State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Report for the Application
and Ambient Air Monitoring
of Linuron in Kern County

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C97-043 (Application)
C97-042 (Ambient)

Date: January 13 , 1999

APPENDIX I

SAMPLING PROTOCOL

Kevin

Cal/EPA

California Environmental Protection Agency

Air Resources Board

P.O. Box 2815
2020 L Street
Sacramento, CA
95812-2815

Pete Wilson
Governor

~~Winston H. Hickox~~
Secretary for Environmental Protection

MEMORANDUM

TO: John S. Sanders, Ph.D., Chief
Environmental Monitoring and Pest Management Branch
Department of Pesticide Regulation

FROM: George Lew, Chief
Engineering and Laboratory Branch

DATE: August 15, 1997

SUBJECT: PROTOCOL FOR THE 1997 LINURON MONITORING

Enclosed is the final protocol, "Protocol for the Ambient and Application Air Monitoring of Linuron." The ambient monitoring will be conducted in Kern County. Monitoring will occur in August and September as recommended in your March 1997 memorandum.

If you have questions or need further information, please contact me at (916) 263-1630 or Mr. ~~Kevin Mongar at~~ (916) 263-~~2063.~~ Angus MacPherson 2045

Enclosure

cc: Ray Menebroker, SSD
David L. Crow, SJVUAPCD
Ted Davis, Kern County Ag. Comm. Office

bcc: Bill Loscutoff, MLD
Peter Venturini, SSD
Lynn Baker, SSD

State of California
California Environmental Protection Agency
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Protocol for the Ambient and Application Monitoring of Linuron

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C97-042 Ambient
C97-043 Application

Date: August 15, 1997

APPROVED:

Kevin Mongar, Project Engineer

Cynthia L. Castronovo, Manager
Testing Section

George Lew, Chief
Engineering and Laboratory Branch

Protocol for the Ambient and Application Monitoring
of Linuron

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR), (March 3, 1997 Memorandum from John Sanders to George Lew) the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticide linuron, 3-(3,4-Dichlorophenyl)-1-methoxy-1-methylurea (linuron), over a six week ambient monitoring period in areas of use which are frequented by people and over a 72 hour monitoring program at an application site. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. The monitoring program will be conducted in Kern County in August and September of 1997.

The standard operating procedures (SOP) for the sampling and analysis of linuron in ambient air will be developed by the Engineering and Laboratory Branch, ARB. The sampling and analysis of linuron in ambient air samples will be based on a previous monitoring project for the pesticide Methomyl ("Methomyl Monitoring in Fresno County, April 18, 1989). Method development results and the SOP are not included in this protocol but will be included in the draft report.

II. Chemical Properties of Linuron

Linuron (CAS: 330-55-2) exists as either colorless to white, odorless crystals or as a crystalline solid. Linuron has a molecular formula of $C_9H_{10}Cl_2N_2O_3$, a molecular weight of 249.10 g/mole. It has a water solubility of 75-81 mg/L at 25 °C, a Henry's Constant of 6.1×10^{-8} atm·m^3/mol at 20-25 °C, and a vapor pressure of 1.5×10^{-5} mmHg at 20 °C. Linuron's solubility in many organic solvents is as follows: 1) acetone: 500 g/kg at 25 °C; 2)benzene: 150 g/kg at 25 °C; 3) ethanol: 150 g/kg at 25 °C; 4)*n*-heptane: 150 g/kg at 25 °C; and 5) xylene: 130 g/kg at 25 °C.

In soil, linuron degrades to 3,4-dichloroanaline. The soil microorganism *Bacillus sphaericus* degrades linuron to *N,O*-dimethylhydroxylamine and carbon dioxide; however *Aspergillus niger* degraded linuron to phenylmethylurea, phenylmethoxy-urea, chloroaniline, ammonia, and carbon dioxide. Linuron's soil half-life ($t_{1/2}$) is two to five months when applied at recommended label rates. When in aqueous solution and exposed to summer sunlight for two months, linuron's photodegradation products included 3-(3-chloro-4-hydroxyphenyl)-1-methoxy-1-methylurea, 3,4-dichlorophenylurea, and 3-(3,4-dichlorophenyl)-1-methylurea formed at yields of 13, 10, and 2 percent, respectively. Linuron's photolysis half-life was approximately 97 days. In a laboratory study, after 24 days of exposure to sunlight, linuron photodecomposed to a trichlorinated biphenyl (1 percent yield) with the accompanying loss of hydrogen chloride. When in a 0.5 N sodium hydroxide solution at 20 °C, linuron's hydrolysis half-life is one day. In an alkaline solution, linuron's hydrolysis

yielded an aromatic amine.

Linuron's acute oral LD_{50} is approximately 1,500 mg/kg for rats. Its LC_{50} (96 hour) is 16 mg/L for rainbow trout and bluegill sunfish. Linuron entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on its use rate and known oncogenic and reproductive toxicity.

III. Sampling

Samples will be collected by passing a measured volume of ambient air through XAD-2 resin. The exposed XAD-2 resin tubes (SKC #226-30-06) are stored in an ice chest on dry ice or in a refrigerator. The flow rate will be accurately measured and the sampling system operated continuously with the exact operating interval noted. The resin tubes will be protected from direct sunlight and supported about 1.5 meters above the ground during the sampling period. Sampling flow rate will be set at 3 liters/minute. At the end of each sampling period the tubes will be capped and placed in culture tubes with an identification label affixed. Any linuron present in the sampled ambient air will be captured by the XAD-2 adsorbent. Subsequent to sampling, the sample cartridges will be transported on dry ice, as soon as reasonably possible, to the ELB laboratory for analysis. The samples will be stored in the refrigerator (4 C) or analyzed immediately.

A sketch of the sampling apparatus is shown in Attachment A. Calibrated rotameters will be used to set and measure sample flow rates. Samplers will be leak checked prior to and after each sampling period with the sampling tubes installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, sample identifications and any other significant data.

IV. Ambient-Site Air Monitoring

The historical trends in linuron use suggest that monitoring should occur over a 30- to 45-day sampling period in Kern County from late August through the end of September. Three to five sampling sites should be selected in relatively high-population areas or in areas frequented by people. Sampling sites should be located near carrot growing areas. Ambient samples should not be collected from samplers immediately adjacent to fields or orchards where permethrin is being applied. At each site, twenty to thirty discrete 24-hour samples should be taken during the sampling period. Background samples should be collected in an area distant to linuron applications.

Replicate (collocated) samples are needed for five dates at each sampling location. Two collocated samplers (in addition to the primary sampler) should be run on those days. The date chosen for replicate samples should be distributed over the entire sampling period. They may, but need not be, the same dates at every site. Field spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling.

V. Application Air Monitoring

The historical trends in linuron use suggest that application-site air monitoring could be conducted in Kern County during September associated with applications to carrots. Monitoring should be related to applications at the highest rates of 0.30 pounds permethrin per acre or greater. Linuron is extensively applied during these periods so care should be taken so that nearby applications do not contaminate collected samples. A three day monitoring period should be established with sampling times as follows: application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. A minimum of four samplers should be positioned, one on each side of the field. A fifth sampler should be collocated at one position. Since permethrin is extensively used in the area, background samples should collect enough volume (either 12 hours at 3 liters/min, or a shorter period with a higher volume pump) to permit a reasonable minimum detection level. Ideally, samplers should be placed a minimum of 20 meters from the field. Field spike samples should be collected at the same environmental (temperature humidity, exposure to sunlight) and experimental (similar air flow rates) conditions as those occurring at the time of sampling.

Additionally, we will provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and direction, humidity, air temperature, and comments regarding degree of cloud cover; and 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to North (identified as either true or magnetic North).

VI. Analysis

The method development results and standard operating procedures for the sampling and analysis of linuron in ambient air are not included in this protocol but will be included in the draft report.

VII. Quality Assurance

Field Quality Control for the application monitoring will include:

1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air during the site background monitoring.

2) Four trip spikes, prepared at the same level as the field spikes. These spikes will be kept in the sample cooler on dry ice at all times except for log-in and label attachment.

3) Replicate samples will be taken for all samples at one sampling location.

4) A trip blank will be obtained.

Field Quality Control for the ambient monitoring will include:

1) Five field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air at the background site for the same duration and at the same flow rate (collocated) as the ambient sample.

2) Five trip spikes prepared at the same level as the field spikes. These spikes will be kept in the sample cooler on dry ice at all times except for log-in and label attachment.

3) Replicate samples will be taken at all five sampling locations every Wednesday during the six week monitoring period.

4) A trip blank will be obtained each week during the six week monitoring period.

A chain of custody sheet will accompany all samples. Rotameters will be calibrated prior to and after sampling in the field. Samplers will be leak checked prior to and after each sampling period with the sampling cartridges installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, sample identifications and any other significant data.

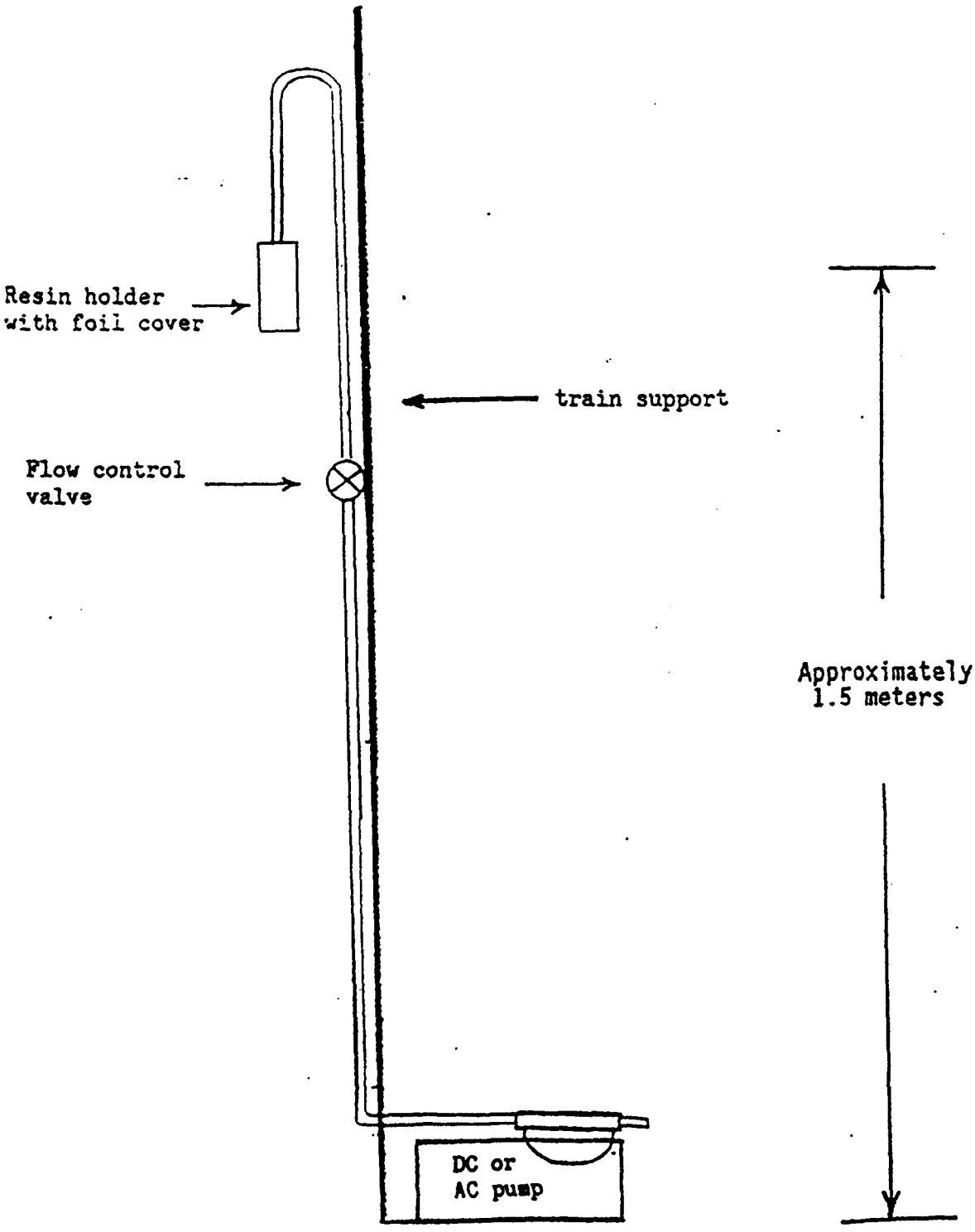
VIII. Personnel

ARB personnel will consist of Kevin Mongar (Project Engineer) and Instrument Technicians.

