60, respectively.

Quality Assurance: A four or five point standard curve was made using a variable volume injection technique. Samples were then double injected and the average of the two areas used to calculate the concentration of methyl parathion. A standard was injected after every other sample and compared to the original standard curve. The analysis was considered valid if the standard agreed within three per cent of the original standard curve. A recovery study (Table 4) was done

before any samples were extracted and resin spikes and blanks were done once a week.

Minimum detectible limit: The minimum detectable limit (MDL) for methyl parathion, was calculated as 0.2 ng/m³(0.019 ppt) based on the following: 0.10 nanograms was detectable in a 6 microliter injection with a total volume of 0.5 ml and a total air volume of 50 cubic meters. The MDL for methyl paraoxon was 0.5 ng/m³(0.05 ppt).

Recoveries: XAD resin was spiked at 2.0 and 0.10 micrograms of methyl parathion in triplicate. Resin was also spiked in triplicate at 0.10 micrograms of methyl paraoxon. Freezer spikes (Table 4) were done in triplicate by spiking resin with the parent and the oxon at 100 nanograms each on May 15 th then placing in the freezer at -20 °C for approximately 11 weeks.

Table 4. Recovery Data for Spikes and Freezer Study

Chemical	Spiked	Replicate 1	Replicate 2	Replicate 3	Average	Standard Deviation
Me Parathion	2.0 µg	90.6	97.9	104.2	97.6	6.8
Me Parathion	100 ng	106	110	118	111	6.1
Me Paraoxon	100 ng	81.0	111	68.1	86.7	22.0
		Freezer Spikes				
Me Parathion	100 ng	86.4	81.7	90.1	86.1	4.2
Me Paraoxon	100 ng	59.3	68.3	72.1	66.5	6.6

METHYL PARATHION TRAPPING EFFICIENCY

To determine the trapping efficiency of methyl parathion using XAD-4, 60 ml and 2 - 30 ml of the adsorbent was placed in separate Teflon cartridges, which were connected to the manifold of a high volume air sampler. Up stream of the adsorbent was a wad of glass wool which was spiked with 40 µl of a 20.2 ng/µl methyl parathion standard in ethyl acetate (Figure 12). Air was drawn through the spiked glass wool and XAD-4 at a rate of about 50 liters per minute for 22 to 24 hours, during which time a thermograph was used to record air temperature fluctuations (Figure 13). The XAD-4 was then placed in a 250 ml Erlenmeyer flask containing 1.5 adsorbent bed volumes of ethyl acetate. The mixture was swirled on a rotary shaker for one hour, decanted and filtered, and the filtrate was concentrated for gas chromatography. The glass wool was also extracted and the extract was concentrated for gas chromatography as well.

All samples were analyzed for methyl parathion using a Varian Model 2100 gas chromatograph equipped with a 1.8m x 3mm (id) glass column packed with 100/120 mesh Supelcoport, coated with 1.5 % of SP 2250 and 1.95 % SP 2401, and an alkali flame ionization detector. Column oven temperature was maintained at 175 °C and the carrier gas (N_2) flow was 35 ml/min. Results are summarized in Table 5.

Field Recovery Experiments: Glass wool was spiked with 2 µg of methyl parathion (assumed 80 ng/m³ for a 24 hr basis) in a curved about 15 cm. X 1 cm. glass tubing. The glass tubing was fitted into a teflon resin trap. An inverted Bantamware drying tube (ca 1.6 X 12.8 cm) was filled to a depth of 3 cm with XAD-4 resin. The tube was attached to

Figure 12. Teflon Cartridge Configurations for Air Sampling Methyl Parathion

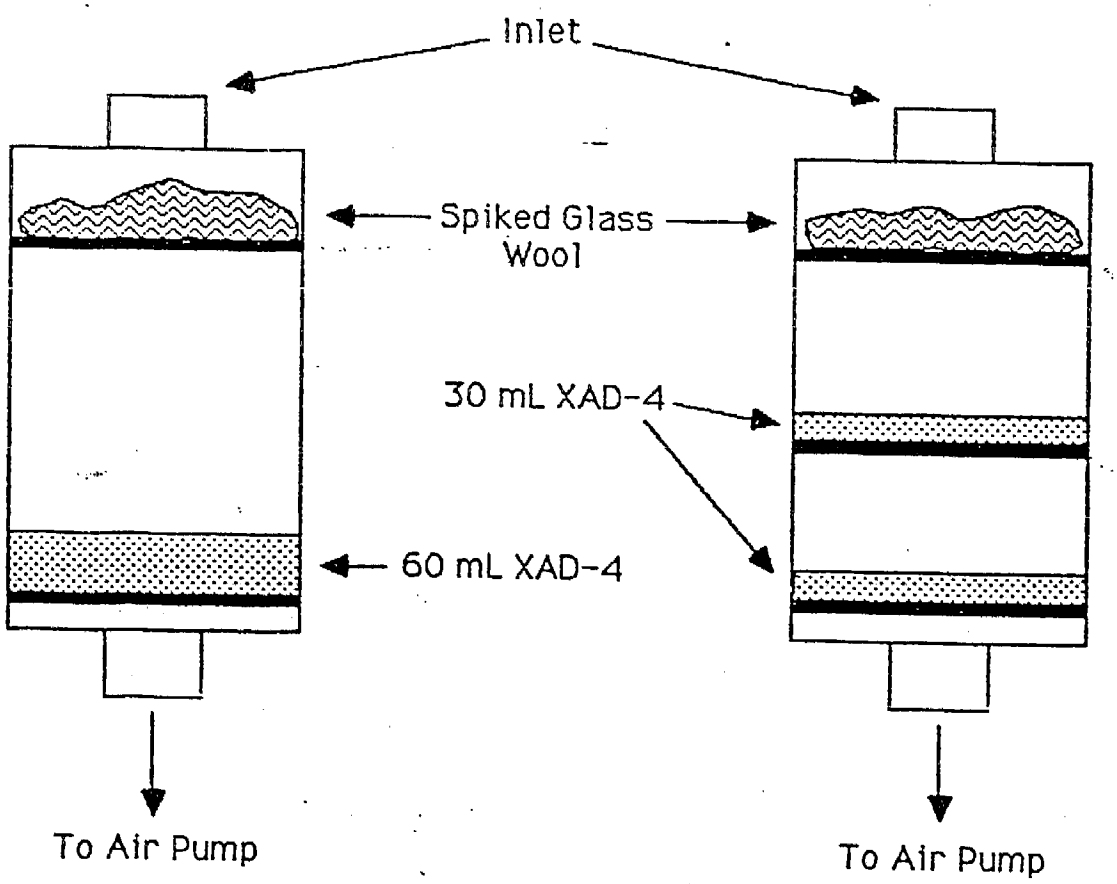
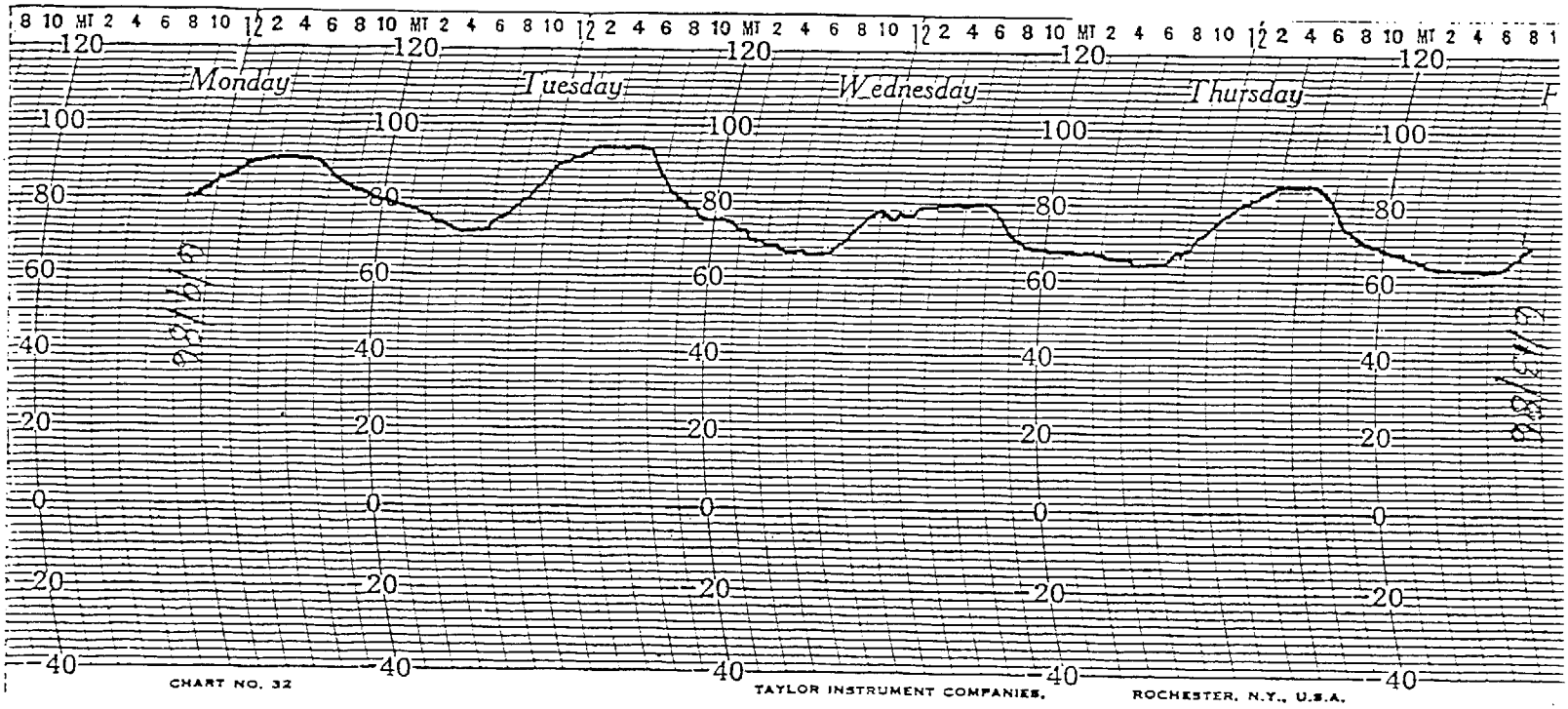


Figure 13. Thermograms of Air Temperature Fluctuations



the inlet of the spiking tube. The bottom of the trap was attached to a second Teflon trap containing 60 ml of resin. The second trap served as a backup trap to check for breakthrough.

Table 5. Recovery of methyl Parathion from Air by XAD-4

Run	Air Flow (lpm) Start	Stop	Total Time (hr.)	Percent Recovery[a]
1[b]	50.0	49.0	22.6	85.2 ± 1.02
2-UX[c]	50.0	50.5	24.0	81.7 ± 1.05
2-LX[c]	50.0	50.5	24.0	-0-
3[a]	50.0	50.0	24.0	-0-

a Average (±SD) of three determinations.
b 1 x 60 ml XAD-4
c 2 x 30 ml XAD-4. UX= upper 30 ml; LX=lower 30 ml (see Figure 12)

The objective for the spiking was two-fold. First, to check the trapping efficiency under field conditions. Second, was to monitor the conversion of methyl parathion to the oxon. The amount of methyl parathion spiked was based on the detection limit for the oxon, and thus was above the levels that were expected in the field. Resin was included in the drying tube to remove any chemical entering *via* inlet air, to prevent interference with the spiking experiment.

Trapping efficiency was calculated as follows:

$$\frac{(\text{amount recovered in resin trap})}{(\text{amount spiked})} \times \frac{(100)}{(\text{extraction efficiency } \%)} = \text{Trapping Efficiency}$$

A summary of the per cent trapped as total methyl parathion and per cent trapped as methyl paraoxon along with the minimum, maximum and average temperatures are in Table 6.

There was no detectible quantities of either methyl parathion or the oxon in the secondary trap. However, there appears to be a higher ratio of oxon to the parent in the field trapping experiments than in the actual samples. The spiking technique may be the reason. No aluminum foil was wrapped around the spiking apparatus.

Table 6. Trapping Efficiencies for Methyl Parathion

DATE	PER CENT[A] ME PARATHION	% AS Me[B] PARAOXON	TEMPERATURE HIGH	LOW	AVERAGE
5/19/86	57	71	29.1	12.9	20.8
5/20/86	43	24	24.3	9.5	16.9
5/21/86	18	0	21.4	10.7	13.4
5/22/86	17	41	25.8	13.6	19.7
5/27/86	34	38	33.0	15.1	24.9
5/28/86	45	82	33.7	17.1	25.6
5/29/86	46	67	34.6	17.3	26.5
5/30/86	15	69	34.2	16.6	25.1
6/2/86	61	32	29.4	12.7	20.4
6/3/86	61	47	29.8	13.6	21.5
6/4/86	57	36	27.9	13.4	20.5
6/5/86	47	32	26.3	12.3	19.3
6/9/86	26	34	34.7	19.9	27.7
6/10/86	29	53	39.0	16.7	28.7
6/11/86	25	30	29.7	15.6	23.3
6/12/86	55	57	33.7	15.2	24.6

A: $\frac{\text{(conc. me parathion + conc oxon X 1.06)}}{\text{2.0 µg methyl parathion}}$ X 100

B: $\frac{\text{(conc. me paraoxon) X 100}}{\text{2.0 µg methyl parathion}}$

PREPARATION OF XAD - 4 RESIN

Resin was cleaned prior to use as follows: Resin(ca 2 L) was washed continuously with deionized water to remove fines until the water became clear. The water was decanted and 2 liters of 0.25 N hydrochloric acid was added and the resin swirled. The acid was decanted after 0.5 hr after which the resin was washed with deionized water until the pH was that of the water. Several rinsings were made with distilled water.

Methanol was added to the resin which was then placed in a large Soxhlet and extracted for 24 hours each with methanol(twice), ethyl acetate and methylene chloride. Resin was dried for 48 hours under vacuum at room temperature then packaged in bottles.

RESULTS

Table 7 summarizes the field samples collected while Table 8 summarizes the sampling periods, in hours, for those samples. Table 9 and 10 contain the results of analysis of field air samples, replicates collected for methyl parathion in ng/m^3 and parts per trillion, respectively. Methyl parathion averages, in ng/m^3 and ppt, are tabulated in Tables 11 and 12. Results for the analytical site, Maxwell, replicates, averages and standard deviations are in Table 17. One background sample on May 14, 1986 did have a methyl parathion level that was twice the MDL. The response could have come from an application on or near the campus.