Attachment A

FIGURE 1

FIELD SAMPLING APPARATUS



APPENDIX II

LABORATORY REPORT

r M. Rooney
tary for
Environmental
Protection

Air Resources Board

John D. Dunlap, III, Chairman
2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Pete Wilson
Governor

MEMORANDUM

TO: Cindy Castronovo, Manager
Testing Section

FROM: Hieu Le, Manager HL
Organics Laboratory Section

DATE: October 1, 1998

SUBJECT: LINURON FINAL REPORT

Attached is a copy of the revised final report for your review.

Please contact me or Dave Hartmann if you or your staff have any questions.

Attachment

cc: George Lew
Mike Poore
Dave Hartmann
Bob Okamoto

MEMORANDUM

TO: Hieu Le, Manager
Organics Laboratory Section

FROM: David Hartmann
Air Pollution Specialist

DATE: 29 October 1998

SUBJECT: LABORATORY RESULTS FOR LINURON (Revised Report)

Pursuant to Cindy Castronovo's original request of 11 August 1997 and "Linuron Analysis Report Comments" of 5 February 1998, the following information and results are submitted.

1. ANALYTICAL TECHNIQUE

SOP No. MLD053, enclosed as Appendix A, was developed based on past laboratory pesticide work and following a literature search of the existing analytical methods for Linuron .

2. DETERMINATION OF LIMIT OF DETECTION (LOD)

The analytical multipoint LOD was determined to be 10 ng/mL which meets the request of 50 ng/mL or less.

3. LABORATORY RECOVERY STUDIES ON SKC XAD-2 RESIN TUBES

Several such studies were performed. The Organic Lab studies are contained in SOP MLD053. The results of XAD-2 tubes spiked by the Testing Section staff are contained in Table 2.

4. WEATHERED SPIKE STUDIES

As stated above.

5. BREAKTHROUGH STUDY

No evidence of breakthrough was found. This is discussed in the SOP MLD053 and in Tables 1 and 2.

6. STABILITY STUDY

Linuron proved to be very stable with recoveries averaging 94% after a three week storage period. All samples submitted were analyzed within two weeks of receipt. Stability data is contained in SOP MLD053.

7. ANALYTICAL SOP

A copy of the SOP MLD053 is included in Appendix A.

8. SAMPLE ANALYSIS

8.1 SAMPLE RESULTS

a. Thirty-nine (39) application samples and ten (10) QA spikes were analyzed. The results are shown in Tables 1 and 2.

b. One hundred and fifty (150) ambient samples and fifteen (15) QA spikes were analyzed. The results are shown in Tables 2 and 3.

8.2 REAGENT BLANK RESULTS

Twenty (20) reagent blanks were analyzed. All were below the Method LOD of 0.01 ug/mL.

8.3 CONTROL CHART

A control sample was analyzed for each batch of ten field samples or spike submitted. The control sample contains 0.200 ug/mL of Linuron and was prepared from a Chem Service's Linuron Solution (2500 ug/mL in ACN), Lot 194-77, with an expiration date of February 1999. The Control Chart is presented as Figure 1. A five (5) percent window for linuron retention time was allowed due to room temperature fluctuation. For any exceedance of this criteria or for any sample where peak identification was questionable, a portion of that sample was spiked with linuron and re-analysed.

8.4 DUPLICATE RUN RESULTS

Results of duplicate analyses are summarized in Table 4. The maximum relative percent difference is 2.9%.

8.5 MULTIPOINT CALIBRATION AND LOD DETERMINATION

The Method LOD multipoint analysis run results are presented in Table 5. The calculated limit of detection is 0.01 ug/mL or 10 ng/mL.

9. CHROMATOGRAMS

In Appendix B, we have included following materials in response to the Testing Section's staff comments on the draft report:

1. Chromatogram of Sample VIN-20, where linuron is near the detection limit.

2. Chromatogram of Sample linap-S5, where linuron is at a higher concentration.

3. Chromatogram of Standard 1 (0.05 ug/mL) which is near the detection limit.

TABLE 1. LINURON APPLICATION SAMPLE RESULTS

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
1	linap-NFS1	24 Sep 97	0.228
2	linap-NB	"	<0.02
3	linap-EFS2	"	0.233
4	linap-EB	"	0.028
5	linap-SFS3	"	0.218
6	linap-SB	"	0.020
7	linap-WFS4	"	0.203
8	linap-WB	"	<0.02
9	linap-N1	"	0.068
10	linap-E1	"	0.044
11	linap-S1	"	0.154
12	linap-W1	"	<0.02
13	linap-E1D	"	0.041
14	linap-E2	"	0.021
15	linap-E2D	1 Oct 97	0.022
16	linap-S2	"	<0.02
17	linap-W2	"	<0.02
18	linap-N2	"	<0.02
19	linap-E3	"	0.109
20	linap-E3D	"	0.109
21	linap-S3	"	0.182
22	linap-W3	"	0.037
23	linap-N3	"	0.175
24	linap-E4	"	0.105
25	linap-E4D	"	0.103
26	linap-S4	"	0.279
27	linap-W4	"	0.111
28	linap-N4	"	0.306
29	linap-N5	"	0.075
30	linap-E5	"	0.125
31	linap-E5D	"	0.122
32	linap-S5	"	0.168
33	linap-W5	"	0.039
34	linap-N6	"	0.258
35	linap-E6	7 Oct 97	1.091*
36	linap-E6D	"	1.017*
37	linap-S6	"	1.840*

*Note: These samples were diluted to fall within the Method calibration range, the second stage of these samples as well as the others having a value above or below LOD, did not give any evidence of linuron.

TABLE 1. LINURON APPLICATION SAMPLE RESULTS (Cont'd)

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
38	linap-W6	1 Oct 97	0.034
39	linap-N7	"	0.235
40	linap-E7	"	0.442
41	linap-E7D	"	0.462
42	linap-S7	"	0.629
43	linap-W7	"	0.078

Note: No linuron was found in the second stages of the above samples.

TABLE 2. LINURON APPLICATION & AMBIENT QA SPIKES & BLANKS

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
44	linap-TB	1 Oct 97	<0.02
45	linap-TS1	"	0.183
46	linap-TS2	"	0.194
47	linap-TS3	"	0.167
48	linap-TS4	"	0.173
49	linap-TS5	"	0.171
"50"	C97-043 FS-5	"	0.200
101	FS-1	24 Sep 97	0.236
102	FS-2	"	0.021
103	FS-3	"	0.193
109	FS-4	"	0.252
110	FS-5	"	0.242
130	TS-1	"	0.181
131	TS-2	"	0.184
132	TS-3	"	0.186
133	TS-4	"	0.164
134	TS-5	"	0.188
None	LABSPIKE-1	18 Sep 97	0.169
None	LABSPIKE-2	"	0.180
None	LABSPIKE-3	"	0.197
None	LABSPIKE-4	"	0.201
None	LABSPIKE-5	"	0.190

TABLE 3. LINURON AMBIENT SITE RESULTS

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
001	BAK-1	27 Aug 97	<0.02
002	VIN-1	"	"
003	MET-1	"	"
004	RUS-1	"	"
005	ALV-1	"	"
006	RUS-2	28 Aug 97	"
007	RUS-2D	"	"
008	BAK-2	"	"
009	BAK-2D	"	"
010	VIN-2	"	"
011	VIN-2D	"	"
012	ALV-2	"	"
013	ALV-2D	"	"
014	MET-2	29 Aug 97	"
015	MET-2D	"	"
016	BLANK-1	27 Aug 97	"
017	RUS-3	29 Aug 97	"
018	BAK-3	"	"
019	VIN-3	"	"
020	ALV-3	"	"
021	MET-3	"	"
022	RUS-4	2 Sep 97	"
023	BAK-4	"	"
024	VIN-4	"	"
025	ALV-4	"	"
026	MET-4	"	"
027	RUS-5	"	"
028	BAK-5	"	"
029	VIN-5	"	"
030	ALV-5	"	"
031	MET-5	"	"
032	RUS-6	"	"
033	RUS-6D	5 Sep 97	"
034	BAK-6	"	"
035	BAK-6D	"	"
036	VIN-6	"	"
037	VIN6D	"	"
038	ALV-6	"	"
039	ALV-6D	10 Sep 97	"
040	MET-6	"	"
041	MET-6D	"	"
042	RUS-7	"	"

TABLE 3. LINURON AMBIENT SITE RESULTS (continued)

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
043	RUS-7	10 Sept 97	< 0.02
044	BAK-7	"	"
045	VIN-7	"	"
046	ALV-7	"	"
047	MET-7	"	"
048	BAK-8	"	"
049	VIN-8	"	"
050	ALV-8	"	"
051	MET-8	"	"
052	RUS-9	"	"
053	BAK-9	"	"
054	VIN-9	"	"
055	ALV-9	"	"
056	MET-9	"	"
057	RUS-10	"	"
058	RUS-10D	"	"
059	BAK-10	"	"
060	BAK-10D	"	"
061	VIN-10	"	"
062	VIN-10D	"	"
063	ALV-10	"	"
064	ALV-10D	"	"
065	MET-10	"	"
066	MET-10D	"	"
067	BLANK	"	"
068	RUS-11	"	"
069	BAK-11	"	"
070	VIN-11	"	"
071	ALV-11	"	"
072	MET-11	"	"
073	RUS-12	18 Sept 1997	"
074	BAK-12	"	"
075	VIN-12	"	"
076	ALV-12	"	"
077	MET-12	"	"
078	RUS-13	"	"
079	BAK-13	"	"
080	VIN-13	"	"
081	ALV-13	"	"

TABLE 3. LINURON AMBIENT SITE RESULTS (continued)

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
082	MET-13	"	< 0.02
083	RUS-14	"	"
084	RUS-14D	"	"
085	BAK-14	"	"
086	BAK-14D	"	"
087	VIN-14	"	"
088	VIN-14D	"	"
089	ALV-14	18 Sept 1997	"
090	ALV-14D	"	"
091	MET-14	"	"
092	MET-14D	"	"
093	RUS- 15	"	"
094	BAK-15	"	"
095	VIN-15	"	"
096	ALV-15	"	"
097	MET-15	"	"
098	BLANK-MET	"	"
099	RUS-16	24 Sept 1997	"
100	BAK-16	"	"
104	VIN-16	"	"
105	ALV-16	"	"
106	MET-16	"	"
107	RUS-17	"	0.029
108	BAK-17	"	0.037
111	VIN-17	"	< 0.02
112	ALV-17	"	"
113	MET-17	"	"
114	RUS-18	"	"
115	RUS-18D	"	"
116	BAK-18	"	"
117	BAK-18D	"	"
118	VIN-18	"	"
119	VIN-18D	"	"
120	ALV-18	"	"
121	ALV-18D	"	"
122	MET-18	"	"
123	MET-18D	"	"
124	BLANK-ALV	"	"
125	RUS-19	"	"
126	BAK-19	"	"