The methyl paraoxon replicate results, in ng/m^3 and ppt are tabulated in Tables 13 and 14, respectively. Averages for each site are tabulated in Tables 15 and 16. Table 18 contains the data from the analytical site for methyl paraoxon.

Table 18a contains the calculated data precision of the collocated samplers. The precision was calculated from following equation: $P = (Y - (Y + X)/2)/X*100$

where P is the calculated data precision; Y is the concentration from duplicate sampler of collocated pair; X is the concentration from primary sampler of collocated pair.

Data completness was calculated to be 94 per cent based on the number of valid samples analyzed divided by the total number of samples taken.

The highest parathion concentrations were recorded at Maxwell

on 5/13/86 (26 ng/m^3). The Maxwell site had generally the highest concentration for methyl parathion followed by Williams then Trowbridge and Robbins. The month of May had the most significant concentrations of both the parent and the oxon. There was no detection of either compound during the first week in June. Methyl parathion was detected during the week of June 10 to 12 in levels near the MDL at Maxwell, Williams and Trowbridge. However, the source could be from the application to tomato fields rather than rice fields. One sample from the background site in Davis on 5/14/86 did contain methyl parathion(0.39 ng/m^3).

The oxon concentration was about one tenth the methyl parathion concentration at Maxwell on 5/13/86. The oxon concentration reached the highest level (5.1 ng/m^3) at the Maxwell site on 5/15/86. Oxon could only be detected at the Maxwell and Williams sites.

Three hour samples (Table 19) had MDL of 0.9 ng/m^3 for methyl parathion and 2.2 ng/m^3 for methyl paraoxon. Thus only two sampling periods from 5/19/86 were above the MDL.

The methyl parathion data for the month of May is graphed in Figure 14, while the data for methyl paraoxon is graphed in Figure 15.

Table 7. Summary of Samples Taken

	T	R	M	W	D	3	HV	TP
5/8/86	X	C	C	C	C			
5/9/86	X	C	C	C	C			
5/10/86	X	C	C	C	C			
5/12/86	X	X	X	X	X	X		
5/13/86	X	X	X	X	X			
5/14/86	X	X	X	X	X			
5/15/86	X	X	X	X	X			X
5/19/86	X	X	X	X	X	X	X	X
5/20/86	X	A	X	X	X			X
5/21/86	X	X	X	X	X			X
5/22/86	X	X	X	X	X			X
5/27/86	X	B	X	X	X	X	X	X
5/28/86	X	X	X	X	X			X
5/29/86	X	X	X	B	C			X
5/30/86	X	X	X	C	X			X
6/2/86	X	X	X	X	X	X	X	X
6/3/86	X	X	X	X	X			X
6/4/86	X	X	X	X	X			X
6/5/86	X	X	X	X	X			X
6/9/86	X	X	X	X		X	X	X
6/10/86	X	X	X	X				X
6/11/86	B	X	X	X				X
6/12/86	X	X	X	X				X

A: Hose came off sampler
B: High volume sampling pump not working
C: City Hall closed on Memorial Day

EXPLANATION OF TABLE

T = Trowbridge (2 reps)
R = Robbins (2 reps)
M = Maxwell (3 reps)
W = Williams (2 reps)
D = Davis (2 reps)
3 = Three hour sampling period, Maxwell (3 reps/period)
HV = High volume air sampler, Maxwell (1 rep)
TP = Trapping efficiencies, Maxwell (1 rep)

Table 8. Approximate Sampling Periods(Hr.) for Each Site

Date	Trowbridge	Robbins	Maxwell	Williams	Davis
5/12/86	23.5	23.5	14	23	24
5/13/86	24	24.25	24	24.75	23
5/14/86	23.75	23.5	23.25	23	24
5/15/86	24	24	23.75	23.25	24
5/19/86	24	24	14.5	23.5	24
5/20/86	23.75	23.5	23.5	25.5	24
5/21/86	23.5	23	22.5	21.5	24
5/22/86	24	24	23.5	23.75	24
5/27/86	24	--	12	24	24
5/28/86	24	19.25	23.5	24	24
5/29/86	24	24	24	--	--
5/30/86	26	26	26	--	24
6/2/86	24	24	24	15	25
6/3/86	23.75	23.5	23	23.25	24
6/4/86	24	24	24	25	24
6/5/86	24.25	24	23.25	23.25	24
6/9/86	23.5	23.75		24.25	--
6/10/86	24.25	24	23.5	25	--
6/11/86	--	24	23.75	23	--
6/12/86	23.25	23.5	23.5	25	--

TABLE 9. METHYL PARATHION RESULTS IN ng/ Cu METER

DATE	TROWBRIDGE		ROBBINS		MAXWELL			WILLIAMS		DAVIS	
	A	B	A	B	A	B	C	A	B	A	B
5/8/86	<0.2	<0.2	C	C	C	C	C	C	C	C	C
5/9/86	<0.2	<0.2	C	C	C	C	C	C	C	C	C
5/10/86	<0.2	<0.2	C	C	C	C	C	C	C	C	C
5/12/86	0.59	0.47	0.73	0.70	4.47	7.00	8.49	0.74	1.33	<0.2	<0.2
5/13/86	1.00	1.09	0.58	0.41	22.20	24.70	30.10	3.89	5.49	<0.2	<0.2
5/14/86	0.52	0.56	0.47	0.52	20.10	21.30	23.20	22.80	20.70	<0.2	<0.2
5/15/86	<0.2	<0.2	0.34	0.39	12.40	14.10	14.90	5.39	5.72	0.39	<0.2
5/19/86	<0.2	<0.2	<0.2	<0.2	14.50	15.20	15.00	5.30	5.31	<0.2	<0.2
5/20/86	<0.2	<0.2	<0.2	A	5.52	5.48	4.02	5.69	4.75	<0.2	<0.2
5/21/86	1.09	1.10	0.43	<0.2	15.50	12.00	14.40	4.77	4.70	<0.2	<0.2
5/22/86	<0.2	<0.2	0.50	<0.2	8.57	6.80	7.80	1.48	1.41	<0.2	<0.2
5/27/86	<0.2	<0.2	B	B	2.35	2.35	1.70	1.18	1.50	<0.2	<0.2
5/28/86	<0.2	<0.2	<0.2	<0.2	4.74	4.98	7.46	1.60	2.04	<0.2	<0.2
5/29/86	<0.2	<0.2	<0.2	<0.2	2.97	2.78	2.77	B	B	<0.2	<0.2
5/30/86	<0.2	<0.2	<0.2	<0.2	1.31	1.83	1.15	C	C	<0.2	<0.2
6/2/86	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
6/3/86	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
6/4/86	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
6/5/86	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
6/9/86	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	C	C
6/10/86	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.468	<0.2	0.64	C	C
6/11/86	<0.2	<0.2	<0.2	<0.2	0.71	0.712	0.705	0.69	0.63	C	C
6/12/86	0.455	0.537	<0.2	<0.2	<0.2	0.37	0.311	0.34	0.33	C	C

A: HOSE CAME OFF SAMPLER

B:SAMPLING PUMP NOT WORKING

C: NO SAMPLE TAKEN

TABLE 10. METHYL PARATHION IN PARTS PER TRILLION

DATE	TROWBRIDGE		ROBBINS		MAXWELL			WILLIAMS		DAVIS	
	A	B	A	B	A	B	C	A	B	A	B
5/8/86	<0.019	<0.019	C	C	C	C	C	C	C	C	C
5/9/86	<0.019	<0.019	C	C	C	C	C	C	C	C	C
5/10/86	<0.019	<0.019	C	C	C	C	C	C	C	C	C
5/12/86	0.054	0.044	0.068	0.065	0.416	0.652	0.790	0.069	0.124	<0.019	<0.019
5/13/86	0.093	0.101	0.054	0.038	2.066	2.299	2.802	0.362	0.511	<0.019	<0.019
5/14/86	0.048	0.052	0.044	0.048	1.871	1.982	2.159	2.122	1.927	<0.019	<0.019
5/15/86	<0.019	<0.019	0.032	0.036	1.154	1.312	1.387	0.502	0.532	0.036	<0.019
5/19/86	<0.019	<0.019	<0.019	<0.019	1.350	1.415	1.396	0.493	0.494	<0.019	<0.019
5/20/86	<0.019	<0.019	<0.019	A	0.514	0.510	0.374	0.530	0.442	<0.019	<0.019
5/21/86	0.101	0.102	0.040	<0.019	1.443	1.117	1.340	0.444	0.437	<0.019	<0.019
5/22/86	<0.019	<0.019	0.047	<0.019	0.798	0.633	0.726	0.138	0.131	<0.019	<0.019
5/27/86	<0.019	<0.019	B	B	0.219	0.219	0.158	0.110	0.140	<0.019	<0.019
5/28/86	<0.019	<0.019	<0.019	<0.019	0.441	0.464	0.694	0.149	0.190	<0.019	<0.019
5/29/86	<0.019	<0.019	<0.019	<0.019	0.276	0.259	0.258	B	B	<0.019	<0.019
5/30/86	<0.019	<0.019	<0.019	<0.019	0.122	0.170	0.107	C	C	<0.019	<0.019
6/2/86	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
6/3/86	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
6/4/86	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
6/5/86	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
6/9/86	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	C	C
6/10/86	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	0.044	0.000	0.060	C	C
6/11/86	<0.019	<0.019	<0.019	<0.019	0.066	0.066	0.066	0.064	0.059	C	C
6/12/86	0.042	0.050	<0.019	<0.019	<0.019	0.034	0.029	0.032	0.031	C	C

A: HOSE CAME OFF SAMPLER

B:SAMPLING PUMP NOT WORKING

C: NO SAMPLE TAKEN

Table 11. Average Methyl Parathion Concentration
(ng/m^3)

DATE	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.2	C	C	C	C
5/9/86	<0.2	C	C	C	C
5/10/86	<0.2	C	C	C	C
5/12/86	0.53	0.72	6.65	1.03	<0.2
5/13/86	1.05	0.50	25.67	4.69	<0.2
5/14/86	0.54	0.50	21.53	21.75	<0.2
5/15/86	<0.2	0.37	13.80	5.56	<0.2
5/19/86	<0.2	<0.2	14.90	5.31	<0.2
5/20/86	<0.2	<0.2(A)	5.01	5.22	<0.2
5/21/86	1.10	<0.2	13.97	4.74	<0.2
5/22/86	<0.2	<0.2	7.72	1.45	<0.2
5/27/86	<0.2	B	2.13	1.34	<0.2
5/28/86	<0.2	<0.2	5.73	1.82	<0.2
5/29/86	<0.2	<0.2	2.84	B	<0.2
5/30/86	<0.2	<0.2	1.43	C	<0.2
6/2/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/3/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/4/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/5/86	<0.2	<0.2	<0.2	<0.2	<0.2
6/9/86	<0.2	<0.2	<0.2	<0.2	C
6/10/86	<0.2	<0.2	<0.2	0.32	C
6/11/86	B	<0.2	0.71	0.66	C
6/12/86	0.50	<0.2	<0.2	0.34	C

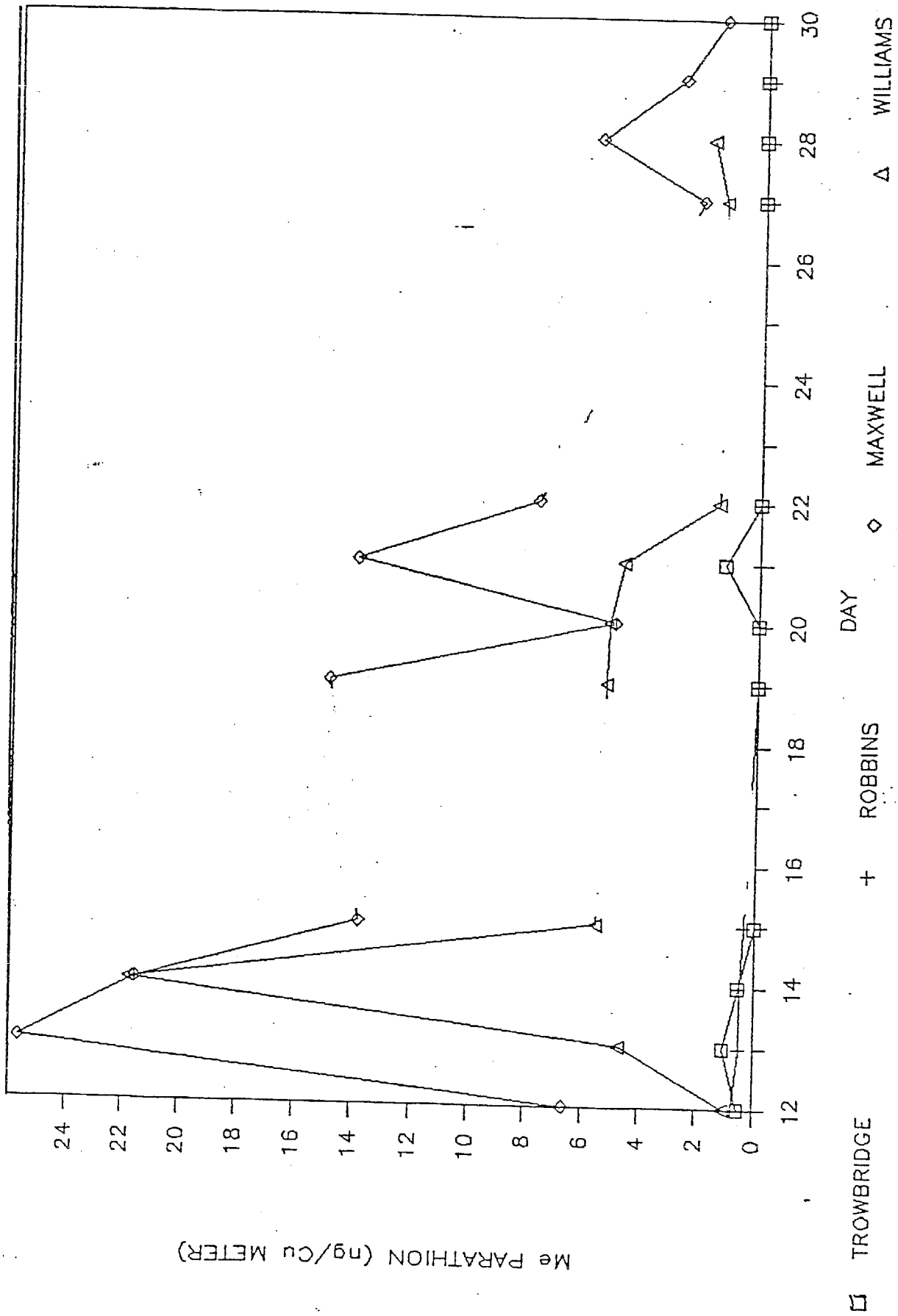
A: One Replicate Only
B: No Sample; Equipment Malfunction
C: No Sample Taken