TABLE 3. LINURON AMBIENT SITE RESULTS (continued)

Log Number	Sample I.D.	Analysis Date	Linuron (ug)
127	VIN-19	"	< 0.02
128	ALV-19	"	"
129	MET-19	"	"
135	RUS-20	01 Oct 1997	0.055
136	BAK-20	"	< 0.02
137	VIN-20	"	0.032
138	ALV-20	"	< 0.02
139	MET-20	"	"
140	BLANK-RUS	"	"
141	RUS-21	"	0.042
142	BAK-21	"	0.048
143	VIN-21	"	< 0.02
144	ALV-21	07 Oct 1997	"
145	MET-21	"	"
146	RUS-22	"	"
147	RUS-22D	"	"
148	BAK-22	"	"
149	BAK-22D	"	"
150	VIN-22	"	"
151	VIN-22D	"	"
152	ALV-22	"	"
153	ALV-22D	"	"
154	MET-22	"	"
155	MET-22D	"	"
156	RUS-23	"	"
157	BAK-23	"	"
158	VIN-23	"	0.047
159	ALV-23	"	0.065
160	MET-23	"	< 0.02

TABLE 4

LINURON DUPLICATE RESULTS

I.D.		Analysis Date	ug/ml
Log 5 ALV-1	First	08/27/97	>LOD
	Second	08/28/97	>LOD
	RPD(%)		
OKA LABSPK 1	First	09/18/97	0.0843
	Second	10/07/97	0.0835
	RPD(%)		0.9535
OKA LABSPK 2	First	09/18/97	0.0896
	Second	10/07/97	0.0891
	RPD(%)		0.5596
OKA LABSPK 3	First	09/18/97	0.0983
	Second	10/07/97	0.0992
	RPD(%)		0.9114
OKA LABSPK 4	First	09/18/97	0.1006
	Second	10/07/97	0.0977
	RPD(%)		2.9249
OKA LABSPK 5	First	09/18/97	0.0952
	Second	10/07/97	0.0927
	RPD(%)		2.6610
Log 40 Linap E7	First	10/01/97	0.2215
	Second	10/07/97	0.2256
	RPD(%)		1.8340
Log 41 Linap E7D	First	10/01/97	0.2311
	Second	10/07/97	0.2359
	RPD(%)		2.0557
Log 42 Linap S7	First	10/01/97	0.3143
	Second	10/07/97	0.3134
	RPD(%)		0.2868

RPD = Relative Percent Difference
= 100 * Abs[1st. - 2nd] / Ave. [1st & 2nd]

LINDUP97

TABLE 5

Multipoint Calibration LINURON

Levels of Concentrations(UG/ML) and Area Counts

	0.0525	0.1050	0.210	0.420	1.050
1st Run	4495	9577	19474	36772	95837
2nd Run	4461	9515	19672	37648	94116
3rd Run	4368	9644	20384	37688	97773
4th Run	4570				
5th Run	4344				
6th Run	4549				
7th Run	4144				
Mean	4419	9579	19843	37369	95909
Std.Dev.=	148	65	479	518	1830
RSD(%)	3.3	0.7	2.4	1.4	1.9

X-Conc.	Y-Area	Predicted Y
0.0525	4419	4668
0.105	9579	9460
0.210	19843	19046
0.420	37369	38216
1.050	95909	95729

Regression Output:

Constant	-125.1099
Std Err of Y Est	698.14
R Squared	0.9997
No. of Observations	5.0000
Degrees of Freedom	3
X Coefficient(s)	91289.4
Std Err of Coef.	858.37

LOD Calculations:

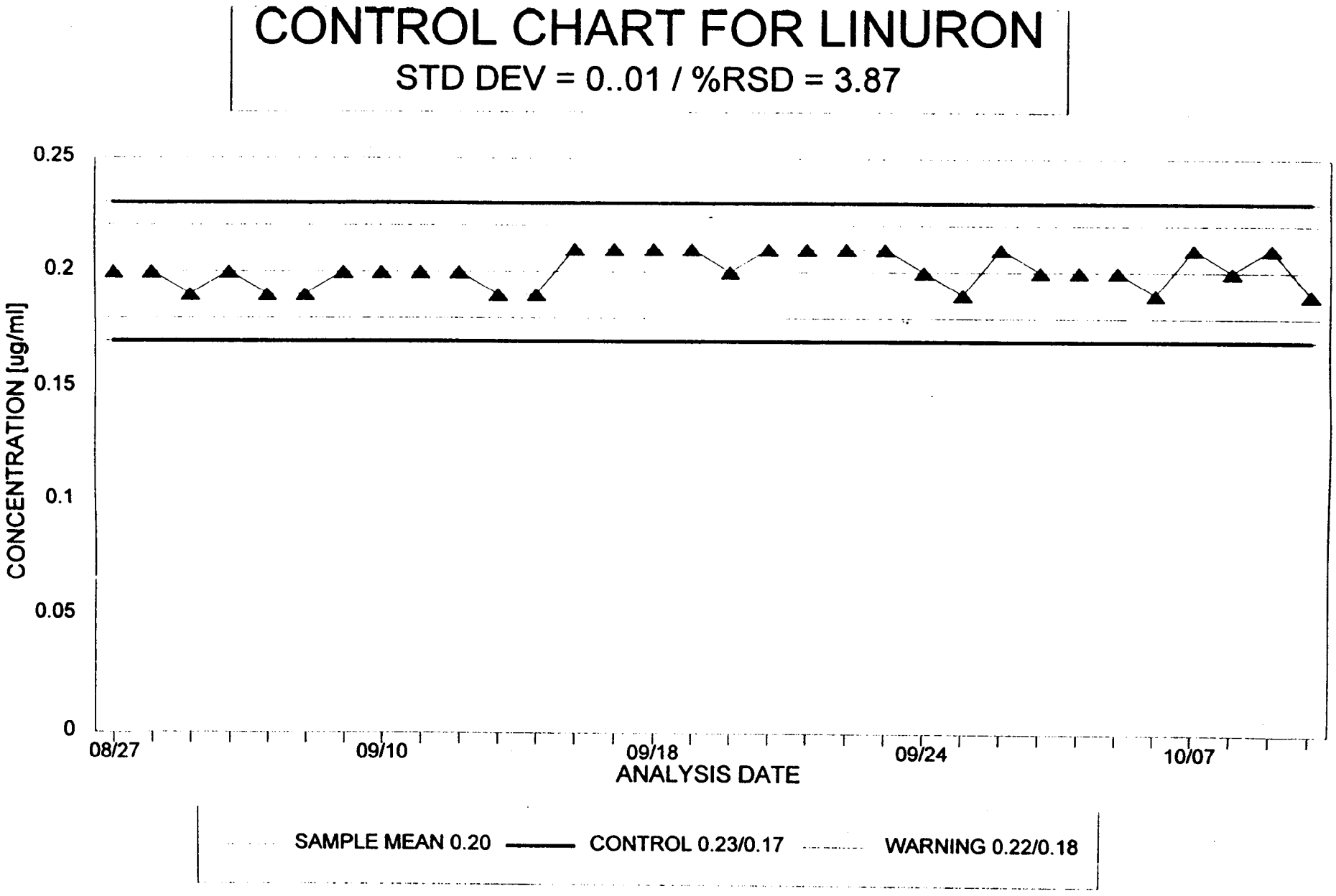
X-Intercept = -(Y-Intercept)/Slope = 0.0014
Std. Dev. of the Response = 147.8
Slope of the Regression Line= 91289.4

LOD (ug/mL)= |X-Intercept| + 3(Std. Dev./Slope)
= [0.0014] + 3(147.8/91289.4)
= 0.006

LINURON RUN 225

21

FIGURE 1


CONTROL CHART FOR LINURON
STD DEV = 0..01 / %RSD = 3.87
CONCENTRATION [ug/ml]
0.25
0.2
0.15
0.1
0.05
0
08/27
09/10
09/18
09/24
10/07
ANALYSIS DATE
SAMPLE MEAN 0.20
CONTROL 0.23/0.17
WARNING 0.22/0.18

APPENDIX A

S.O.P. MLD No. 053
Effective Date: 01 Sept 1997
Revision No. : 1.0
Approved: _____

AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION

S.O.P. No. MLD 053

STANDARD OPERATING PROCEDURE FOR THE DETERMINATION OF LINURON IN AMBIENT AIR BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

1. SCOPE

This is a high performance liquid chromatographic (HPLC) method for the determination of N'-(3,4-Dichlorophenyl)-N-methoxy-N-methylurea: Linuron, Afalon, Lorox, Linex in the ambient air samples.

2. SUMMARY OF METHOD

Exposed XAD-2 sorbant tubes are held at 4 degrees Celsius until desorbed with 2 mL of acetonitrile. The reverse phase chromatographic method employs a gradient acetonitrile/water mobile phase and a silica/C18 bonded stationary phase with ultraviolet spectrometric detection.

3. INTERFERENCES/LIMITATIONS

Potential interferences may arise due to contaminants in laboratory solvents, reagents, glassware and/or apparatus. A reagent blank must be run through the method procedure and analyzed with each set of samples.

4. EQUIPMENT AND/OR APPARATUS

4.1 Instrumentation

The Waters Corporation HPLC system consists of a Model 600 solvent delivery unit, Model 712 WISP automated sampler, Model 486 Tunable U/V Absorbance Detector, and a Maxima 825 Chromatography Workstation. The column is a Waters uBondapakC18 (3.9 mm x 30 cm).

4.2 Apparatus

1. Supelco 4 mL glass desorption vials with Teflon septum screw caps.
2. Sample shaker/desorber with timer and sample rack.
3. Whatman syringe filters, PTFE, 13 mm Diameter, 0.2um Pore Size.
4. Filtration and degassing system for solvents such as Waters Part# 85124.
5. Volumetric Class A glassware normally found in an analytical laboratory.
6. Sun Brokers 1 mL autosampler "SunVial" with polyethylene cap septum.
7. Eppendorf adjustable pippetes, 10-100 uL and 100-1000 uL.
8. Becton-Dickinson 10 mL Luer-Lok syringes, PN 309604.

5. REAGENTS

5.1 Acetonitrile and Water mobile phase solvent, HPLC grade, such as Burdick & Jackson Product #015 and #365, respectively.

5.2 Stock Standard: 2.00 ug/uL of Linuron.
Accurately weigh approximately 0.1000 g of pure material. Dissolve the linuron in acetonitrile and dilute to volume in a 50 mL volumetric flask. The linuron was obtained from Chem Service Inc., Cat# PS-372, LOT# 190-92B, Purity 99% with an expiration date of June 2001..

5.3 Calibration Standards: Prepare calibration standards at a minimum of five concentration levels by adding accurately measured volumes of the stock standard to a volumetric flask and diluting to volume with acetonitrile. One of the standards should be representative of a concentration near, but above, the method detection limit. The other concentrations should correspond to the range of concentrations expected in the sample concentrates. Determine the method LOD using seven injections of the lowest concentration and three injections of each of the remaining four concentrations.

5.4 Control Sample: Prepare a control sample of 0.200 ug/mL from Chem Service's Linuron Solution 2500 ug/mL in ACN, Lot 194-77A, expiration 02/99.

6. INSTRUMENT CONDITIONS

Column Temperature:	Ambient, approximately 20-22 degrees Celsius.
Mobile Phase:	Gradient, acetonitrile/water, programmed linearly from 50% ACN to 100%, after a 5 min. hold, in 16 minutes. The linuron retention time is approx. 12 minutes. The flow rate is 1.0 mL/min.
Detector:	UV/VIS at 254 nm wavelength. Sample rate at 2 points/second, and 1.00 AUFS.

7. INSTRUMENT CALIBRATION

7.1 Equlibrate the column for 60 minutes at initial start-up for the day. Analyze a blank to check for method interferences.

7.2 Calibrate the instrument using three standards and quantitate based on peak areas. Calibrations should be within the linear range and have a correlation coefficient of 0.98 or better.

7.3 Check the calibration of the instrument by analyzing the control sample. Thereafter, analyse a control for every ten samples injected. The centration given must fall within the warning limits of the control sample value (+/- 2 SD). Plot all results on the method control chart..

8. ANALYSIS OF SAMPLES

8.1 Remove the glass wool plug from the primary end of the XAD-2 tube with a forceps and place it into a 4 mL desorbing vial. Pour the XAD-2 resin into the vial and wash down the sides of the tube into the vial using 2.0 mL acetonitrile.

Retain the secondary section of the XAD-2 tube for later analysis in case the primary section gives a positive result.

8.2 Agitate the capped vials for 45 minutes. Filter the extract through a 0.2 um PTFE filter and transfer the filtrate into a 1 mL autosampler vial.

8.3 For each run, spike one of the ambient samples and test for analyte recovery. Run a duplicate every tenth sample.

8.4 Results are recorded in micrograms per sample and are calculated as:

ug = [Concentration in ug/mL] x [2 mL]

9. METHOD SENSITIVITY AND PRECISION

Linuron concentration (ug/mL)	0.0525	0.1050	0.2100	0.4200	1.050
Average Peak Area	4419	9579	19843	37369	95909
Std. Deviation	148	65	479	518	1830
RSD(%)	3.3	0.7	2.4	1.4	1.9

Standard Deviation of the Response: 147.8
Correlation Coefficient: 0.9998
Slope: 91289.4
X - Intercept: 0.0014
LOD= [X - Intercept] + 3 (Std. Dev./Slope) = [0.0014] + 3 (147.8/91289.4) = 0.006 ug/mL
= 0.01 ug/mL

10. SPIKED XAD-2 TUBE RECOVERIES

Sample	Spike (ug)	Recovery (ug)	%Rec	Average
22001 No exposure	0.21	0.22	104	
23106 "	0.21	0.21	100	
23107 "	0.21	0.20	98	101
22002 24hr exposure	0.21	0.19	90	
22504 "	0.21	0.19	90	
22505 "	0.21	0.19	90	
22601 "	0.21	0.18	87	
23204 "	0.21	0.19	90	
23205 "	0.21	0.20	98	
23407 "	0.21	0.19	90	
23408 "	0.21	0.19	90	
23404 "	1.05	0.98	93	
23405 "	1.05	0.98	93	91

Notes: 1. Tubes exposed were ambient air sampled at 13th & T at a flow rate setting of 4 LPM. Temperatures ranged from 15 to 40 degrees Celsius and Humidity from 14 to 84 % RH.

2. No linuron was detected in the secondary stages of the spiked cartridges..
3. The primary stages of the XAD-2 cartridges were spiked, using Hamilton glass syringes. The linuron solution concentration was 10.5 ug/mL and either 20 or 100 uL were injected to achieve a spike of 0.21 or 1.05 ug.

11. STORAGE STABILITY STUDIES

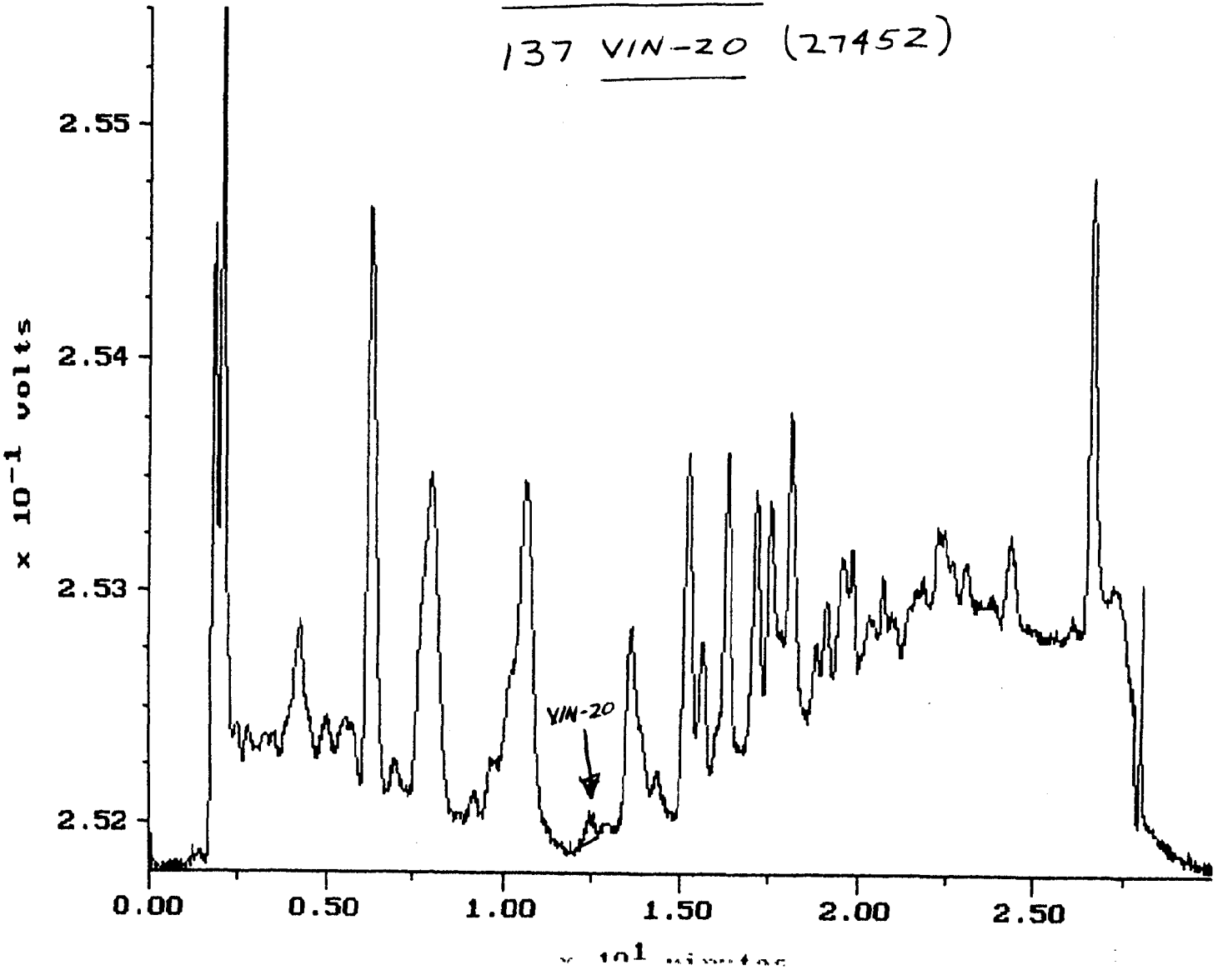
Sample	Spike (ug)	Recovery (ug)	%Rec	Average %
23304 Held one hour	0.26	0.26	100	NA
24011 Held one week	0.26	0.24	92	
24102 "	0.26	0.23	88	
24103 "	0.26	0.24	92	
24104 "	0.26	0.23	88	90
24915 Held two weeks	0.26	0.26	100	
24916 "	0.26	0.24	92	96
26105 Held three weeks	0.26	0.24	92	
26106 "	0.26	0.25	96	94

Notes: 1. Tubes were held at 4 degrees Celsius before analysis.
2. No linuron was detected in the secondary stages of the XAD-2 cartridges .

ATTACHMENT 1

LINURON

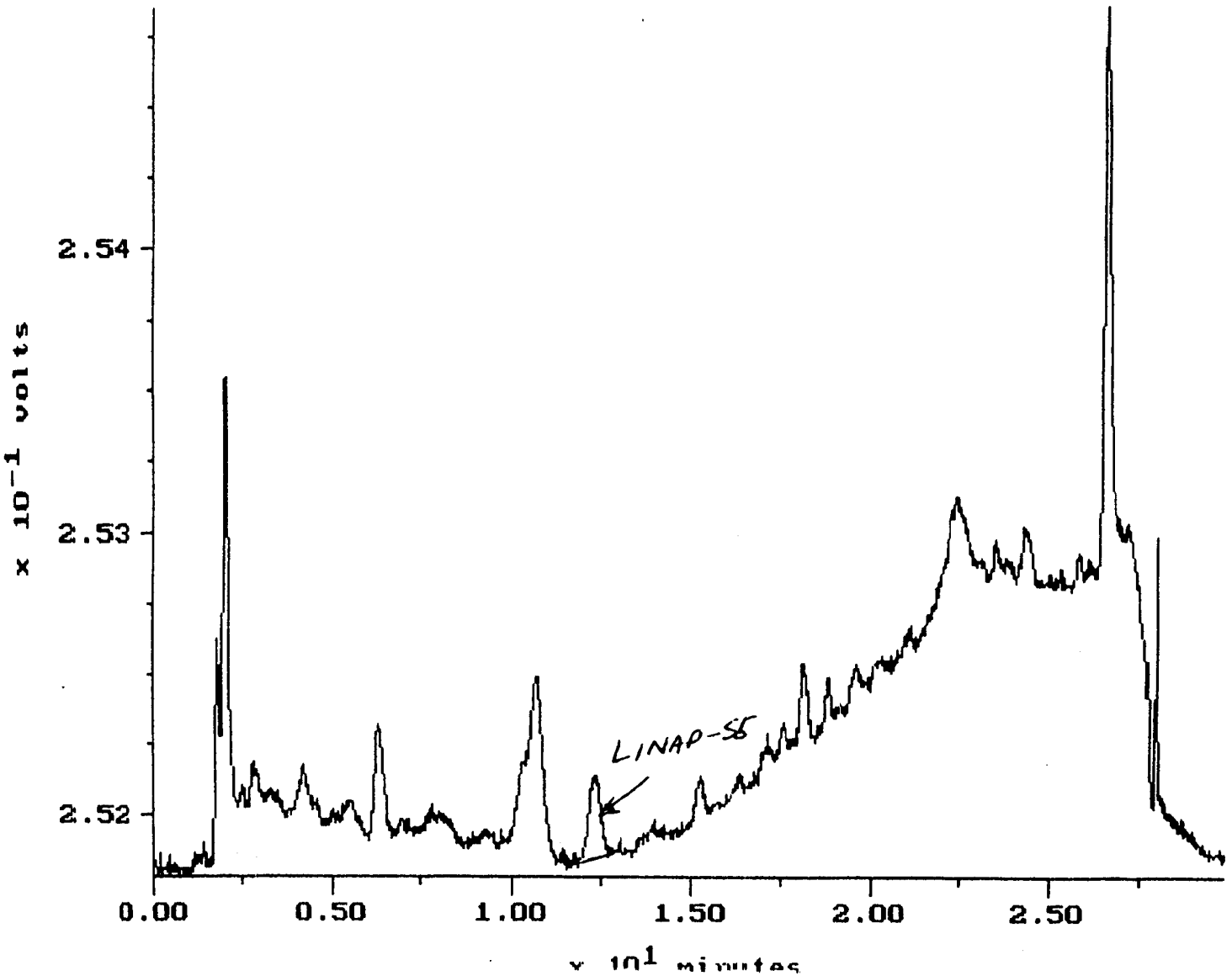
137 VIN-20 (27452)