Table 12. Methyl Parathion Average
(Parts Per Trillion)

DATE	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.019	C	C	C	C
5/9/86	<0.019	C	C	C	C
5/10/86	<0.019	C	C	C	C
5/12/86	0.098	0.067	0.619	0.096	<0.019
5/13/86	0.195	0.046	2.389	0.437	<0.019
5/14/86	0.101	0.046	2.004	2.024	<0.019
5/15/86	<0.019	0.034	1.284	0.517	0.018
5/19/86	<0.019	<0.019	1.387	0.494	<0.019
5/20/86	<0.019	<0.019(A)	0.466	0.486	<0.019
5/21/86	0.204	0.020	1.300	0.441	<0.019
5/22/86	<0.019	0.023	0.719	0.134	<0.019
5/27/86	<0.019	B	0.199	0.125	<0.019
5/28/86	<0.019	<0.019	0.533	0.169	<0.019
5/29/86	<0.019	<0.019	0.264	B	<0.019
5/30/86	<0.019	<0.019	0.133	C	<0.019
6/2/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/3/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/4/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/5/86	<0.019	<0.019	<0.019	<0.019	<0.019
6/9/86	<0.019	<0.019	<0.019	<0.019	C
6/10/86	<0.019	<0.019	0.015	0.030	C
6/11/86	B	<0.019	0.066	0.061	C
6/12/86	0.092	<0.019	0.021	0.031	C

A: Only One Replicate
B: Equipment Malfunction
C: No Sample Taken

Figure 14. Graph of Methyl Parathion for May



TALBE 13. METHYL PARAOXON RESULTS IN ng/Cu METERS

DATE	TROWBRIDGE		ROBBINS		MAXWELL			WILLIAMS		DAVIS	
	A	B	A	B	A	B	C	A	B	A	B
5/8/86	<0.5	<0.5	C	C	C	C	C	C	C	C	C
5/9/86	<0.5	<0.5	C	C	C	C	C	C	C	C	C
5/10/86	<0.5	<0.5	C	C	C	C	C	C	C	C	C
5/12/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5/13/86	<0.5	<0.5	<0.5	<0.5	1.8	2.5	2.65	0.92	1.35	<0.5	<0.5
5/14/86	<0.5	<0.5	<0.5	<0.5	0.53	0.85	1.1	0.95	0.544	<0.5	<0.5
5/15/86	<0.5	<0.5	<0.5	<0.5	7.79	<0.5	6.91	0.51	1.22	<0.5	<0.5
5/19/86	<0.5	<0.5	<0.5	<0.5	1.41	0.51	2.01	<0.5	0.8	<0.5	<0.5
5/20/86	<0.5	<0.5	<0.5	A	0.72	0.82	0.5	0.899	0.963	<0.5	<0.5
5/21/86	<0.5	<0.5	<0.5	<0.5	1.86	<0.5	2.36	0.958	1	<0.5	<0.5
5/22/86	<0.5	<0.5	<0.5	<0.5	2.97	2.34	3.89	<0.5	0.98	<0.5	<0.5
5/27/86	<0.5	<0.5	C	C	<0.5	<0.5	<0.5	0.712	<0.5	<0.5	<0.5
5/28/86	<0.5	<0.5	<0.5	<0.5	1.68	1.76	D	0.62	0.821	<0.5	<0.5
5/29/86	<0.5	<0.5	<0.5	<0.5	0.612	0.694	0.645	---	---	<0.5	<0.5
5/30/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.91	<0.5	<0.5	<0.5	<0.5
6/2/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
6/3/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
6/4/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	B	B	<0.5	<0.5
6/5/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	C	C	<0.5	<0.5
6/9/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	C	C
6/10/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	C	C
6/11/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	C	C
6/12/86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	C	C

A: HOSE CAME OFF SAMPLER B:SAMPLING PUMP NOT WORKING C: NO SAMPLE TAKEN D:SAMPLE LOST

TABLE 14. METHYL PARAOXON IN PARTS PER TRILLION

DATE	TROWBRIDGE		ROBBINS		MAXWELL			WILLIAMS		DAVIS	
	A	B	A	B	A	B	C	A	B	A	B
5/8/86	<0.05	<0.05	C	C	C	C	C	C	C	C	C
5/9/86	<0.05	<0.05	C	C	C	C	C	C	C	C	C
5/10/86	<0.05	<0.05	C	C	C	C	C	C	C	C	C
5/12/86	<0.05	<0.05	<0.05	<0.05	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
5/13/86	<0.05	<0.05	<0.05	<0.05	0.185	0.257	0.263	0.091	0.134	<0.05	<0.05
5/14/86	<0.05	<0.05	<0.05	<0.05	0.054	0.087	0.109	0.094	0.054	<0.05	<0.05
5/15/86	<0.05	<0.05	<0.05	<0.05	0.800	<0.05	0.685	0.051	0.121	<0.05	<0.05
5/19/86	<0.05	<0.05	<0.05	<0.05	0.145	0.052	0.199	<0.05	0.079	<0.05	<0.05
5/20/86	<0.05	<0.05	<0.05	A	0.074	0.084	0.050	0.089	0.095	<0.05	<0.05
5/21/86	<0.05	<0.05	<0.05	<0.05	0.191	<0.05	0.234	0.095	0.099	<0.05	<0.05
5/22/86	<0.05	<0.05	<0.05	<0.05	0.305	0.240	0.385	<0.05	0.097	<0.05	<0.05
5/27/86	<0.05	<0.05	B	B	<0.05	<0.05	<0.05	0.071	<0.05	<0.05	<0.05
5/28/86	<0.05	<0.05	<0.05	<0.05	0.173	0.181	D	0.061	0.081	<0.05	<0.05
5/29/86	<0.05	<0.05	<0.05	<0.05	0.063	0.071	0.064	B	B	<0.05	<0.05
5/30/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.090	C	C	<0.05	<0.05
6/2/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6/3/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6/4/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6/5/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6/9/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	C	C
6/10/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	C	C
6/11/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	C	C
6/12/86	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	C	C

A: HOSE CAME OFF SAMPLER B:SAMPLING PUMP NOT WORKING C: NO SAMPLE TAKEN D: SAMPLE LOST

Table 15. Average Methyl Paraoxon Concentration
(ng/m^3)

DATE	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.5	C	C	C	C
5/9/86	<0.5	C	C	C	C
5/10/86	<0.5	C	C	C	C
5/12/86	<0.5	<0.5	<0.5	<0.5	<0.5
5/13/86	<0.5	<0.5	2.32	1.14	<0.5
5/14/86	<0.5	<0.5	0.83	0.75	<0.5
5/15/86	<0.5	<0.5	<0.5	0.87	<0.5
5/19/86	<0.5	<0.5	1.14	<0.5	<0.5
5/20/86	<0.5	<0.5(A)	0.68	0.93	<0.5
5/21/86	<0.5	<0.5	<0.5	0.98	<0.5
5/22/86	<0.5	<0.5	3.07	<0.5	<0.5
5/27/86	<0.5	B	<0.5	<0.5	<0.5
5/28/86	<0.5	<0.5	1.15	0.72	<0.5
5/29/86	<0.5	<0.5	0.65	B	<0.5
5/30/86	<0.5	<0.5	<0.5	C	<0.5
6/2/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/3/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/4/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/5/86	<0.5	<0.5	<0.5	<0.5	<0.5
6/9/86	<0.5	<0.5	<0.5	<0.5	C
6/10/86	<0.5	<0.5	<0.5	<0.5	C
6/11/86	B	<0.5	<0.5	<0.5	C
6/12/86	<0.5	<0.5	<0.5	<0.5	C

A: One Replicate Only
B: No Sample; Equipment Malfunction
C: No Sample Taken

Table 16. Methyl Paraoxon PPT Average

	TROWBRIDGE	ROBBINS	MAXWELL	WILLIAMS	DAVIS
5/8/86	<0.05	C	C	C	C
5/9/86	<0.05	C	C	C	C
5/10/86	<0.05	C	C	C	C
5/12/86	<0.05	<0.05	<0.05	<0.05	<0.05
5/13/86	<0.05	<0.05	0.160	0.106	<0.05
5/14/86	<0.05	<0.05	0.060	0.070	<0.05
5/15/86	<0.05	<0.05	<0.05	0.081	<0.05
5/19/86	<0.05	<0.05	0.062	<0.05	<0.05
5/20/86	<0.05	<0.05(A)	0.041	0.087	<0.05
5/21/86	<0.05	<0.05	<0.05	0.091	<0.05
5/22/86	<0.05	<0.05	0.193	<0.05	<0.05
5/27/86	<0.05	B	<0.05	<0.05	<0.05
5/28/86	<0.05	<0.05	0.055	0.067	<0.05
5/29/86	<0.05	<0.05	0.042	B	<0.05
5/30/86	<0.05	<0.05	<0.05	C	<0.05
6/2/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/3/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/4/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/5/86	<0.05	<0.05	<0.05	<0.05	<0.05
6/9/86	<0.05	<0.05	<0.05	<0.05	C
6/10/86	<0.05	<0.05	<0.05	<0.05	C
6/11/86	B	<0.05	<0.05	<0.05	C
6/12/86	<0.05	<0.05	<0.05	<0.05	C

A: Only One Replicate
B: Equipment Malfunction
C: No Sample Taken

Figure 15. Graph of Methyl Paraoxon

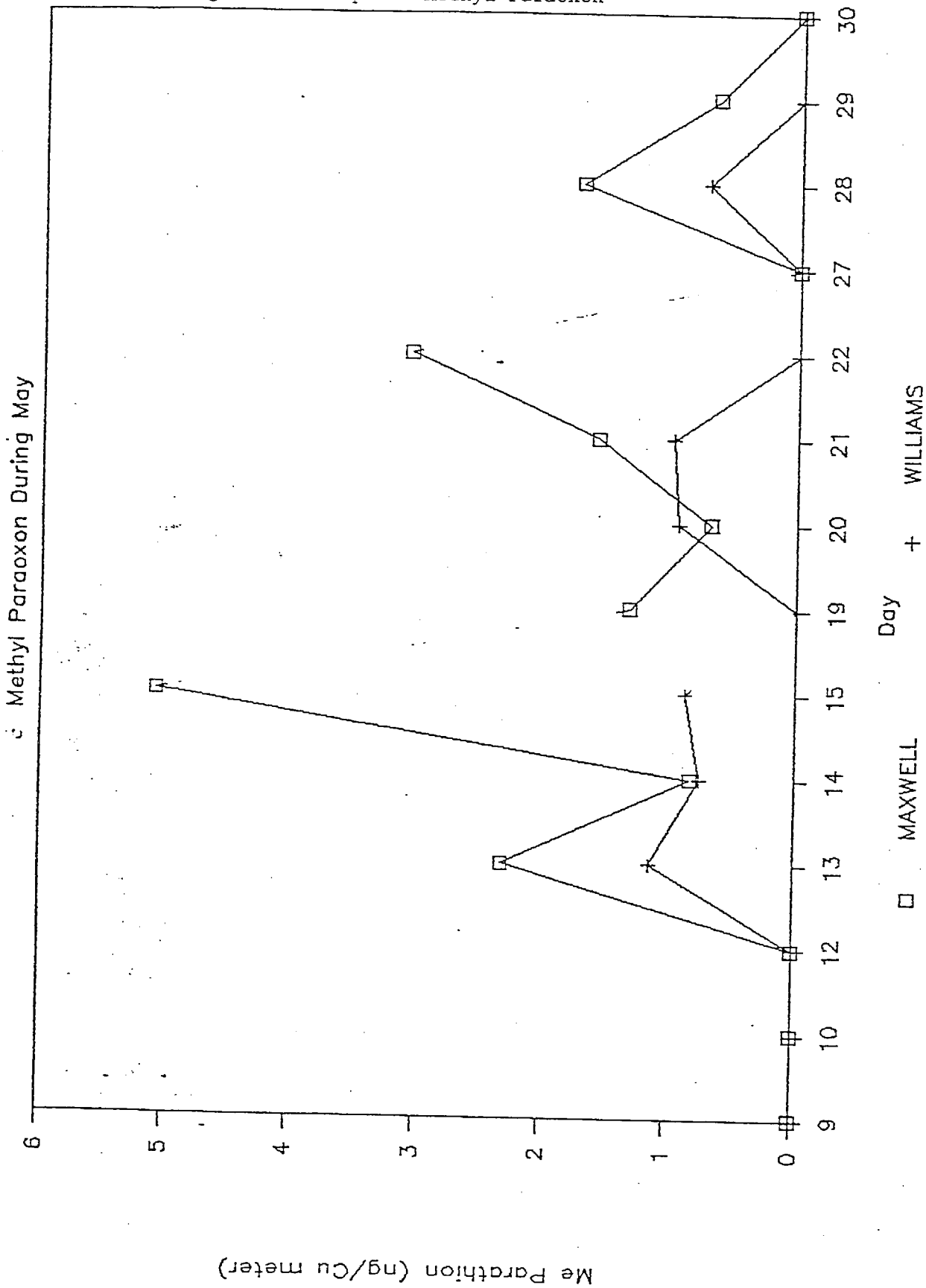


Table 17. Methyl Parathion Replicates, Averages and Standard Deviations For Maxwell Site (ng/m³)