ATTACHMENT 2

LINURON

32 - LINAP 55 (27429)

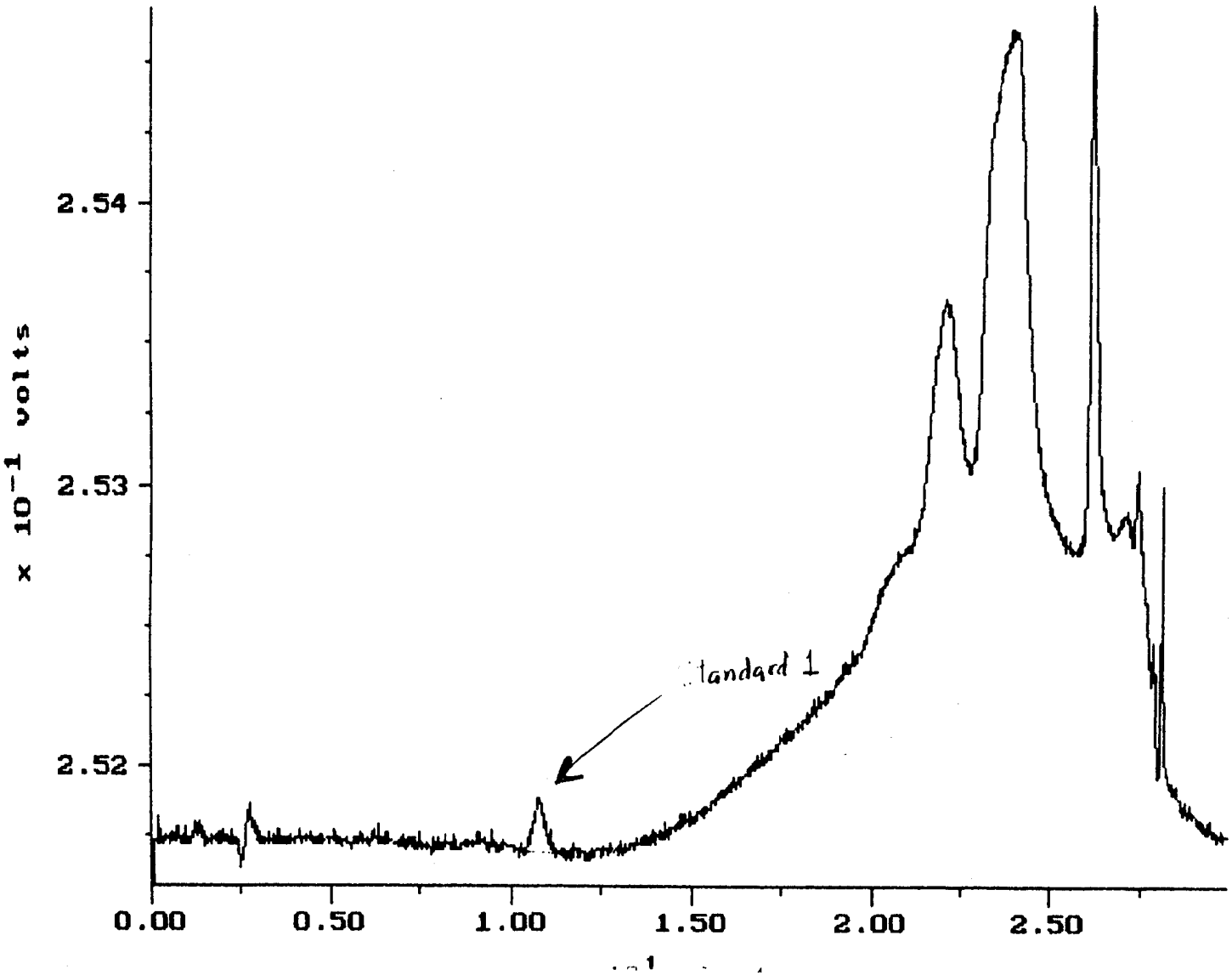


B-2

ATTACHMENT 3

LINURON

STD1 0.050 ug/ML (27401)



APPENDIX III

PESTICIDE USE REPORT

KERN CO. AG COMM. Search Status: Use Report File 1997 OPERATOR 7 DAY U.R.'s

SEC: 36 TWN: 29S RNG: 26E APP. METH: G (G or O) REPORT #: < 526>

OPERATOR ID: >1501604< APP DATE: 09/16/97 TIME: 1630 ACRES TREATED: 100.00

LOCATION: C33 PLANTED ACREAGE: 100.00 A COMMODITY: CARROT

PERMITTEE: WM. BOLTHOUSE, INC.

R.M.?: N (Y,N) EPA REG # > 264- 482-AA- 0<

PESTICIDE: ROVRAL 4 FLOWABLE

AMOUNT USED: 12.50 UNITS: GA (LB,OZ,PT,QT,GA,GR,KG,ML,LI)

Data in > < can be used to FIND Use Report recs or Ref File recs (use Ctrl F)

Data in < > can be used to FIND Use Report Records Only (Use Ctrl P or N)

*** To Exit, Hit ESCAPE (ESC) Key ***

>> THIS ENTRY SCREEN PERFORMS A PESTICIDE/COMMODITY LABEL DISCREPANCY CHECK <<

KERN CO. AG COMM. Search Status: Use Report File 1997 OPERATOR 7 DAY U.R.'s

SEC: 36 TWN: 29S RNG: 26E APP. METH: G (G or O) REPORT #: < 526>

OPERATOR ID: >1501604< APP DATE: 09/16/97 TIME: 1630 ACRES TREATED: 100.00

LOCATION: C33 PLANTED ACREAGE: 100.00 A COMMODITY: CARROT

PERMITTEE: WM. BOLTHOUSE, INC.

R.M.?: N (Y,N) EPA REG # > 352- 394-AA- 0<

PESTICIDE: DU PONT LOROX DF HERBICIDE

AMOUNT USED: 250.00 UNITS: LB (LB,OZ,PT,QT,GA,GR,KG,ML,LI)

Data in > < can be used to FIND Use Report recs or Ref File recs (use Ctrl F)

Data in < > can be used to FIND Use Report Records Only (Use Ctrl P or N)

*** To Exit, Hit ESCAPE (ESC) Key ***

>> THIS ENTRY SCREEN PERFORMS A PESTICIDE/COMMODITY LABEL DISCREPANCY CHECK <<

APPENDIX IV

DPR's
AIR MONITORING RECOMMEDATIONS FOR LINURON

State of California

Memorandum

To: George Lew, Chief
Engineering and Laboratory Branch
Monitoring and Laboratory Division
Air Resources Board
600 North Market Boulevard
Sacramento, California 95812

Date: March 3, 1997

From: **Department of Pesticide Regulation** - 1020 N Street, Room 161
Sacramento, California 95814-5624

Subject: AIR MONITORING RECOMMENDATION FOR LINURON

Attached is the Department of Pesticide Regulation's (DPR) recommendation for monitoring the herbicide linuron. DPR provides this recommendation pursuant to the requirements of Assembly Bill 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5). DPR bases its air monitoring recommendations on historical linuron use information. Therefore, we request you consult with the agricultural commissioner in the county where air monitoring will be conducted to select appropriate sites.

We anticipate submission of air monitoring data by September, 1998.

If you have any questions, please contact Kevin Kelley, of my staff, at (916) 324-4187.

John S. Sanders

John S. Sanders, Chief
Environmental Monitoring and
Pest Management Branch
(916) 324-4100

Attachment

SURNAME

cc: Ted Davis - Agricultural Commissioner, Kern County (w/attachment)
Raymond Menebroker - ARB (w/attachment)
Kevin Mongar - ARB (w/attachment)
Lynn Baker - ARB (w/attachment)
Charles M. Andrews - DPR (w/attachment)
Barry Cortez - DPR (w/attachment)
John Donahue - DPR (w/attachment)
Gary Patterson - DPR (w/attachment)
Kevin Kelley - DPR (w/attachment)
Madeline Brattesani - DPR (w/attachment)

California Department of
Pesticide Regulation
Environmental Monitoring and
Pest Management Branch

Staff Report

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDE ACTIVE INGREDIENT LINURON

February 1997

Principal Author

Pamela Wales
Environmental Research Scientist

State of California
Department of Pesticide Regulation
1020 N Street
Sacramento, California 95814-5624

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDE ACTIVE INGREDIENT LINURON

A. BACKGROUND

This recommendation contains general information regarding the physical-chemcal properties and the historical uses of 3-(3,4-Dichlorophenyl)-1-methoxy-1-methylurea (linuron). The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

Linuron (CAS: 330-55-2) exists as either colorless to white, odorless crystals or as a crystalline solid. Linuron has a molecular formula of $C_9H_{10}Cl_2N_2O_3$, a molecular weight of 249.10 g/mole. It has a water solubility of 75-81 mg/L at 25 °C, a Henry's Constant of 6.1×10^{-8} atm·m³/mol at 20–25 °C, and a vapor pressure of 1.5×10^{-5} mmHg at 20 °C. Linuron's solubility in many organic solvents is as follows: 1) acetone: 500 g/kg at 25 °C; 2)benzene: 150 g/kg at 25 °C; 3) ethanol: 150 g/kg at 25 °C; 4) *n*-heptane: 150 g/kg at 25 °C; and 5) xylene: 130 g/kg at 25 °C.

In soil, linuron degrades to 3,4-dichloroanaline. The soil microorganism *Bacillus sphaericus* degrades linuron to *N,O*-dimethylhydroxylamine and carbon dioxide; however *Aspergillus niger* degraded linuron to phenylmethylurea, phenylmethoxy-urea, chloroaniline, ammonia, and carbon dioxide. Linuron's soil half–life ($t_{1/2}$) is two to five months when applied at recommended label rates. When in aqueous solution and exposed to summer sunlight for two months, linuron's photodegradation products included 3-(3-chloro-4-hydroxyphenyl)-1-methoxy-1-methylurea, 3,4-dichlorophenylurea, and 3-(3,4-dichlorophenyl)-1-methylurea formed at yields of 13, 10, and 2 percent, respectively. Linuron's photolysis half-life was approximately 97 days. In a laboratory study, after 24 days of exposure to sunlight, linuron photodecomposed to a trichlorinated biphenyl (1 percent yield) with the accompanying loss of hydrogen chloride. When in a 0.5 N sodium hydroxide solution at 20 °C, linuron's hydrolysis half-life is one day. In an alkaline solution, linuron's hydrolysis yielded an aromatic amine.

Linuron's acute oral LD_{50} is approximately 1,500 mg/kg for rats. Its LC_{50} (96 hour) is 16 mg/L for rainbow trout and bluegill sunfish. Linuron entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on its use rate and known oncogenic and reproductive toxicity.

B. USE OF LINURON

As of January 28, 1997, four linuron-containing products were registered for use in California. Linuron is a selective preemergence and postemergence herbicide used to control a broad spectrum of annual and broadleaf weeds.

With DPR's implementation of full pesticide use reporting in 1990, all users must report the agricultural use of any pesticide to their county agricultural commissioners, who subsequently forward this information to DPR. DPR compiles and publishes the use information in the annual

Pesticide Use Report (PUR). Because of California's broad definition for agricultural use, DPR includes data from pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and rights-of-way, postharvest applications of pesticides to agricultural commodities, and all pesticides used in poultry and fish production, and some livestock applications in the PUR. DPR does not collect use information for home and garden use, or for most industrial and institutional uses. The information included in this monitoring recommendation reflects widespread cropland applications of linuron. Use rates were calculated by dividing the total pounds of linuron used (where linuron was applied to acreage) by the total number of acres treated.

According to the PUR, over 90 percent of California's total linuron use occurs in six counties (Table 1). Historically, cropland applications account for over 99 percent of the total amount of linuron reported used each year. Non-agricultural applications—landscape maintenance or rights-of-way—account for less than one percent of the total amount of linuron reported used each year. The information included in this monitoring recommendation reflects widespread cropland applications of linuron. Use rates were calculated by dividing the total pounds of linuron used (where linuron was applied to acreage) by the total number of acres treated.

In California, growers use linuron to control a broad spectrum of annual and broadleaf weeds in asparagus, carrots, celery, and outdoor-grown nursery crops. Linuron is also used along rights of way for weed control. Linuron has both soil and foliar activity. Labeled use rates for linuron range from 1-2 pounds of active ingredient per acre for carrots to as much as 8 pounds per acre on fern-stage asparagus. Linuron is formulated as either a dispersible granule or flowable powder; in either case, it is mixed in water and applied as a spray. Linuron-containing products include the Signal Word "Caution" on their labels.

Table 1. Annual Agricultural Use of Linuron (Pounds of Active Ingredient)

County	1995	1994	1993
Kern	39,970	36,297	37,758
Imperial	15,986	12,347	19,638
San Joaquin	7,851	6,032	5,988
Santa Barbara	6,181	6,625	7,135
Monterey	5,470	5,558	6,319
San Luis Obispo	2,989	5,034	5,155
County Totals	78,447	71,893	81,993
Percent of Total	***92%***	***90%***	***92%***
CALIFORNIA TOTAL	**85,127**	**79,993**	**89,568**

According to the PUR, Kern County routinely receives the greatest applications of linuron; Kern County growers use nearly half of all the linuron reported used in California. Table 2 summarizes the total amounts and average daily rates of linuron applied in the counties of highest use—Kern and Imperial Counties—during the months of greatest use. Applications of linuron in Kern County are highest in September, when more than twice the amount is applied than during any other time of the year. The second highest use occurs in Kern County in March, followed by applications of linuron in Imperial County in November.

The application of linuron in Kern County during September may be attributed to widespread use of a single product—Du Pont Lorox DF Herbicide®†. DPR issued a Special Local Need (SLN) registration (820042) to allow growers the use of this product for the preharvest control of annual broadleaf weeds—Shepherd's Purse, Hairy Nightshade, Sow Thistle, Mustard Chickweed—and annual grasses in carrots.

Table 2. Linuron Applications in Kern and Imperial Counties

		1995		1994		1993	
		Lbs Used[1]	*Rate*[2]	*Lbs Used*[1]	*Rate*[2]	*Lbs Used*[1]	*Rate*[2]
Kern							
	September	13,017	1.18	11,710	1.16	12,615	1.12
	March	3,389	0.91	7,172	1.16	5,816	0.91
Imperial							
	November	3,673	0.64	3,703	0.64	3,673	0.64

[1] In pounds of active ingredient.
[2] Average rate (in pounds of active ingredient per acre).

The highest rates of linuron are used to treat asparagus at an average rate of 2.0 lbs per acre; however, the applications are limited and occur only a few days per year. Consequently, monitoring the use of linuron on this commodity may be difficult to arrange. The highest consistent use occurs during the month of September in Kern County, when growers apply linuron to carrots at the average rate of 1.2 lbs per acre.

† Du Pont Lorox DF Herbicide is a registered product of the E.I. Du Pont de Nemours & Co., Inc. Agricultural Products Department, Wilmington, Delaware.

C. RECOMMENDATIONS

1. Ambient Air Monitoring

The historical trends in linuron use suggest that monitoring should occur over a 30- to 45-day sampling period in Kern County during the month of September. Three to five sampling sites should be selected in relatively high-population areas or in areas frequented by people. Sampling sites should be located near carrot growing areas. Ambient samples should not be collected from samplers immediately adjacent to fields or orchards where linuron is being applied. At each site, twenty to thirty discrete 24-hour samples should be taken during the sampling period. Background samples should be collected in an area distant to linuron applications.

Replicate (collocated) samples are needed for five dates at each sampling location. Two collocated samplers (in addition to the primary sampler) should be run on those days. The date chosen for replicate samples should be distributed over the entire sampling period. They may, but need not be, the same dates at every site. Field blank and spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling.

2. Application-Site Air Monitoring

Linuron is typically used at a higher rate on fern-stage asparagus than on carrots; however, the limited number of applications made each year to asparagus may make it difficult to locate an appropriate monitoring site. Therefore, the historical trends in use suggest that application-site air monitoring should be conducted during September in Kern County in association with application to carrots. Applications of linuron to carrots during September are associated with a SLN registration; consequently, monitoring staff should ensure the SLN is still in effect prior to selecting an appropriate monitoring site. Linuron is extensively applied during this period so care should be taken to prevent nearby applications from contaminating collected samples. A three day monitoring period should be established with sampling times as follows: application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. A minimum of four samplers should be positioned, one on each side of the field. A fifth sampler should be collocated at one position. Since linuron is extensively used in the area, background samples should collect enough volume (either 12 hours at 15 liters/min, or a shorter period with a higher volume pump) to permit a reasonable minimum detection level. Ideally, samplers should be placed a minimum of 20 meters from the field. Field blank and field spike samples should be collected at the same environmental conditions (temperature humidity, exposure to sunlight) and experimental conditions (similar air flow rates) as those occurring at the time of sampling.

Additionally, we request that you provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and

direction, humidity, and air temperature, and comments regarding degree of cloud cover; and 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to North (identified as either true or magnetic North).

APPENDIX V

APPLICATION AND AMBIENT FIELD LOG SHEETS

LOG BOOK

Project: Linuron Application in Kern Co.
Project #: C97-043

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
1	linap-NFS1	9-15-97 9-16-97	1540 0740	START: 3 STOP: 3 lpm ROTAMETER 12A	K	
2	linap-NB	9-15-97 9-16-97	1540 0740	START: 3 STOP: 3 lpm ROTAMETER 12B	K	
3	linap-EFS2	9-15-97 9-16-97	1545 0745	START: 3 STOP: 3 lpm RM II 11A		
4	linap-EB	9-15-97 9-16-97	1545 0745	START: 3 STOP: 3 lpm RM II 11B		
5	linap-SFS3	9-15-97 9-16-97	1550 0750	START: 3 STOP: RM II 10A		
6	linap-SB	9-15-97 9-16-97	1550 0750	START: 3 STOP: RM II 10B		
7	linap-WFS4 (WSF4) SEE 2	9-15-97 9-16-97	1600 0800	START: 3 STOP: 3 lpm RM II 12		
8	linap-WB	9-15-97 9-16-97	1600 0800	START: 3 STOP: 3 lpm RM II 13		
9	linap-N1	9-16-97 11	0740 1840	START: 3 lpm STOP 3 lpm RM II 12A START AT @ 1000	PC	
10	linap-E1	9-16-97 11	0745 1845	START: 3 lpm STOP: 3 lpm RM II 11A		
11	linap-S1	9-16-97 9-16-97	0750 1830	START: 3 lpm STOP: 3 lpm RM II 10A		
12	linap-W1	9-16-97 9-16-97	0800 1835	START 3 lpm STOP: 3 lpm RM II 12		
13	linap-E1D	9-16-97 11	0745 1845	START: 3 lpm STOP: 3 lpm RM II 11B DUPLICATE		
14	linap-E2	9-16-97 11	1845 2030	START: 3 lpm RM 11A STOP: 3 lpm		
15	linap-E2D	9-16-97 11	1845 2030	DUPLICATE START: 3 lpm RM 11B STOP: 3		
16	linap-S2	9-16-97 11	1830 2030	START: 3 lpm RM 10A STOP: 3 lpm		
17	linap-W2	9-16-97 11	1835 2035	START: 3 lpm RM 12 STOP: 3 lpm		
18	linap-N2	9-16-97 11	1840 2025	START 3 lpm RM 12A STOP 3 lpm		
19	linap-E3	9-16-97 9-17-97	2030 0020	START: 3 lpm STOP: 3		
20	linap-E3D	9-16-97 9-17-97	2030 0020	START: 3 lpm STOP 3		
21	linap-S3	9-16-97 9-17-97	2030 0030	START: 3 lpm STOP 3 lpm		
22	linap-W3	9-16-97 9-17-97	2035 0035	START: 3 lpm STOP 3 lpm		

LOG BOOK

Project: Linuron Application in Kern Co.
Project #: C97-043

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
23	linap-N3	9-16-97 9-17-97	2025 0015		PC	
24	linap-E4	9-17-97 "	0020 0835	START 3lpm STOP 3lpm		
25	linap-E4D	9-17-97 "	0020 0835	START 3lpm STOP 3lpm		
26	linap-S4	9-17-97 "	0030 0840	START 3lpm STOP 3lpm		
27	linap-W4	9-17-97 "	0035 0845	START 3lpm STOP 3lpm		
28	linap-N4	9-17-97 "	0015 0830	START 3lpm STOP 3lpm		
29	linap-N5	9-17-97 9-17-97	0830 1530	START 3lpm STOP: 3lpm		
30	linap-E5	9.17.97 9-17-97	0835 1540	START 3lpm STOP: 3LPM		
31	linap-E5D	9.17.97 9-17-97	0835 1540	START 3lpm STOP: 3LPM		
32	linap-S5	9.17.97 9-17-97	0840 1550	START 3lpm STOP: 3LPM		
33	linap-W5	9.17.97 9-17-97	0845 1600	START 3lpm STOP: 3LPM		
34	linap-N6	9-17-97 9-18-97	1530 1535	START: 3LPM STOP: 3LPM	PC	
35	linap-E6	9-17-97 9-18-97	1540 1545	START: 3LPM STOP: 3LPM		
36	linap-E6D	9-17-97 9-18-97	1540 1545	START: 3LPM STOP: 3LPM		
37	linap-S6	9.17.97 9.18.97	1550 1555	START: 3LPM STOP: 3LPM		
38	linap-W6	9.17.97 9.18.97	1600 0405 K	1605 START: 3LPM STOP: 3LPM		
39	linap-N7	9.18.97 9.19.97	1535 1500	START: 3LPM STOP: 3lpm	K	
40	linap-E7	9.18.97 9.19.97	1545 1505	START: 3LPM STOP: 3lpm		
41	linap-E7D	9.18.97 9.19.97	1545 1505	START: 3LPM STOP: 3lpm		
42	linap-S7	9.18.97 9.19.97	1555 1510	START: 3LPM STOP: 3lpm		
43	linap-W7	9.18.97 9.19.97	0405 1515	1605 START: 3LPM STOP: 3lpm		
44	linap-TB	9.22.97		TRIP BLANK	NA	

LOG BOOK
Project: Linuron Application in Kern Co.
Project #: C97-043

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
45	linap-TS1			TRIP SPIKE	WA	QSM
46	linap-TS2			↓	↓	↓
47	linap-TS3					
48	linap-TS4					
49	linap-TS5			↓	↓	↓
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					
	linap-					

BAK = [illegible] 4A + 4B

VIN = [illegible] Roto # 3A + 3B

MET = [illegible] 1A - 1B

RUS = [illegible] LOG BOOK - Roto 7A + 7B

Project: Linuron Ambient Kern Co.