DATE	A	B	C	AVG	STD
5/12/86	4.47	7.00	8.49	6.65	2.03
5/13/86	22.20	24.70	30.10	25.67	4.04
5/14/86	20.10	21.30	23.20	21.53	1.56
5/15/86	12.40	14.10	14.90	13.80	1.28
5/19/86	14.50	15.20	15.00	14.90	0.36
5/20/86	5.52	5.48	4.02	5.01	0.85
5/21/86	15.50	12.00	14.40	13.97	1.79
5/22/86	8.57	6.80	7.80	7.72	0.89
5/27/86	2.35	2.35	1.70	2.13	0.38
5/28/86	4.74	4.98	7.46	5.73	1.51
5/29/86	2.97	2.78	2.77	2.84	0.11
5/30/86	1.31	1.83	1.15	1.43	0.36
6/2/86	<0.2	<0.2	<0.2	---	---
6/3/86	<0.2	<0.2	<0.2	---	---
6/4/86	<0.2	<0.2	<0.2	---	---
6/5/86	<0.2	<0.2	<0.2	---	---
6/9/86	<0.2	<0.2	<0.2	---	---
6/10/86	<0.2	<0.2	0.47	---	---
6/11/86	0.710	0.712	0.705	0.71	0.00
6/12/86	<0.2	0.37	0.31	0.34	---

Table 18. Methyl Paraoxon Replicates, Averages, and Standard Deviations for Maxwell Site (ng/m³)

DATE	A	B	C	AVG	STD
5/12/86	<0.5	<0.5	<0.5	---	---
5/13/86	1.80	2.50	2.65	2.31	0.45
5/14/86	0.53	0.85	1.10	0.82	0.28
5/15/86	7.79	<0.5	6.91	4.90	4.26
5/19/86	1.41	0.51	2.01	1.71	0.76
5/20/86	0.72	0.82	0.50	0.68	0.16
5/21/86	1.86	<0.5	2.36	1.41	1.24
5/22/86	2.97	2.34	3.89	3.06	0.78
5/27/86	<0.5	<0.5	<0.5	---	---
5/28/86	1.68	1.76		1.72	0.049
5/29/86	0.61	0.69	0.64	0.65	0.04
5/30/86	<0.5	<0.5	0.91	---	---
6/2/86	<0.5	<0.5	<0.5	---	---
6/3/86	<0.5	<0.5	<0.5	---	---
6/4/86	<0.5	<0.5	<0.5	---	---
6/5/86	<0.5	<0.5	<0.5	---	---
6/9/86	<0.5	<0.5	<0.5	---	---
6/10/86	<0.5	<0.5	<0.5	---	---
6/11/86	<0.5	<0.5	<0.5	---	---
6/12/86	<0.5	<0.5	<0.5	---	---

Table 18a. Precision for Collocated Samplers

Methyl Parathion

Date	Trowbridge	Robbins	Maxwell	Williams
5/12/86	11.7	2.1	-18.1	-22.3
5/13/86	-4.1	20.7	-5.1	-14.6
5/14/86	-3.6	-4.8	-2.8	5.1
5/15/86	---	-6.4	-6.0	-2.9
5/19/86	---	---	-2.3	-0.1
5/20/86	---	---	0.4	9.9
5/21/86	-0.5	---	14.6	0.7
5/22/86	---	---	13.0	2.5
5/27/86	---	---	0.0	-10.7
5/28/86	---	---	-2.4	-10.8
5/29/86	---	---	3.4	---
5/30/86	---	---	-14.2	---
6/2/86	---	---	---	---
6/3/86	---	---	---	---
6/4/86	---	---	---	---
6/5/86	---	---	---	---
6/9/86	---	---	---	---
6/10/86	---	---	---	---
6/11/86	---	---	-0.1	4.8
6/12/86	-7.6	---	---	1.5

Methyl Paraoxon

Date	Trowbridge	Robbins	Maxwell	Williams
5/12/86	---	---	---	---
5/13/86	---	---	-14.0	-15.9
5/14/86	---	---	-18.8	37.3
5/15/86	---	---	---	-29.1
5/19/86	---	---	---	---
5/20/86	---	---	-6.1	-3.3
5/21/86	---	---	---	-2.1
5/22/86	---	---	13.5	---
5/27/86	---	---	---	---
5/28/86	---	---	-2.3	-12.2
5/29/86	---	---	-5.9	---
5/30/86	---	---	---	---
6/2/86	---	---	---	---
6/3/86	---	---	---	---
6/4/86	---	---	---	---
6/5/86	---	---	---	---
6/9/86	---	---	---	---
6/10/86	---	---	---	---
6/11/86	---	---	---	---
6/12/86	---	---	---	---

Table 19. 3 Hour Methyl Parathion Results
(ng/m^3)

DATE	TIME	A	B	C	AVG
5/12/86	8:30	<0.9	<0.9	<0.9	---
5/12/86	11:30	<0.9	<0.9	<0.9	---
5/12/86	14:30	<0.9	<0.9	<0.9	---
5/19/86	8:10	6.38	8.94	7.4	7.57
5/19/86	11:05	2.58	4.67	<0.9	3.63
5/27/86	8:02	<0.9	<0.9	<0.9	---
5/27/86	11:00	<0.9	<0.9	<0.9	---
5/27/86	13:50	<0.9	<0.9	<0.9	---
5/27/86	16:35	<0.9	<0.9	<0.9	---
6/2/86	8:00	<0.9	<0.9	<0.9	---
6/2/86	11:05	<0.9	<0.9	<0.9	---
6/9/86	8:05	<0.9	<0.9	<0.9	---
6/9/86	11:00	<0.9	<0.9	<0.9	---
6/9/86	14:15	<0.9	<0.9	<0.9	---
		Methyl Paraoxon			
5/19/86	8:10	4.59	<2.0	2.2	
5/19/86	11:05	<2.0	2.57	<2.0	

Table 20 summarizes the reported methyl parathion applications in the Maxwell - Williams area during the month of May. This data is shown in graphical form in Figures 16 and 17. There was little use from May 1-4, increasingly heavy use starting May 6 reaching a maximum May 13 - May 21, then tailing off to minimal quantities from May 24 on to the end of the study period. There was no pesticide use reports could be found for that area during the first two weeks of June.

Table 21 and 22 summarizes the 24 hour meteorological data for Maxwell and Nicolaus. The minimum, maximum and average temperatures for Maxwell and Nicolaus are graphed in figures 18 and 19 respectively. The Nicolaus data is from the CIMIS site located there while the Maxwell data is from roof top of Maxwell High School and is average from the start to the end of each period. The prevailing wind direction was from the north during the first week of sampling and then shifted to the south. The days were clear with the exception of during the first week of June when fog or high overcast occurred during the morning hours. The minimum, maximum and average temperatures for Maxwell and Nicolaus are graphed in figures 18 and 19 respectively.

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Table 20. Methyl Parathion Usage in the Maxwell - Williams Area for May 1986

	ACRES					GALLONS			
	Township					Township			
DAY	15	16	17	TOTAL		15	16	17	TOTAL
1	0	54	103	157	:	0	7	15	22
2	0	0	0	0	:	0	0	0	0
3	0	0	0	0	:	0	0	0	0
4	0	72	0	72	:	0	10	0	10
5	0	0	0	0	:	0	0	0	0
6	0	243	354	597	:	0	31	40	71
7	0	0	157	157	:	0	0	23	23
8	0	0	0	0	:	0	0	0	0
9	0	0	0	0	:	0	0	0	0
10	75	456	160	691	:	9	58	24	91
11	0	0	0	0	:	0	0	0	0
12	0	100	0	100	:	0	9	0	9
13	0	494	482	976	:	0	68	50	118
14	65	119	237	421	:	8	15	34	57
15	150	193	442	785	:	20	26	49	95
16	69	117	61	247	:	9	15	9	33
17	0	46	663	709	:	0	6	93	99
18	47	316	693	1056	:	6	47	96	149
19	0	270	558	828	:	0	35	84	119
20	0	169	148	317	:	0	24	22	46
21	0	263	354	617	:	0	34	35	69
22	0	160	0	160	:	0	24	0	24
23	0	0	172	172	:	0	0	21	21
24	0	0	0	0	:	0	0	0	0
25	0	0	0	0	:	0	0	0	0
26	0	42	0	42	:	0	3	0	3
27	0	0	0	0	:	0	0	0	0
28	0	0	60	60	:	0	0	8	8
29	0	0	0	0	:	0	0	0	0
30	0	0	0	0	:	0	0	0	0
31	0	0	0	0	:	0	0	0	0

Figure 6 Methyl Parathion Applied Acres

Usage During May in Maxwell Area

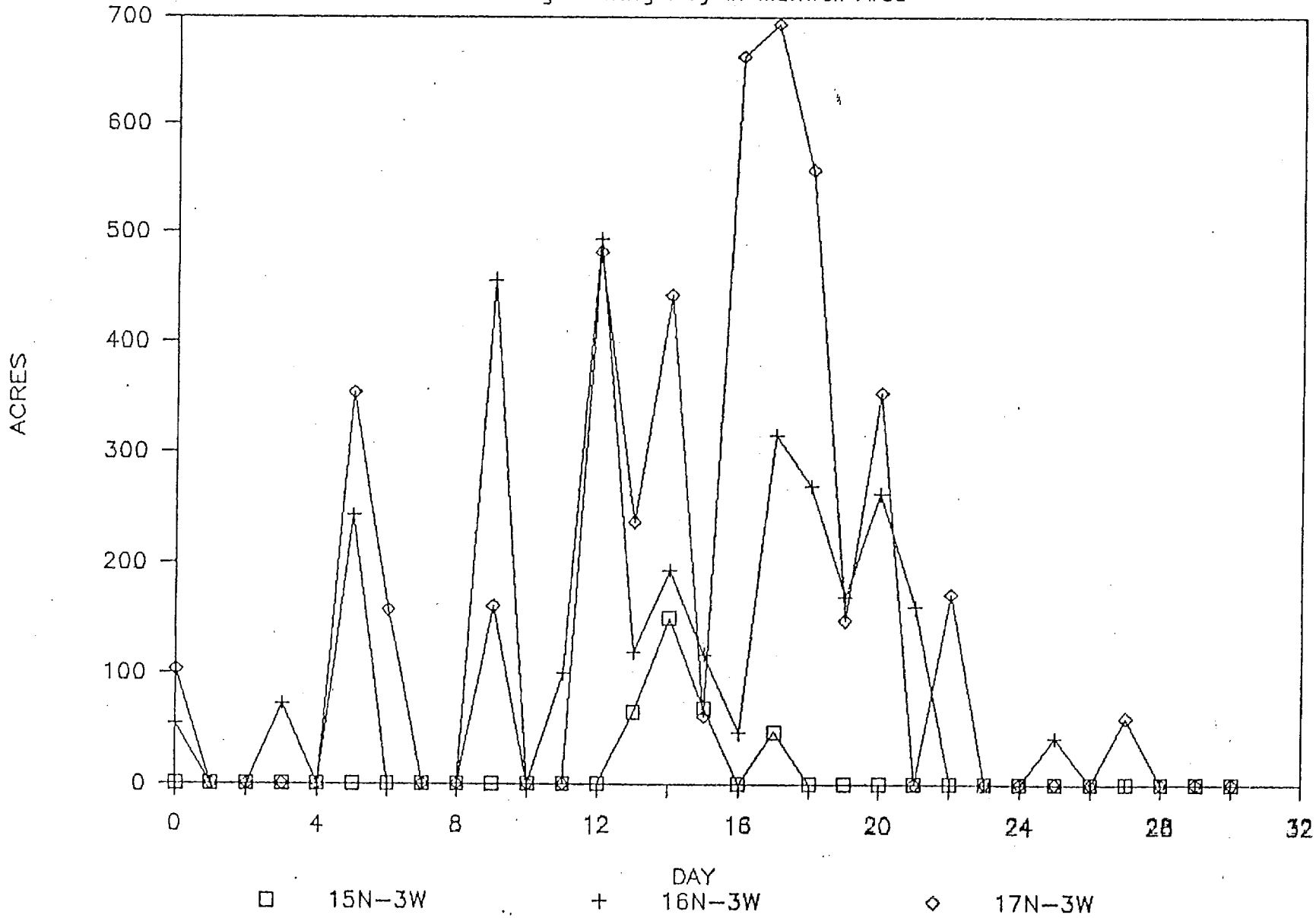


Figure 17 Methyl Parathion Formulation

Usage During May in Maxwell Area

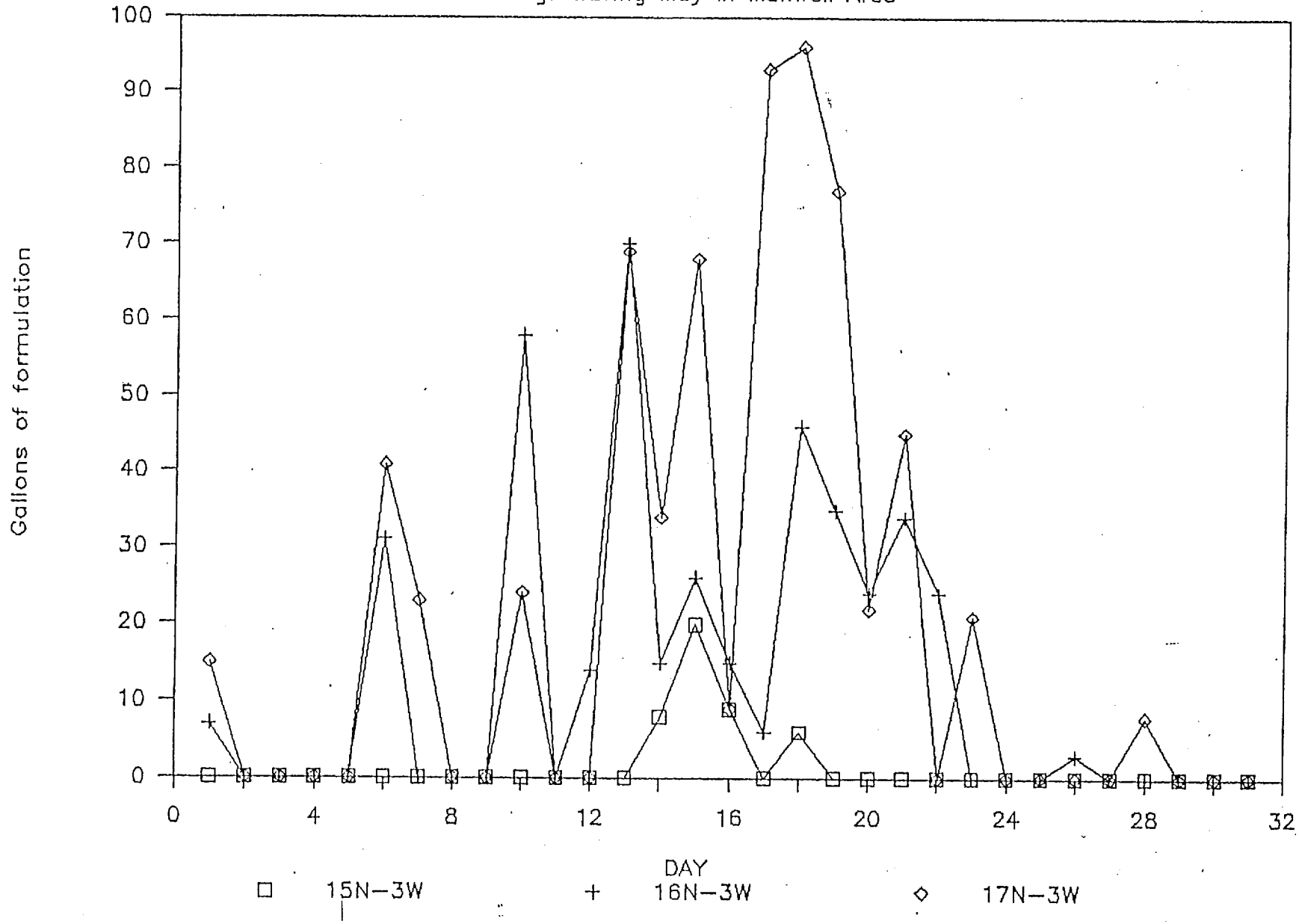


Table 21. Average Windspeed, Direction and Temperature at Maxwell for Each 24 Hour Sampling Period

DATE	TEMPERATURE MIN	TEMPERATURE MAX	TEMPERATURE AVERAGE	WINDSPEED[A] (cm/sec) AVERAGE	DIRECTION[B] (avg) Deg	
5/12/86	13.5	28.9	21.4	288	246	NW
5/13/86	16.2	30.0	22.9	249	241	NW
5/14/86	12.6	28.9	21.3	287	227	NW
5/15/86	17.2	29.0	23.0	374	266	N
5/16/86	16.6	30.4	23.4	437	249	N
5/17/86	17.2	33.7	25.8	220	169	W
5/18/86	15.2	32.4	24.4	254	61	SE
5/19/86	12.9	29.1	20.8	407	70	S
5/20/86	9.5	24.3	16.9	479	143	SW
5/21/86	10.7	21.4	13.4	307	200	W
5/22/86	13.6	25.8	19.7	327	150	SW
5/24/86	16.5	30.4	23.6	0	123	SW
5/25/86	21.4	32.2	27.8	0	67	SE
5/27/86	15.1	33.0	24.9	0	93	S
5/28/86	17.1	33.7	25.6	0	61	SE
5/29/86	17.3	34.6	26.5	0	62	SE
5/30/86	16.6	34.2	25.1	0	53	SE
5/31/86	16.5	32.0	23.2	0	65	SE
6/1/86	14.7	30.9	22.8	0	51	SE
6/2/86	12.7	29.4	20.4	502	52	SE
6/3/86	13.6	29.8	21.5	353	69	S
6/4/86	13.4	27.9	20.5	397	61	SE
6/5/86	12.3	26.3	19.3	371	71	S
6/6/86	13.4	26.4	19.6	387	54	SE
6/7/86	16.5	29.6	23.6	275	226	NW
6/8/86	21.4	32.7	26.4	500	268	N
6/9/86	19.9	34.7	27.7	403	261	N
6/10/86	16.7	39.0	28.7	212	164	W
6/11/86	15.6	29.7	23.3	319	74	S
6/12/86	15.2	33.7	24.6	358	34	SE

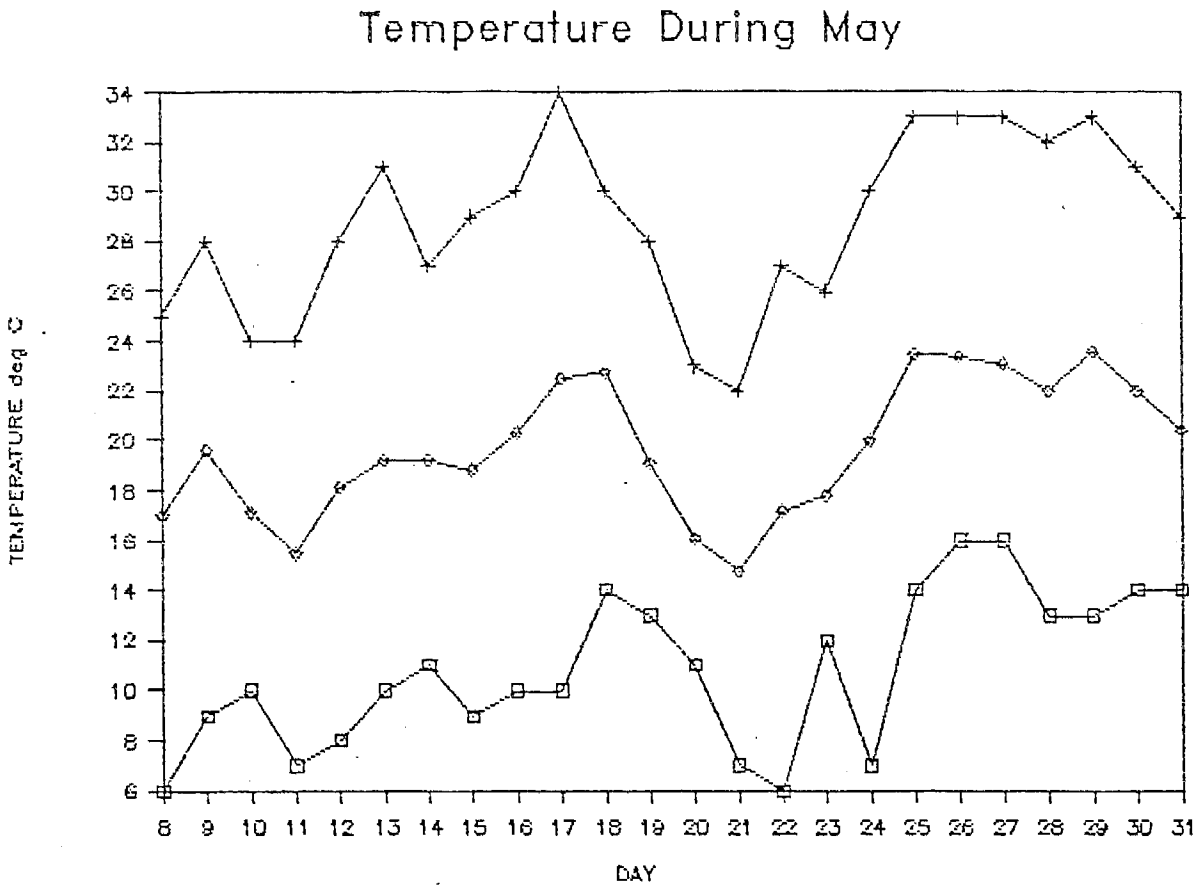
A: Equipment Malfunction during 5/24/86 - 5/31/86

B: 0 ° = East; 90 ° = South; 180 ° = West; 270 ° = North

Table 22. Daily Temperature and Windspeed at Nicolaus

DAY	TEMPERATURE MAX	MIN	AVERAGE	WINDSPEED (cm/sec)
5/ 8/86	25	6	17.0	310
5/ 9/86	28	9	19.6	210
5/10/86	24	10	17.1	220
5/11/86	24	7	15.5	180
5/12/86	28	8	18.1	170
5/13/86	31	10	19.2	90
5/14/86	27	11	19.2	200
5/15/86	29	9	18.8	140
5/16/86	30	10	20.3	250
5/17/86	34	10	22.5	110
5/18/86	30	14	22.8	160
5/19/86	28	13	19.1	350
5/20/86	23	11	16.1	400
5/21/86	22	7	14.8	160
5/22/86	27	6	17.2	220
5/23/86	26	12	17.8	230
5/24/86	30	7	20.0	130
5/25/86	33	14	23.5	130
5/26/86	33	16	23.4	240
5/27/86	33	16	23.1	250
5/28/86	32	13	22.0	200
5/29/86	33	13	23.6	170
5/30/86	31	14	22.0	280
5/31/86	29	14	20.4	310
6/1/86	28	13	20.0	340
6/2/86	26	13	18.7	440
6/3/86	29	12	20.0	320
6/4/86	29	14	19.7	340
6/5/86	24	14	18.3	380
6/6/86	25	12	18.0	350
6/7/86	28	13	19.6	210
6/8/86	30	13	22.4	260
6/9/86	34	14	24.7	180
6/10/86	37	14	26.3	140
6/11/86	28	16	21.2	320
6/12/86	32	14	21.7	310

Figure 18. Minimum, Maximum and Average Temperature for Maxwell



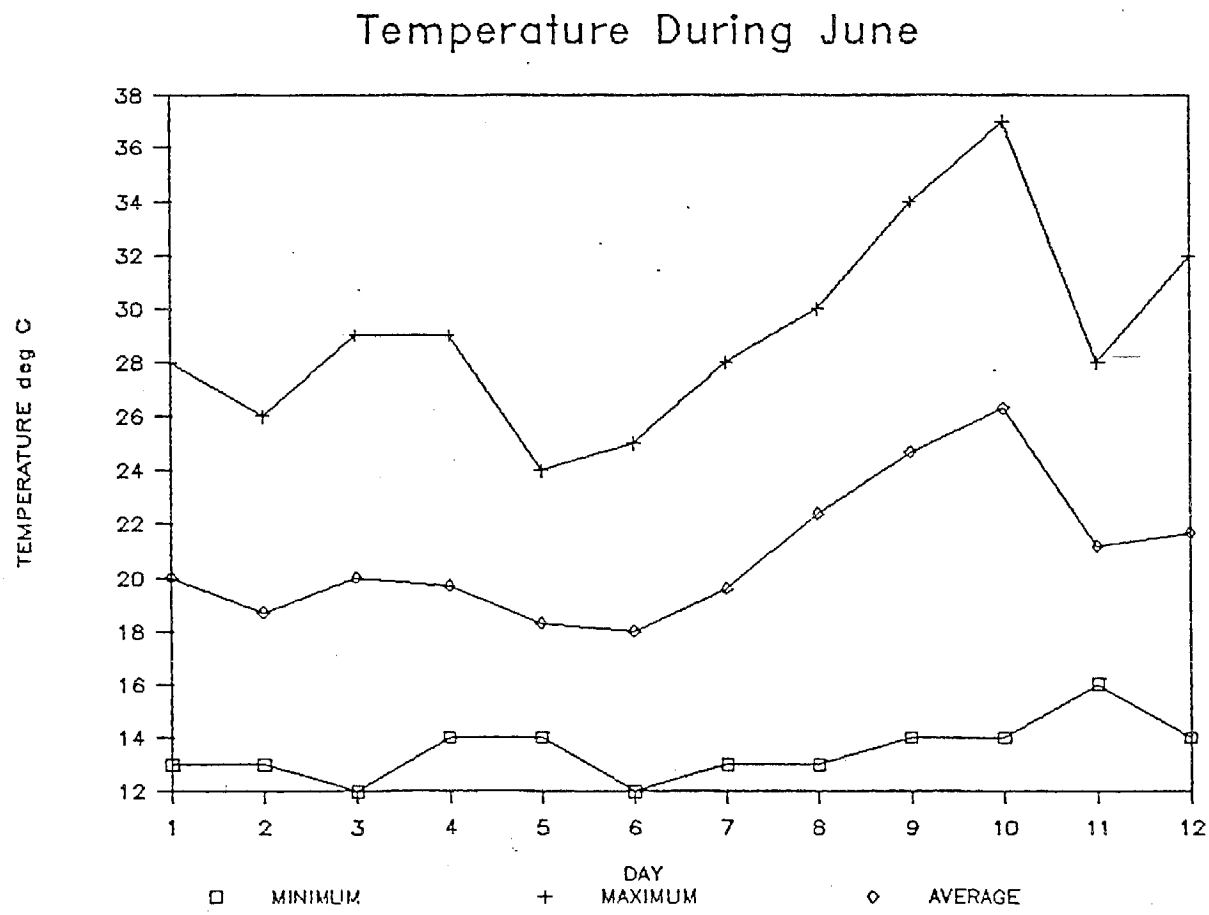
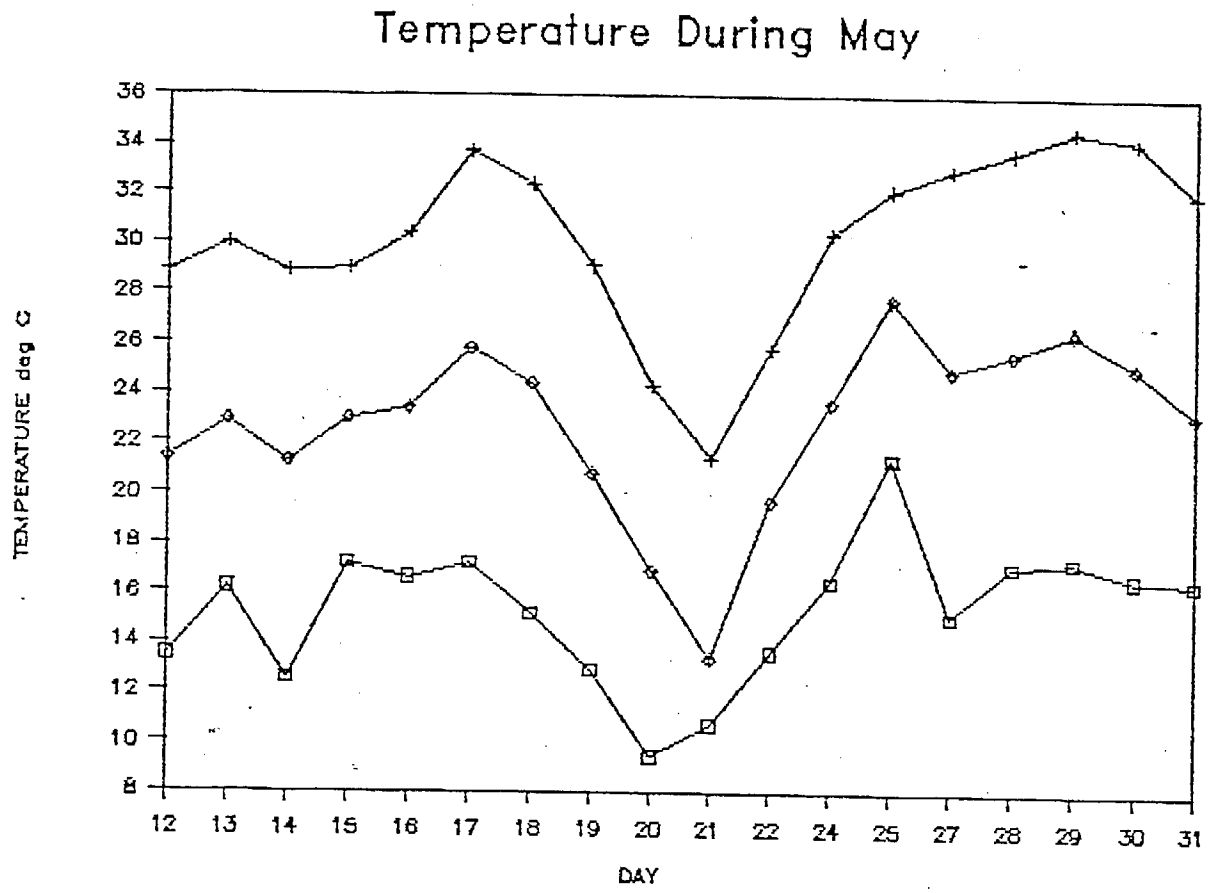
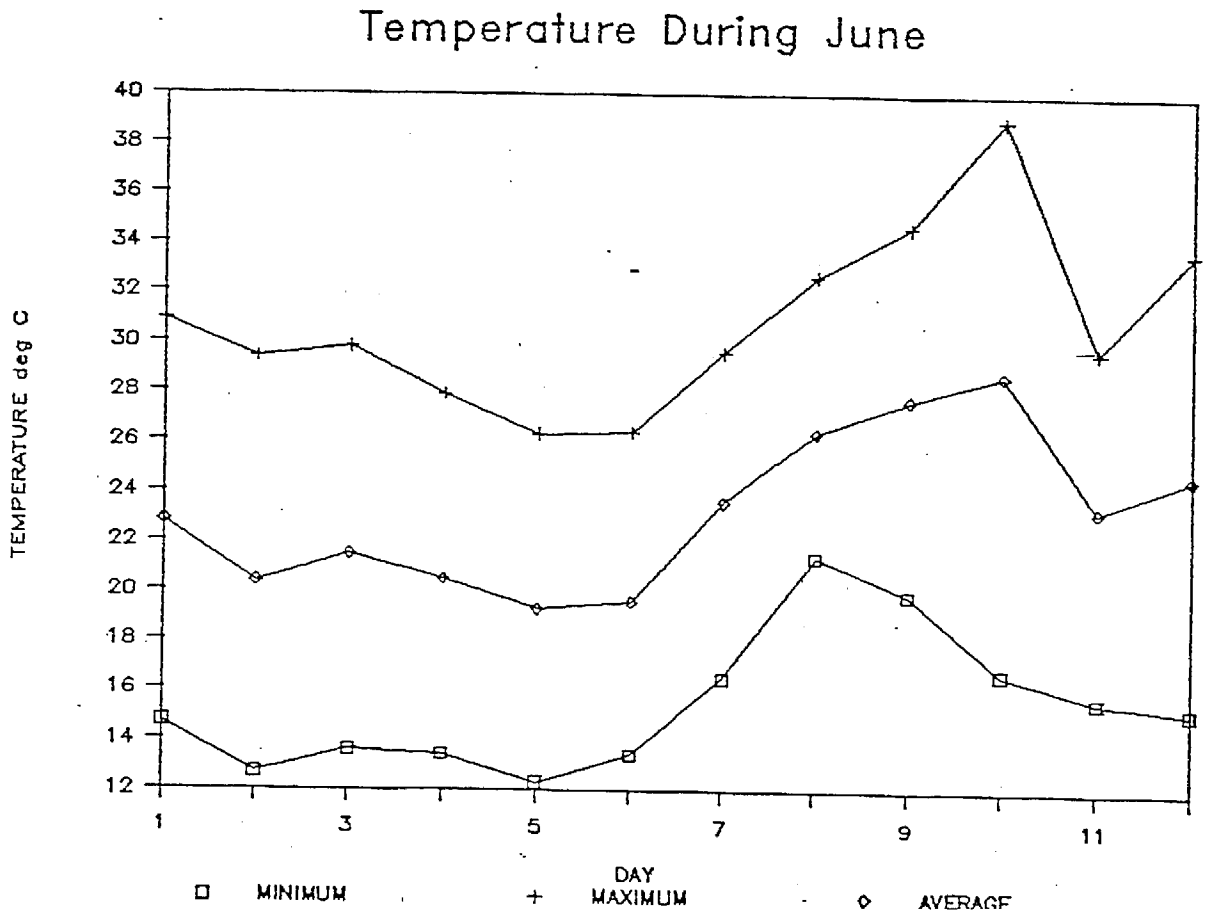