Project #: C97-042

ALV - ALVIN - [illegible] 2A + 2B

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
1	BAK-1	8-19-97	0945	Roto 4A	O	LDT
		8-20-97	0930			
2	VIN-1	8-19-97	1250	3A		
		8-20-97	1030			
3	MET-1	8-19-97	1315	1A		
		8-20-97	1130			
4	RUS-1	8-19-97	1110	7A		
		8-20-97	0900			
5	ALV-1	8-19-97	1230	2A		
		8-20-97	1050			
6	RUS-2	8-20-97	0930			
		8-21-97	0815			
7	RUS-20	8-20-97	0900			
		8-21-97	0815			
8	BAK-2	8-20-97	0930			
		8-21-97	0835			
9	BAK-20	8-20-97	0930			
		8-21-97	0835			
10	VIN-2	8-20-97	1030			
		8-21-97	0910			
11	VIN-20	8-20-97	1030			
		8-21-97	0910			
12	ALV-2	8-20-97	1050			
		8-21-97	0926			
13	ALV-20	8-20-97	1050			
		8-21-97	0930			
14	MET-2	8-20-97	1120			
		8-21-97	0950			
15	MET-20	8-20-97	1120			
		8-21-97	0950			
16	BLANK #1	8-20-97	0911	RUS S.W.		
17	RUS-3	8-21-97	0815			
		8-22-97	1040			
18	BAK-3	8-21-97	0835	Office Closed waited to get sample		
		8-22-97	1010			
19	VIN-3	8-21-97	0910			
		8-22-97	0950			
20	ALV-3	8-21-97	0920			
		8-22-97	0845			
21	MET-3	8-21-97	0950			
		8-22-97	0815			
22	RUS-4	8-25-97	1300			
		8-26-97	0830			

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
23	BAK 4	8-25-97	1230		K	LOT
		8-26-97	0900			
24	VIN-4	8-25-97	1310			
		8-26-97	1000			
25	ALV-4	8-25-97	1330			
		8-26-97	1015			
26	MET-4	8-25-97	1400			
		8-26-97	1040			
27	RUS-5	8-26-97	0830			
		8-27-97	0800			
28	BAK-5	8-26-97	0900			
		8-27-97	0830			
29	VIN-5	8-26-97	1000			
		8-27-97	0915			
30	ALV-5	8-26-97	1015			
		8-27-97	0930			
31	MET-5	8-26-97	1045			
		8-27-97	1000			
32	RUS-6	8-27-97	0800			
		8-28-97	0810			
33	RUS-6D	8-27-97	0800			
		8-28-97	0810			
34	BAK-6	8-27-97	0830			
		8-28-97	0835			
35	BAK-6D	8-27-97	0830			
		8-28-97	0835			
36	VIN-6	8-27-97	0915			
		8-28-97	0900			
37	VIN-6D	8-27-97	0915			
		8-28-97	0900			
38	ALV-6	8-27-97	0930			
		8-28-97	0915			
39	ALV-6D	8-27-97	0930			
		8-28-97	0915			
40	MET-6	8-27-97	1013			
		8-28-97	0935			
41	MET-6D	8-27-97	1000			
		8-28-97	0935			
42	Blank-2	8-27-97	0900	BAK Site		
43	RUS-7	8-28-97	0810			
		8-29-97	1015			
44	BAK-7	8-28-97	0835		↓	↓
		8-29-97	1000			

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
45	VIN-7	8-28-97	0900		K	LDT
		8-29-97	0915			
46	ALV-7	8-28-97	0915			
		8-29-97	0910			
47	MET-7	8-28-97	0935			
		8-29-97	0836			
48	BAK-8	9-1-97	1100	RUS - closed for Holiday		
		9-2-97	0855			
49	VIN-8	9-1-97	1130			
		9-2-97	0935			
50	ALV-8	9-1-97	1140			
		9-2-97	0940			
51	MET 8	9-1-97	1205			
		9-2-97	1005			
52	RUS-9	9-2-97	0830		O	
		9-3-97	0810			
53	BAK-9	9-2-97	0855			
		9-3-97	0830			
54	VIN-9	9-2-97	0935			
		9-3-97	0905			
55	ALV-9	9-2-97	0940			
		9-3-97	0955			
56	MET 9	9-2-97	1005			
		9-3-97	1035			
57	RUS-10	9-3-97	0810		K	
		9-4-97	0800			
58	RUS-10D	9-3-97	0810			
		9-4-97	0800			
59	BAK-10	9-3-97	0830			
		9-4-97	0820			
60	BAK-10D	9-3-97	0830			
		9-4-97	0820			
61	VIN-10	9-3-97	0905			
		9-4-97	0850			
62	VIN-10D	9-3-97	0905			
		9-4-97	0850			
63	ALV-10	9-3-97	0955			
		9-4-97	0905			
64	ALV-10D	9-3-97	0955			
		9-4-97	0905			
65	MET-10	9-3-97	1035			
		9-4-97	0935			
66	MET-10D	9-3-97	1035			
		9-4-97	0935			

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
67	Blank	9-3-97	0905	VIN Location		LDT
68	RUS-11	9-4-97	0800			
		9-5-97	0945			
69	BA-	9-4-97	0820			
		9-5-97	0930			
70	VIN	9-4-97	0850			
		9-5-97	0915			
71	A.V-	9-4-97	0905			
		9-5-97	0900			
72	M-	9-4-97	0935			
		9-5-97	0830			
73	RUS-12	9-8-97	1230		K	LJT
		9-9-97	0840			
74	BAK-12	9-8-97	1300			
		9-9-97	0915			
75	VIN-12	9-8-97	1330			
		9-9-97	1025			
76	ALV-12	9-8-97	1345			
		9-9-97	1035			
77	MET-12	9-8-97	1430			
		9-9-97	1115			
78	RUS-13	9-9-97	0840			
		9-10-97	0835			
79	BAK-13	9-9-97	0915			
		9-10-97	0855			
80	VIN-13	9-9-97	1025			
		9-10-97	0940			
81	ALV-13	9-9-97	1035			
		9-10-97	0955			
82	MET-13	9-9-97	1115			
		9-10-97	1030			
83	RUS-14	9-10-97	0835			
		9-11-97	0830			
84	RUS-14D	9-10-97	0835	DUPLICATE ROTO 7B		
		9-11-97	0830			
85	BAK14	9-10-97	0855			
		9-11-97	0905			
86	BAK-14D	9-10-97	0855	DUPLICATE ROTO 4B		
		9-11-97	0905			
87	VIN-14	9-10-97	0940			
		9-11-97	0945			
88	VIN-14D	9-10-97	0940	DUPLICATE ROTO 3B		
		9-11-97	0945			

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
89	ALV-14	9-15-97	0955		K	LM
		9-16-97	1005			
90	ALV-14D	9-15-97	0955	Duplicate ROTO 2B		
		9-16-97	1005			
91	MET-14	9-15-97	1030			
		9-16-97	1030			
92	MET-14D	9-15-97	1030	Duplicate ROTO 1B		
		9-16-97	1030			
93	RVS-15	9-11-97	0830			
		9-12-97	0820			
94	BAK-15	9-11-97	0905			
		9-12-97	0845			
95	VIN-15	9-11-97	0945			
		9-12-97	0915			
96	ALV-15	9-11-97	1005			
		9-12-97	0930			
97	MET-15	9-11-97	1030			
		9-12-97	1000		↓	
98	BLANK	9-12-97	1000	MET LOCATION	K	
		—	—			
99	RVS-16	9-15-97	1235			
		9-16-97	0825			
100	BAK-16	9-15-97	1300			
		9-16-97	0850			
101	FS-1	9-15-97	1300	DONE AT BAK		
		9-16-97	0850	ROTO 1B		
102	FS-2	9-15-97	1300			
		9-16-97	0850	ROTO 5A " " BAK		
103	FS-3	9-15-97	1300			
		9-16-97	0860	ROTO 5B " " BAK		
104	VIN-16	9-15-97	1340			
		9-16-97	0955			
105	ALV-16	9-15-97	1355			
		9-16-97	1015			
106	MET-16	9-15-97	1425			
		9-16-97	1045		↓	
107	RVS-17	9-16-97	0825			
		9-17-97	0830		PC	
108	BAK-17	9-16-97	0850			
		9-17-97	0905			
109	FS-4	9-16-97	0850	DONE AT BAK		
		9-17-97	0905	ROTO 4B		
110	FS-5	9-16-97	0850			
		9-17-97	0905	ROTO 5A " " BAK	↓	↓

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
111	VIN-17	9-16-97	0955		pc	JJ
		9-17-97	1025			
112	ALV-17	9-16-97	1015			
		9-17-97	1045			
113	MET-17	9-16-97	1045			
		9-17-97	1115			
114	RUS-18	9-17-97	0830		k	
		9-18-97	0820			
115	RUS-18D	9-17-97	0830			
		9-18-97	0820			
116	BAK-18	9-17-97	0905			
		9-18-97	0845			
117	BAK-18D	9-17-97	0905			
		9-18-97	0845			
118	VIN-18	9-17-97	1025			
		9-18-97	0935			
119	VIN-18D	9-17-97	1025			
		9-18-97	0935			
120	ALV-18	9-17-97	1045			
		9-18-97	0950			
121	ALV-18D	9-17-97	1045			
		9-18-97	0950			
122	MET-18	9-17-97	1115			
		9-18-97	1020			
123	MET-18D	9-17-97	1115			
		9-18-97	1020			
124	Blank	9-18-97	0955	ALV LOCATION		
		-	-			
125	RUS-19	9-18-97	0820		k	
		9-19-97	0805			
126	BAK-19	9-18-97	0845			
		9-19-97	0830			
127	VIN-19	9-18-97	0935			
		9-19-97	0905			
128	ALV-19	9-18-97	0950			
		9-19-97	0920			
129	MET-19	9-18-97	1020			
		9-19-97	0945			
130	TS-1	9-19-97	-	TRIP SPIKE		
		-	-			
131	TS-2	9-19-97	-	" "		
		-	-			
132	TS-3	9-19-97	-	" "		
		-	-			

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
133	TS-4	9-19-97	-	TRIP SPIKE	K	JM
		-	-			
134	TS-5	9-19-97	-	" "	↓	↓
		-	-			
135	RUS-20	9-22-97	1230			
		9-23-97	0810		K	JM
136	BAK-20	9-22-97	1250			
		9-23-97	0835			
137	VIN-20	9-22-97	1335			
		9-23-97	0925			
138	ALV-20	9-22-97	1350			
		9-23-97	0940			
139	MET-20	9-22-97	1420			
		9-23-97	1010		↓	
140	Blank	-	-			
		9-24-97	0805	RUS SITE (BLANK)	K	
141	RUS-21	9-23-97	0810			
		9-24-97	0810			
142	BAK-21	9-23-97	0835			
		9-24-97	0840			
143	VIN-21	9-23-97	0925			
		9-24-97	0915			
144	ALV-21	9-23-97	0940			
		9-24-97	0935			
145	MET-21	9-23-97	1010			
		9-24-97	1005		↓	
146	RUS-22	9-24-97	0810			
		9-25-97	0815		SPRINKLES	
147	RUS-22D	9-24-97	0810			
		9-25-97	0815	DUPLICATE		
148	BAK-22	9-24-97	0840			
		9-25-97	0835			
149	BAK-22D	9-24-97	0840			
		9-25-97	0835	DUPLICATE		
150	VIN-22	9-24-97	0915			
		9-25-97	0915			
151	VIN-22D	9-24-97	0915			
		9-25-97	0915	DUPLICATE	↓	
152	ALV-22	9-24-97	0935			
		9-25-97	0930		RAIN	
153	ALV-22D	9-24-97	0935			
		9-25-97	0930	DUPLICATE	↓	
154	MET-22	9-24-97	1005			
		9-25-97	1005		↓	↓