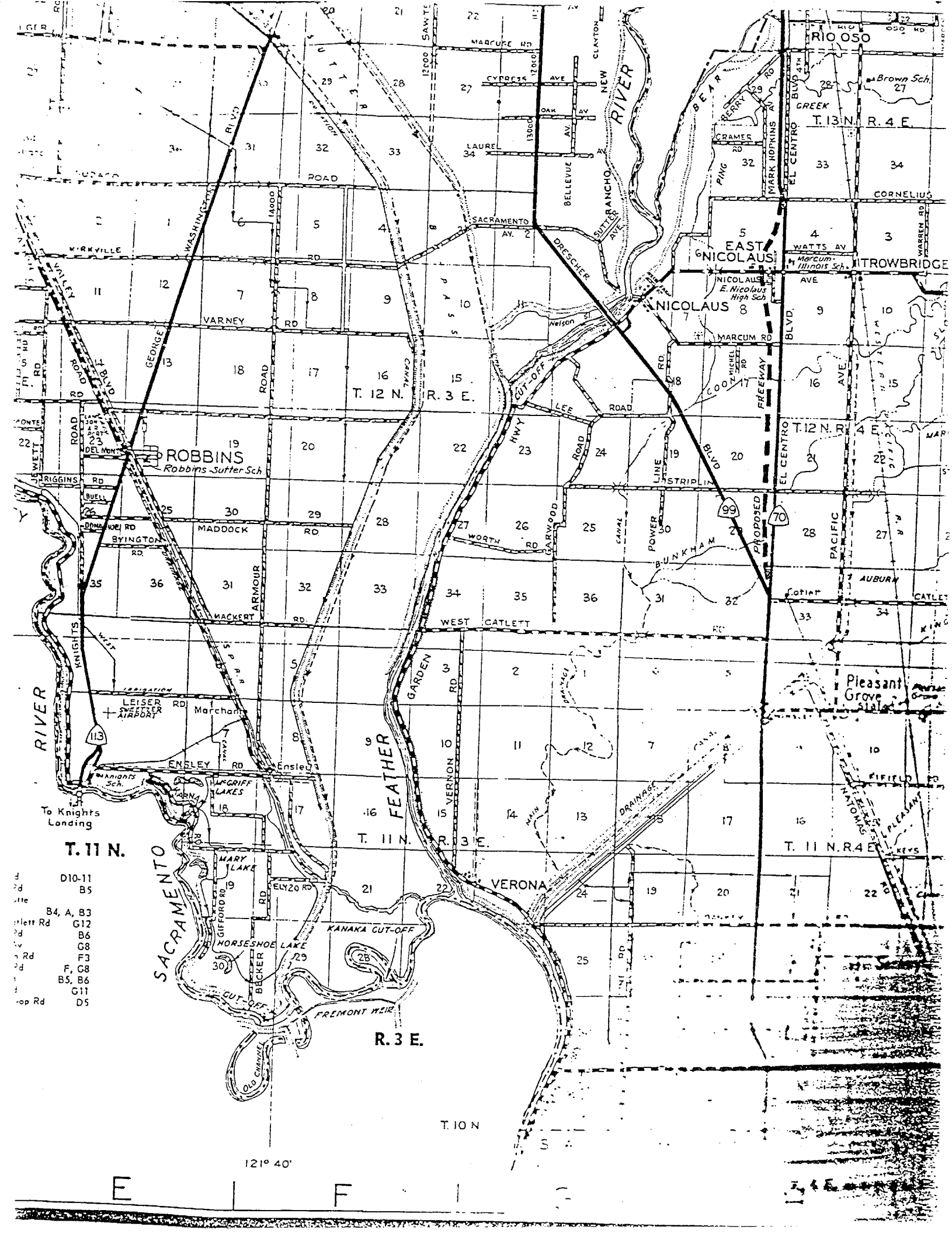
Figure 19. Minimum, Maximum and Average Temperature for Nicolaus





Appendix A: Section Map of the Maxwell- Williams Area

DELEVAN
DELEVAN ROAD
ZUMWALT RD
RANCHO
Del Valley Farms Inc.
Maxwell Gun Club
LENAHAN
KRUSE RD
PERRY RD
CORBIN RD
FREEWAY
POWER
CREEK
FUNKS
PACKER RD
T.17 N. R.3 W.
T. 17 N. R.2 W.
WADLEIGH RD
TWO MILE
FOUR MILE
McDERMOTT
REARDON
CEMETERY
GLEN-COLUSA CANAL
SOUTHERN PACIFIC
LAUSTEN RD
MAXWELL
EL. 91'
El Dorado Gun Club
MILLS ORCHARDS
MAXWELL - COLUSA RD
DANLEY
FINKS RD
WILSON RD
LYONS
Green Mallard Duck Club
Bell Outing Gun Club
Limit Gun Club
FAIRVIEW RD
WELLS RD
HOLLOWAY
HARBISON RD
Commodore Gun Club
Kuhl Gun Club
Lake Land Gun Club
Colusa Gun Club
BOWEN RD
T.16 N. R.3 W.
T. 16 N. R.2 W.
MAIN
IRRIGATION
SLOUGH
DANLEY LATERAL
CORTENA
LURLINE RD
Northern Gun Club
JAMIESON
HOPKINS
COLUSA
EL. 61'
LA GRANDE
GLENN VALLEY
MARENGO RD
HASS RD
STANDARD
SAN JOSE
NUTTER
PARALLEL
JUDICIAL DISTRICT
GIBSON
FRESHWATER
GLEN-COLUSA CANAL
SCHAAD
WILLIAMS
LANDING STRIP
COLUSA
LONE STAR
NATIONAL
SALT
T.15 N. R.3 W.
T. 15 N. R. 2 W.
AREL RD
CRAWFORD RD
FOUR CORNERS
HANKINS
DAVIS
GEORGE
PUMPHOUSE
TUERNER
WALNUT
WARE
HUSTED
EAST
CAMP
BEAUCHAMP


RIO OSO
Brown Sch.
T. 13 N. R. 4 E.
EAST NICOLAUS
NICOLAUS
E. Nicolaus High Sch
Marcum-Illinois Sch.
TROWBRIDGE
T. 12 N. R. 3 E.
T. 12 N. R. 4 E.
ROBBINS
Robbins-Sutter Sch
Pleasant Grove
T. 11 N.
T. 11 N. R. 3 E.
T. 11 N. R. 4 E.
R. 3 E.
T. 10 N
VERONA
SACRAMENTO
FEATHER
RIVER
KANAKA CUT-OFF
HORSESHOE LAKE
FREMONT WEIR
LEISER AIRPORT
To Knights Landing
121° 40'
D10-11
B5
B4, A, B3
G12
B6
G8
F3
F, G8
B5, B6
G11
D5

Appendix B: Section Map of the Robbins - Trowbridge Area

Appendix C: CIMIS Meteorological Data for Nicolaus and Colusa

California Irrigation Management Information System
Department of Water Resources
Colusa

Daily Weather Data for Station # 32

DATE	ETo mm	PRECIP mm	RADIATION SOLAR ---W/sq.m---	RADIATION NET	VAPOR PRESSURE MAX ---kPa---	VAPOR PRESSURE MIN	VAPOR PRESSURE AVE	AIR TEMPERATURE MAX ---Celsius---	AIR TEMPERATURE MIN	AIR TEMPERATURE AVE	REL. HUM. MAX ---%---	REL. HUM. MIN	REL. HUM. AVE	DEWPT C	WIND AVE m/s	WIND RUN km	SOIL TEMP. AT 15cm MAX ---Celsius---	SOIL TEMP. AT 15cm MIN	SOIL TEMP. AT 15cm AVE
5/ 1/86 Th	4.67	0.00	205	113	1.2	0.6	0.9	21	10	15.3	N/C	N/C	52	5	3.6	308	17	16	16.4
5/ 2/86 Fr	2.79	0.00	131	73	1.6	1.1	1.3	21	12	15.4	N/C	N/C	75	11	3.7	320	17	16	16.2
5/ 3/86 Sa	3.67	1.00	193	106	1.5	0.6	1.1	21	6	14.3	N/C	N/C	68	9	3.1	265	17	16	16.1
TOTALS:			AVERAGES:																
WEEK	11.13	1.00	176	97	1.4	0.8	1.1	21	9	15.0	N/A	N/A	65	8	3.4	298	17	16	16.2
5/ 4/86 Su	3.27	0.00	200	105	1.4	0.9	1.1	20	7	13.0	N/C	N/C	71	8	2.7	232	16	15	15.7
5/ 5/86 Mo	3.96	0.00	215	116	1.3	0.5	0.9	20	4Y	12.5	N/C	N/C	63	6	2.8	241	16	15	15.6
5/ 6/86 Tu	3.47	0.00	234	117	0.9	0.6	0.7	18	0R	9.3	N/C	N/C	61	2	1.8	156	16	14	14.8
5/ 7/86 We	5.49	0.00	327	170	1.1	0.4	0.8	24	2Y	13.6	N/C	N/C	49	3	2.0	172	16	14	14.8
5/ 8/86 Th	7.91	0.00	328	174	1.1	0.5	0.8	25	8	17.7	N/C	N/C	41	4	4.7	406	16	15	15.5
5/ 9/86 Fr	7.32	0.00	323	174	1.1	0.5	0.8	30	10	20.5	N/C	N/C	32	3	3.2	276	18	15	16.2
5/10/86 Sa	6.51	0.00	329	173	1.0	0.4	0.6	25	11	17.6	N/C	N/C	32	1	2.9	247	18	16	17.1
TOTALS:			AVERAGES:																
WEEK	37.92	0.00	279	147	1.1	0.6	0.8	23	7	14.9	N/A	N/A	50	4	2.9	247	17	15	15.7
5/11/86 Su	6.35	0.00	328	166	1.1	0.4	0.6	24	9	15.6	N/C	N/C	34	0	2.7	237	18	16	16.9
5/12/86 Mo	6.98	0.00	330	169	1.3	0.5	0.8	29	8	19.1	N/C	N/C	35	3	3.1	271	18	16	16.9
5/13/86 Tu	4.83	0.00	247	134	1.5	0.6	1.1	31	9	19.9	N/C	N/C	47	8	1.5	127	18	16	17.2
5/14/86 We	6.60	0.00	299	158	1.2	0.4	0.7	29	10	20.3	N/C	N/C	30	2	2.4	211	18	17	17.6
5/15/86 Th	6.78	0.00	328	174	1.5	0.5	0.8	29	8	18.9	N/C	N/C	39	5	2.3	202	18	17	17.5
5/16/86 Fr	8.60	0.00	332	173	1.3	0.5	0.7	30	15	22.0	N/C	N/C	28	3	4.0	346	19	17	17.7
5/17/86 Sa	6.97	0.00	326	178	1.6	0.5	0.9	34	11	23.6	N/C	N/C	30	5	1.7	144	20	17	18.2
TOTALS:			AVERAGES:																
WEEK	47.11	0.00	313	165	1.4	0.5	0.8	29	10	19.9	N/A	N/A	35	4	2.5	219	18	16	17.4
5/18/86 Su	6.86	0.00	332	178	1.8	0.5	1.1	33	12	24.5	N/C	N/C	36	8	1.8	158	20	18	19.1
5/19/86 Mo	6.07	0.00	285	158	1.5	0.8	1.3	30	14	21.2	N/C	N/C	51	11	3.0	255	20	19	19.6
5/20/86 Tu	5.09	1.00	236	127	1.6	0.7	1.2	25	10	17.7	N/C	N/C	58	9	3.6	314	20	19	19.1
5/21/86 We	5.51	0.00	334	167	1.2	0.4	0.7	23	6	15.2	N/C	N/C	40	2	1.9	164	19	17	18.3
5/22/86 Th	6.18	0.00	323	154	1.0	0.4	0.7	28	9	17.3	N/C	N/C	33	1	2.8	239	19	17	18.0
5/23/86 Fr	5.37	0.00	294	131	1.1	0.4	0.7	27	13	19.3	N/C	N/C	33	3	2.2	187	19	18	18.3
5/24/86 Sa	6.46	0.00	336	167	1.8	0.5	0.9	32	9	21.8	N/C	N/C	34	5	1.7	143	20	18	18.8
TOTALS:			AVERAGES:																
WEEK	41.54	1.00	306	154	1.4	0.5	0.9	28	10	19.6	N/A	N/A	41	6	2.4	209	20	18	18.7
5/25/86 Su	6.64	0.00	338	177	2.0	1.1	1.5	33	16	25.0	N/C	N/C	48	13	2.0	176	21	19	20.1
5/26/86 Mo	5.91R	0.00	328	157H	1.9	0.8	1.5	35	17	24.8	N/C	N/C	49	13	2.2	192	22	20	21.1
5/27/86 Tu	6.41	0.00	329	169	1.9	1.2	1.6	34	17	25.1	N/C	N/C	49	14	2.3	198	23	21	21.7
5/28/86 We	6.74	0.00	338	171	1.6	0.9	1.4	35	13	24.8	N/C	N/C	43	11	2.1	184	23	21	22.0
5/29/86 Th	7.42	0.00	330	176	1.9	0.6	1.2	35	14	26.0	N/C	N/C	35	9	2.1	178	23	21	22.3
5/30/86 Fr	7.40	0.00	328	174	1.9	0.8	1.4	34	15	24.9	N/C	N/C	45	12	2.9	252	23	21	22.3
5/31/86 Sa	5.82	0.00	296	151	1.8	1.3	1.6	32	16	22.8	N/C	N/C	57	14	2.8	238	23	21	22.2
TOTALS:			AVERAGES:																
WEEK	40.44	0.00	326	168	1.8	0.9	1.5	34	15	24.8	N/A	N/A	47	12	2.3	203	23	21	21.7
MONTH	178.15	2.00	294	152	1.4	0.6	1.0	28	11	19.3	N/A	N/A	45	7	2.6	227	19	17	18.2

1 calorie/sq.cm/day (Ly/day)*.484=W/sq.m inches*25.4=mm (F-32)*5/9=C. mph*.447=m/s mBars*.1=kPa miles=km/1.60934

--------- SEVERE FLAGS (not included in totals) --------- ---------- INFORMATIVE FLAGS ----------

N/C -not collected N/A -not available S -not in service P -calculated from partial hourly data H -hourly is flagged N/A, S or R
noc -cannot calculate R -out of range, severe Q -all quality control not performed Y -out of range

* * * * PRELIMINARY DATA * * * *

California Irrigation Management Information System
Department of Water Resources
Colusa

Daily Weather Data for Station # 32

DATE	ETo mm	PRECIP mm	RADIATION SOLAR W/sq.m	RADIATION NET W/sq.m	VAPOR PRESSURE MAX kPa	VAPOR PRESSURE MIN kPa	VAPOR PRESSURE AVE kPa	AIR TEMPERATURE MAX Celsius	AIR TEMPERATURE MIN Celsius	AIR TEMPERATURE AVE Celsius	REL. HUM. MAX %	REL. HUM. MIN %	REL. HUM. AVE %	DEWPT C	WIND AVE m/s	WIND RUN km	SOIL TEMP. AT 15cm MAX Celsius	SOIL TEMP. AT 15cm MIN Celsius	SOIL TEMP. AT 15cm AVE Celsius
6/ 1/86 Su	6.47	0.00	330	177	2.0	1.5	1.7	30	15	22.2	N/C	N/C	64	15	3.3	282	28	21	24.4
6/ 2/86 Mo	6.07	0.00	328	170	2.1	1.3	1.6	28	14	20.3	N/C	N/C	68	14	4.0	341	27	24	24.7
6/ 3/86 Tu	5.81	0.00	333	166	1.8	1.1	1.5	30	13	20.9	N/C	N/C	59	13	2.7	231	25	23	23.7
6/ 4/86 We	5.24	0.00	315	147	1.8	1.1	1.5	28	14	20.7	N/C	N/C	62	13	3.0	258	24	23	23.4
6/ 5/86 Th	5.15	0.00	321	149	1.7	1.3	1.5	26	14	19.4	N/C	N/C	66	13	3.4	296	24	22	22.9
6/ 6/86 Fr	5.79	0.00	336	169	1.7	0.9	1.3	27	12	19.2	N/C	N/C	61	11	3.2	277	23	22	22.5
6/ 7/86 Sa	5.72	0.00	318	166	1.7	0.5	1.2	29	13	20.4	N/C	N/C	51	10	2.1	183	23	22	22.3
TOTALS:			AVERAGES:																
WEEK	40.25	0.00	326	163	1.8	1.1	1.5	28	14	20.4	N/A	N/A	62	13	3.1	267	25	22	23.4
6/ 8/86 Su	8.67	0.00	355	165	1.2	0.5	0.8	32	17	24.3	N/C	N/C	27	4	4.0	344	23	21	22.0
6/ 9/86 Mo	9.22	0.00	355	170	1.7	0.5	0.8	35	19	26.6	N/C	N/C	24	4	3.8	329	22	21	21.7
6/10/86 Tu	7.18	0.00	352	177	2.0	0.5	1.1	38	13	27.1	N/C	N/C	30	8	1.5	132	23	21	22.1
6/11/86 We	5.71	0.00	281	145	1.8	1.3	1.6	30	16	23.3	N/C	N/C	55	14	2.7	235	23	22	22.6
6/12/86 Th	6.86	0.00	326	174	1.8	1.1	1.5	33	15	23.8	N/C	N/C	50	13	2.9	248	23	22	22.6
6/13/86 Fr	6.57	0.00	328	174	1.9	1.3	1.5	31	14	21.7	N/C	N/C	59	13	3.6	314	23	22	22.5
6/14/86 Sa	6.29	0.00	339	175	1.7	1.2	1.4	29	13	20.5	N/C	N/C	60	12	3.7	320	23	21	22.2
TOTALS:			AVERAGES:																
WEEK	50.49	0.00	334	169	1.7	0.9	1.2	33	15	23.9	N/A	N/A	43	10	3.2	275	23	21	22.2
6/15/86 Su	6.45	0.00	345	176	1.8	1.0	1.4	28	14	20.8	N/C	N/C	58	12	3.4	290	23	21	22.0

1 calorie/sq.cm/day (Ly/day)*.484=W/sq.m inches*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa miles=km/1.60934

--------- SEVERE FLAGS (not included in totals) --------- ---------- INFORMATIVE FLAGS ----------

N/C -not collected N/A -not available S -not in service P -calculated from partial hourly data H -hourly is flagged N/A, S or R
noc -cannot calculate R -out of range, severe Q -all quality control not performed Y -out of range

* * * * PRELIMINARY DATA * * * *

California Irrigation Management Information System
Department of Water Resources
Nicolaus

Daily Weather Data for Station # 30

DATE	ETo mm	PRECIP mm	RADIATION SOLAR W/sq.m	RADIATION NET W/sq.m	VAPOR PRESSURE MAX kPa	VAPOR PRESSURE MIN kPa	VAPOR PRESSURE AVE kPa	AIR TEMPERATURE MAX Celsius	AIR TEMPERATURE MIN Celsius	AIR TEMPERATURE AVE Celsius	REL. HUM. MAX %	REL. HUM. MIN %	REL. HUM. AVE %	DEWPT C	WIND AVE m/s	WIND RUN km	SOIL TEMP. AT 15cm MAX Celsius	SOIL TEMP. AT 15cm MIN Celsius	SOIL TEMP. AT 15cm AVE Celsius
5/ 1/86 Th	85.94R	0.00Y	88	39H	1.3	0.8	1.1	21	14	16.4	N/C	N/C	59	8	2.6	226	16	16	16.1
5/ 2/86 Fr	4.21	2.00	243	130	1.7	1.2	1.4	23	11	16.3	N/C	N/C	74	12	2.9	247	18	15	16.3
5/ 3/86 Sa	2.42	1.00	161	75	1.6	0.9	1.3	20	7	13.8	N/C	N/C	80	11	2.3	198	17	16	16.3
TOTALS:			AVERAGES:																
WEEK	6.64	3.00	164	81	1.5	0.9	1.2	21	10	15.5	N/A	N/A	71	10	2.6	224	17	15	16.2
5/ 4/86 Su	3.74	1.00	252	136	1.5	0.9	1.2	19	6	13.0	N/C	N/C	79	9	2.3	203	18	14	15.9
5/ 5/86 Mo	3.29	1.00	190	109	1.4	0.7	1.1	19	4	12.0	N/C	N/C	79	9	2.8	243	17	15	15.9
5/ 6/86 Tu	3.07	0.00	246	110	1.1	0.7	0.9	18	2Y	10.0	N/C	N/C	70	5	1.5	126	16	14	14.9
5/ 7/86 We	4.91	0.00	328	162	1.3	0.7	1.0	23	3Y	13.9	N/C	N/C	63	7	1.6	137	17	13	14.8
5/ 8/86 Th	6.22	0.00	327	164	1.4	0.9	1.1	25	6	17.0	N/C	N/C	57	8	3.1	267	17	14	15.6
5/ 9/86 Fr	5.90	0.00	322	157	1.3	0.7	1.1	28	9	19.6	N/C	N/C	47	8	2.1	185	19	14	16.3
5/10/86 Sa	5.41	0.00	325	157	1.2	0.8	1.0	24	10	17.1	N/C	N/C	52	7	2.2	190	19	16	17.3
TOTALS:			AVERAGES:																
WEEK	32.55	2.00	284	142	1.3	0.8	1.1	22	6	14.7	N/A	N/A	64	8	2.2	193	17	14	15.8
5/11/86 Su	4.91	0.00	327	147	1.5	0.6	1.0	24	7	15.5	N/C	N/C	55	7	1.8	153	19	15	17.3
5/12/86 Mo	5.56	0.00	332	162	1.5	0.9	1.2	28	8	18.1	N/C	N/C	56	9	1.7	144	19	16	17.7
5/13/86 Tu	3.68	0.00	257	108	1.8	1.1	1.4	31	10	20.3	N/C	N/C	59	12	0.9	79	20	16	18.0
5/14/86 We	4.96	0.00	287	133	1.5	0.9	1.2	27	11	19.2	N/C	N/C	54	10	2.0	169	19	17	18.2
5/15/86 Th	5.16	0.00	324	150	1.6	1.0	1.2	29	9	18.8	N/C	N/C	57	10	1.4	121	19	17	18.1
5/16/86 Fr	6.58	0.00	332	162	1.5	1.0	1.2	30	10	20.3	N/C	N/C	51	10	2.5	218	19	17	18.0
5/17/86 Sa	5.93	0.00	323	172	1.8	0.9	1.4	34	10	22.5	N/C	N/C	51	12	1.1	93	21	17	18.7
TOTALS:			AVERAGES:																
WEEK	36.78	0.00	312	148	1.6	0.9	1.2	29	9	19.3	N/A	N/A	55	10	1.6	140	19	16	18.0
5/18/86 Su	5.88	0.00	338	167	2.1	1.1	1.5	32	14	22.8	N/C	N/C	56	14	1.6	137	21	18	19.7
5/19/86 Mo	5.46	1.00H	304	152	1.9	1.3	1.5	28	13	19.1	N/C	N/C	67	13	3.5	301	21	18	19.8
5/20/86 Tu	2.98	0.00	178	77	1.8	1.1	1.5	23	11	16.6	N/C	N/C	78	13	4.0	342	20	18	18.6
5/21/86 We	4.74	0.00	337	156	1.2	0.8	1.0	22	7	14.8	N/C	N/C	58	7	1.6	137	20	16	18.0
5/22/86 Th	5.71	0.00	328	161	1.2	0.5	0.9	27	6	17.2	N/C	N/C	46	6	2.2	186	19	16	17.7
5/23/86 Fr	4.99	0.00	271	139	1.4	0.7	1.0	26	12	17.8	N/C	N/C	50	7	2.3	200	20	17	18.3
5/24/86 Sa	5.38	0.00	331	164	1.9	0.9	1.3	30	7	20.0	N/C	N/C	56	11	1.3	110	21	17	18.7
TOTALS:			AVERAGES:																
WEEK	35.15	1.00	298	145	1.7	0.9	1.2	27	10	18.3	N/A	N/A	59	10	2.3	202	20	17	18.7
5/25/86 Su	5.45	0.00	335	168	2.1	1.5	1.8	33	14	23.5	N/C	N/C	61	16	1.3	116	25	18	21.3
5/26/86 Mo	6.03	0.00	331	180	2.4	1.6	1.9	33	16	23.4	N/C	N/C	65	16	2.4	212	25	20	22.2
5/27/86 Tu	6.13	0.00	329	179	2.4	1.4	1.8	33	16	23.1	N/C	N/C	65	16	2.5	215	24	21	22.6
5/28/86 We	5.86	0.00	333	177	2.4	1.3	1.7	32	13	22.0	N/C	N/C	64	15	2.0	169	24	20	22.1
5/29/86 Th	5.75P	0.00H	326H	178H	2.5	1.1	1.7H	33	13	23.6H	N/C	N/C	58	15	1.7H	143	24	21	22.3H
5/30/86 Fr	5.96	0.00	308	167	2.4	1.4	1.8	31	14	22.0	N/C	N/C	66	15	2.8	245	24	21	22.3
5/31/86 Sa	5.30	0.00	293	161	2.3	1.5	1.8	29	14	20.4	N/C	N/C	74	16	3.1	272	23	21	22.1
TOTALS:			AVERAGES:																
WEEK	40.48	0.00	322	173	2.4	1.4	1.8	32	14	22.6	N/A	N/A	65	16	2.3	196	24	20	22.1
MONTH	151.60	6.00	290	145	1.7	1.0	1.3	27	10	18.4	N/A	N/A	62	11	2.2	187	20	17	18.4

1 calorie/sq.cm/day (Ly/day)*.484=W/sq.m inches*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa miles=km/1.60934

--------- SEVERE FLAGS (not included in totals) --------- ---------- INFORMATIVE FLAGS ----------

N/C -not collected N/A -not available S -not in service P -calculated from partial hourly data H -hourly is flagged N/A, S or R

noc -cannot calculate R -out of range, severe Q -all quality control not performed Y -out of range

* * * * PRELIMINARY DATA * * * *

California Irrigation Management Information System
Department of Water Resources
Nicolaus

Daily Weather Data for Station # 30

DATE	ETo mm	PRECIP mm	RADIATION SOLAR W/sq.m	RADIATION NET W/sq.m	VAPOR PRESSURE MAX kPa	VAPOR PRESSURE MIN kPa	VAPOR PRESSURE AVE kPa	AIR TEMPERATURE MAX Celsius	AIR TEMPERATURE MIN Celsius	AIR TEMPERATURE AVE Celsius	REL. HUM. MAX %	REL. HUM. MIN %	REL. HUM. AVE %	DEWPT C	WIND AVE m/s	WIND RUN km	SOIL TEMP. AT 15cm MAX Celsius	SOIL TEMP. AT 15cm MIN Celsius	SOIL TEMP. AT 15cm AVE Celsius
6/ 1/86 Su	5.95	0.00	325	183	2.3	1.4	1.8	28	13	20.0	N/C	N/C	77	16	3.4	298	23	21	21.8
6/ 2/86 Mo	5.75	1.00	323	179	2.2	1.4	1.7	26	13	18.7	N/C	N/C	78	15	4.4	376	23	20	21.5
6/ 3/86 Tu	5.61	0.00	335	174	2.2	1.4	1.7	29	12	20.0	N/C	N/C	72	15	3.2	276	23	20	21.4
6/ 4/86 We	5.00	0.00	299	153	2.2	1.5	1.7	29	14	19.7	N/C	N/C	73	15	3.4	294	23	20	21.3
6/ 5/86 Th	5.24	0.00	315	169	2.0	1.4	1.6	24	14	18.3	N/C	N/C	77	14	3.8	325	23	20	21.2
6/ 6/86 Fr	5.39	0.00	334	171	2.0	1.3	1.5	25	12	18.0	N/C	N/C	74	13	3.5	303	23	19	20.9
6/ 7/86 Sa	5.26	0.00	309	164	2.1	1.1	1.5	28	13	19.6	N/C	N/C	65	13	2.1	184	22	18	20.1
TOTALS:			AVERAGES:																
WEEK	38.21	1.00	320	170	2.1	1.4	1.6	27	13	19.2	N/A	N/A	74	14	3.4	294	23	20	21.2
6/ 8/86 Su	7.27	0.00	348	181	1.7	1.0	1.3	30	13	22.4	N/C	N/C	49	11	2.6	224	22	19	20.5
6/ 9/86 Mo	6.72	0.00	348	169	2.0	1.0	1.5	34	14	24.7	N/C	N/C	47	13	1.8	152	23	19	21.0
6/10/86 Tu	6.24	0.00	344	169	2.2	0.9	1.6	37	14	26.3	N/C	N/C	46	14	1.4	121	25	20	22.6
6/11/86 We	4.85	0.00	262	134	2.2	1.5	1.7	28	16	21.2	N/C	N/C	69	15	3.2	274	24	22	22.7
6/12/86 Th	6.23	0.00	328	179	2.4	1.4	1.8	32	14	21.7	N/C	N/C	67	15	3.1	264	24	21	22.5
6/13/86 Fr	5.82	0.00	324	170	2.2	1.4	1.7	28	13	19.8	N/C	N/C	74	15	4.0	347	24	21	22.4
6/14/86 Sa	5.83	0.00	333	173	2.0	1.4	1.6	27	13	19.4	N/C	N/C	72	14	4.2	363	23	21	21.8
TOTALS:			AVERAGES:																
WEEK	42.97	0.00	327	168	2.1	1.2	1.6	31	14	22.2	N/A	N/A	61	14	2.9	249	24	20	21.9
6/15/86 Su	5.91	0.00	339	170	2.0	1.1	1.5	27	13	19.6	N/C	N/C	68	13	3.5	306	23	20	21.7

1 calorie/sq.cm/day (Ly/day)*.484=W/sq.m inches*25.4=mm (F-32)*5/9=C mph*.447=m/s mBars*.1=kPa miles=km/1.60934

--------- SEVERE FLAGS (not included in totals) --------- ---------- INFORMATIVE FLAGS ----------

N/C -not collected N/A -not available S -not in service P -calculated from partial hourly data H -hourly is flagged N/A, S or R
noc -cannot calculate R -out of range, severe Q -all quality control not performed Y -out of range

* * * * PRELIMINARY DATA * * * *

Appendix D : Pesticide Use Report Data for Maxwell - Williams Area

Pesticide Use Reports for Methyl Parathion in Maxwell - Williams Area

TOWNSHIP	DATE APPLIED	SECTION	ACRES	GAL
T.15NR. 3W.	5/14/86	6	65	8
T.15NR. 3W.	5/15/86	1	80	10
T.15NR. 3W.	5/15/86	21	70	10
T.15NR. 3W.	5/16/86	7	69	9
T.15NR. 3W.	5/18/86	6	28	4
T.15NR. 3W.	5/18/86	3	19	2
T.16NR. 3W.	4/29/86	4	30	5
T.16NR. 3W.	5/4/86	2	72	10
T.16NR. 3W.	5/6/86	7	54	7
T.16NR. 3W.	5/6/86	5	114	14
T.16NR. 3W.	5/6/86	6	26	4
T.16NR. 3W.	5/6/86	5	49	6
T.16NR. 3W.	5/1/86	5	54	7
T.16NR. 3W.	5/10/86	7	13	1
T.16NR. 3W.	5/10/86	18	88	13
T.16NR. 3W.	5/10/86	5	61	9
T.16NR. 3W.	5/10/86	5	32	2
T.16NR. 3W.	5/10/86	2	57	9
T.16NR. 3W.	5/10/86	24	32	4
T.16NR. 3W.	5/10/86	14	24	3
T.16NR. 3W.	5/10/86	6	34	2
T.16NR. 3W.	5/10/86	23	90	13
T.16NR. 3W.	5/10/86	6	25	2
T.16NR. 3W.	5/12/86	7	100	14
T.16NR. 3W.	5/13/86	23	40	6
T.16NR. 3W.	5/13/86	5	60	9
T.16NR. 3W.	5/13/86	14	20	3
T.16NR. 3W.	5/13/86	4	25	4
T.16NR. 3W.	5/13/86	30	73	8
T.16NR. 3W.	5/13/86	14	20	3
T.16NR. 3W.	5/13/86	10	61	9
T.16NR. 3W.	5/13/86	17	72	10
T.16NR. 3W.	5/13/86	20	54	8
T.16NR. 3W.	5/13/86	3	16	2
T.16NR. 3W.	5/13/86	4	53	8
T.16NR. 3W.	5/14/86	4	49	6
T.16NR. 3W.	5/14/86	17	70	9
T.16NR. 3W.	5/15/86	2	63	10
T.16NR. 3W.	5/15/86	5	93	10
T.16NR. 3W.	5/15/86	4	37	6
T.16NR. 3W.	5/16/86	17	75	10
T.16NR. 3W.	5/16/86	4	42	5
T.16NR. 3W.	5/17/86	2	46	6
T.16NR. 3W.	5/18/86	1	58	9

Pesticide Use Reports for Methyl Parathion in Maxwell - Williams Area

TOWNSHIP	DATE APPLIED	SECTION	ACRES	GAL
T.16NR. 3W.	5/18/86	19	62	9
T.16NR. 3W.	5/18/86	10	152	23
T.16NR. 3W.	5/18/86	27	44	5
T.16NR. 3W.	5/19/86	7	157	21
T.16NR. 3W.	5/19/86	18	56	7
T.16NR. 3W.	5/19/86	17	57	7
T.16NR. 3W.	5/20/86	23	46	7
T.16NR. 3W.	5/20/86	27	75	11
T.16NR. 3W.	5/20/86	18	48	6
T.16NR. 3W.	5/21/86	17	62	8
T.16NR. 3W.	5/21/86	21	63	8
T.16NR. 3W.	5/21/86	14	94	12
T.16NR. 3W.	5/21/86	8	44	6
T.16NR. 3W.	5/22/86	34	160	24
T.16NR. 3W.	5/26/86	8	42	3
T.17NR. 3W.	4/30/86	17	47	2
T.17NR. 3W.	5/1/86	25	103	15
T.17NR. 3W.	5/6/86	33	35	4.3
T.17NR. 3W.	5/6/86	33	40	5
T.17NR. 3W.	5/6/86	33	56	7
T.17NR. 3W.	5/6/86	28	103	12.6
T.17NR. 3W.	5/6/86	20	53	2
T.17NR. 3W.	5/6/86	30	67	10
T.17NR. 3W.	5/7/86	34	69	10
T.17NR. 3W.	5/7/86	12	88	13
T.17NR. 3W.	5/10/86	15	132	20
T.17NR. 3W.	5/10/86	30	28	4
T.17NR. 3W.	5/13/86	23	100	15
T.17NR. 3W.	5/13/86	11	25	4
T.17NR. 3W.	5/13/86	13	80	12
T.17NR. 3W.	5/13/86	13	84	12
T.17NR. 3W.	5/13/86	36	150	19
T.17NR. 3W.	5/13/86	3	43	7
T.17NR. 3W.	5/14/86	23	174	25
T.17NR. 3W.	5/14/86	11	24	4
T.17NR. 3W.	5/14/86	33	10	1
T.17NR. 3W.	5/14/86	17	29	4
T.17NR. 3W.	5/15/86	29	35	6
T.17NR. 3W.	5/15/86	35	13	2
T.17NR. 3W.	5/15/86	28	3	1
T.17NR. 3W.	5/15/86	4	64	10
T.17NR. 3W.	5/15/86	29	46	8
T.17NR. 3W.	5/15/86	36	150	19
T.17NR. 3W.	5/15/86	28	2	1
T.17NR. 3W.	5/15/86	20	42	7

Pesticide Use Reports for Methyl Parathion in Maxwell - Williams Area

TOWNSHIP	DATE APPLIED	SECTION	ACRES	GAL
T.17NR. 3W.	5/15/86	33	32	5
T.17NR. 3W.	5/15/86	11	41	6
T.17NR. 3W.	5/15/86	29	14	3
T.17NR. 3W.	5/16/86	20	61	9
T.17NR. 3W.	5/17/86	7	213	30
T.17NR. 3W.	5/17/86	7	31	5
T.17NR. 3W.	5/17/86	14	20	3
T.17NR. 3W.	5/17/86	25	94	14
T.17NR. 3W.	5/17/86	36	150	19
T.17NR. 3W.	5/17/86	23	65	9
T.17NR. 3W.	5/17/86	24	90	13
T.17NR. 3W.	5/18/86	22	48	6
T.17NR. 3W.	5/18/86	19	70	10
T.17NR. 3W.	5/18/86	26	337	50
T.17NR. 3W.	5/18/86	30	86	10
T.17NR. 3W.	5/18/86	34	152	20
T.17NR. 3W.	5/19/86	27	250	37
T.17NR. 3W.	5/19/86	22	215	26
T.17NR. 3W.	5/19/86	5	93	14
T.17NR. 3W.	5/20/86	15	12	2
T.17NR. 3W.	5/20/86	32	22	3
T.17NR. 3W.	5/20/86	14	114	17
T.17NR. 3W.	5/21/86	25	75	10
T.17NR. 3W.	5/21/86	14	73	9
T.17NR. 3W.	5/21/86	2	60	8
T.17NR. 3W.	5/21/86	14	146	18
T.17NR. 3W.	5/23/86	25	88	11
T.17NR. 3W.	5/23/86	28	84	10
T.17NR. 3W.	5/28/86	2	30	4
T.17NR. 3W.	5/28/86	2	30	4

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