LOG BOOK
Project: Linuron Ambient Kern Co.
Project #: C97-042

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
155	MET-22D	9-24-97 9-25-97	1005 1005		RAIN	JJ
156	RUS-23	9-25-97 9-26-97	0815 0810		K	
157	BAK-23	9-25-97 9-26-97	0835 0840			
158	VIN-23	9-25-97 9-26-97	0915 0915			
159	ALV-23	9-25-97 9-26-97	0930 0940			
160	MET-23	9-25-97 9-26-97	1005 1015	CIRCUIT BREAKER PUMP WAS NOT RUNNING		

APPENDIX VI

LINURON APPLICATION METEOROLOGICAL DATA

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	258	1602	78.9	1002	59.0
1997	258	1617	80.1	1002	56.2
1997	258	1632	80.3	1002	54.5
1997	258	1647	80.4	1001	51.3
1997	258	1702	80.1	1001	47.0
1997	258	1717	79.8	1001	46.3
1997	258	1732	80.0	1001	51.9
1997	258	1747	79.7	1001	52.8
1997	258	1802	79.7	1001	49.2
1997	258	1817	79.6	1001	53.5
1997	258	1832	79.1	1001	51.7
1997	258	1847	78.0	1001	49.1
1997	258	1902	76.8	1001	54.9
1997	258	1917	76.3	1001	54.1
1997	258	1932	75.9	1001	55.3
1997	258	1947	75.3	1001	55.4
1997	258	2002	75.1	1001	58.0
1997	258	2017	74.5	1001	57.2
1997	258	2032	74.1	1001	60.4
1997	258	2047	72.5	1001	67.6
1997	258	2102	71.8	1001	71.7
1997	258	2117	70.6	1001	72.4
1997	258	2132	70.7	1001	67.0
1997	258	2147	70.5	1002	71.1
1997	258	2202	70.2	1002	71.1
1997	258	2217	70.1	1002	68.9
1997	258	2232	70.1	1002	69.1
1997	258	2247	70.7	1002	68.6
1997	258	2302	70.2	1002	70.0
1997	258	2317	70.1	1002	68.9
1997	258	2332	70.3	1002	65.4
1997	258	2347	70.2	1002	62.8
1997	259	2	69.4	1002	63.7
1997	259	17	67.8	1002	67.8
1997	259	32	66.4	1002	72.7
1997	259	47	65.7	1002	71.2
1997	259	102	64.8	1002	75.6
1997	259	117	64.0	1002	74.5
1997	259	132	64.5	1002	71.3
1997	259	147	63.7	1002	73.1
1997	259	202	62.3	1002	76.5
1997	259	217	61.3	1002	79.7

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	259	232	61.1	1002	78.0
1997	259	247	61.4	1002	77.8
1997	259	302	61.0	1002	78.8
1997	259	317	60.9	1001	82.8
1997	259	332	60.6	1001	81.3
1997	259	347	60.0	1001	81.1
1997	259	402	59.3	1001	82.7
1997	259	417	60.5	1001	75.9
1997	259	432	61.0	1001	78.4
1997	259	447	61.2	1001	77.0
1997	259	502	61.4	1001	76.8
1997	259	517	61.2	1001	75.7
1997	259	532	59.9	1001	81.8
1997	259	547	59.1	1001	80.6
1997	259	602	59.2	1001	80.4
1997	259	617	59.6	1001	80.6
1997	259	632	58.9	1001	80.3
1997	259	647	59.7	1002	80.7
1997	259	702	59.7	1002	81.9
1997	259	717	60.4	1002	79.7
1997	259	732	61.7	1002	78.2
1997	259	747	62.5	1002	77.9
1997	259	802	64.0	1002	77.8
1997	259	817	65.1	1002	75.0
1997	259	832	66.7	1002	72.6
1997	259	847	69.7	1002	70.7
1997	259	902	71.9	1002	69.2
1997	259	917	73.2	1002	65.1
1997	259	932	72.3	1002	66.9
1997	259	947	74.8	1002	67.1
1997	259	1002	75.2	1002	65.0
1997	259	1017	74.5	1002	68.0
1997	259	1032	74.8	1002	64.3
1997	259	1047	76.1	1002	58.8
1997	259	1102	74.9	1002	56.9
1997	259	1117	75.0	1002	56.2
1997	259	1132	74.9	1001	56.4
1997	259	1147	74.7	1001	53.4
1997	259	1202	75.4	1001	56.5
1997	259	1217	77.3	1001	55.4
1997	259	1232	76.9	1001	54.9
1997	259	1247	77.1	1001	53.9

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	259	1302	78.5	1001	51.4
1997	259	1317	79.8	1000	49.3
1997	259	1332	78.7	1000	50.4
1997	259	1347	80.4	1000	50.0
1997	259	1402	79.8	1000	49.6
1997	259	1417	81.0	1000	46.1
1997	259	1432	79.5	999	44.4
1997	259	1447	78.9	999	40.9
1997	259	1502	81.5	999	41.1
1997	259	1517	81.0	999	39.8
1997	259	1532	81.2	999	38.8
1997	259	1547	80.7	998	39.1
1997	259	1602	81.1	998	39.7
1997	259	1617	82.3	998	40.3
1997	259	1632	81.5	998	40.4
1997	259	1647	80.7	998	42.7
1997	259	1702	82.1	998	40.0
1997	259	1717	82.8	998	40.5
1997	259	1732	80.5	997	43.1
1997	259	1747	81.4	997	42.7
1997	259	1802	81.2	997	45.7
1997	259	1817	80.4	997	45.0
1997	259	1832	80.1	997	43.8
1997	259	1847	78.0	997	44.2
1997	259	1902	77.0	997	46.3
1997	259	1917	76.5	997	44.4
1997	259	1932	75.5	997	45.7
1997	259	1947	74.6	997	50.0
1997	259	2002	74.0	997	50.7
1997	259	2017	73.6	997	51.7
1997	259	2032	73.0	997	50.0
1997	259	2047	71.9	997	54.3
1997	259	2102	70.5	997	56.0
1997	259	2117	70.8	997	52.9
1997	259	2132	71.0	997	55.7
1997	259	2147	70.2	997	56.1
1997	259	2202	71.0	997	53.3
1997	259	2217	70.8	997	54.8
1997	259	2232	70.3	997	55.3
1997	259	2247	69.9	997	57.5
1997	259	2302	69.2	997	60.2
1997	259	2317	69.3	997	59.3

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	259	2332	69.5	997	59.7
1997	259	2347	69.4	997	59.9
1997	260	2	67.9	997	61.1
1997	260	17	67.1	997	61.3
1997	260	32	66.8	997	64.6
1997	260	47	65.8	997	67.0
1997	260	102	65.5	997	68.8
1997	260	117	66.2	997	68.3
1997	260	132	67.1	997	65.8
1997	260	147	66.9	997	65.5
1997	260	202	67.3	997	67.1
1997	260	217	67.1	997	65.5
1997	260	232	66.6	997	67.4
1997	260	247	66.5	997	66.6
1997	260	302	66.3	997	66.6
1997	260	317	65.2	997	68.7
1997	260	332	65.3	997	68.5
1997	260	347	63.9	996	74.4
1997	260	402	63.3	996	73.7
1997	260	417	63.2	996	72.7
1997	260	432	62.3	996	75.7
1997	260	447	62.4	996	76.6
1997	260	502	63.0	996	73.3
1997	260	517	62.0	996	78.0
1997	260	532	61.4	996	79.3
1997	260	547	61.7	996	78.5
1997	260	602	62.2	996	78.2
1997	260	617	60.6	996	80.6
1997	260	632	60.3	996	80.3
1997	260	647	60.6	996	79.2
1997	260	702	61.1	997	78.8
1997	260	717	60.2	997	80.7
1997	260	732	62.4	997	78.6
1997	260	747	64.0	997	77.1
1997	260	802	66.6	997	73.8
1997	260	817	66.3	997	70.6
1997	260	832	68.6	997	63.9
1997	260	847	71.3	997	59.2
1997	260	902	73.4	997	54.7
1997	260	917	72.4	997	55.6
1997	260	932	72.6	997	57.0
1997	260	947	74.0	997	55.7

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	260	1002	77.0	997	52.4
1997	260	1017	77.7	997	55.3
1997	260	1032	78.0	997	53.3
1997	260	1047	79.7	997	53.9
1997	260	1102	81.5	997	48.7
1997	260	1117	83.8	997	46.9
1997	260	1132	83.4	997	44.4
1997	260	1147	83.4	996	45.8
1997	260	1202	84.6	996	43.0
1997	260	1217	85.0	996	44.1
1997	260	1232	85.3	996	43.4
1997	260	1247	87.1	996	42.2
1997	260	1302	88.1	996	40.0
1997	260	1317	86.5	995	40.4
1997	260	1332	86.9	995	40.8
1997	260	1347	88.2	995	38.7
1997	260	1402	90.0	995	39.2
1997	260	1417	89.8	994	36.7
1997	260	1432	93.2	994	34.8
1997	260	1447	91.8	994	29.2
1997	260	1502	90.5	994	28.4
1997	260	1517	88.7	993	29.7
1997	260	1532	88.6	993	39.7
1997	260	1547	86.2	993	40.8
1997	260	1602	85.3	993	40.2
1997	260	1617	85.0	993	40.5
1997	260	1632	84.4	993	42.6
1997	260	1647	84.1	993	39.2
1997	260	1702	83.8	994	41.4
1997	260	1717	83.4	994	43.3
1997	260	1732	83.1	994	44.7
1997	260	1747	82.6	994	47.6
1997	260	1802	82.5	994	47.5
1997	260	1817	82.1	994	48.4
1997	260	1832	82.0	994	48.6
1997	260	1847	82.0	994	47.3
1997	260	1902	82.0	994	47.7
1997	260	1917	81.3	994	50.5
1997	260	1932	80.9	994	50.7
1997	260	1947	80.9	993	48.9
1997	260	2002	79.9	993	52.6
1997	260	2017	79.4	994	53.2

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	260	2032	79.1	994	52.5
1997	260	2047	78.9	994	52.2
1997	260	2102	78.1	994	56.8
1997	260	2117	76.9	994	61.8
1997	260	2132	75.3	994	70.8
1997	260	2147	75.1	994	70.5
1997	260	2202	74.4	994	66.0
1997	260	2217	74.2	994	67.3
1997	260	2232	74.2	994	67.2
1997	260	2247	74.2	994	67.3
1997	260	2302	73.6	994	68.2
1997	260	2317	73.3	994	68.4
1997	260	2332	73.3	994	68.4
1997	260	2347	72.6	994	69.9
1997	261	2	71.5	994	72.8
1997	261	17	71.6	993	72.4
1997	261	32	71.2	993	72.0
1997	261	47	70.8	993	73.0
1997	261	102	71.3	993	72.1
1997	261	117	71.3	993	71.5
1997	261	132	71.0	993	73.3
1997	261	147	69.6	993	75.6
1997	261	202	70.0	993	75.6
1997	261	217	69.9	993	78.1
1997	261	232	69.3	993	79.6
1997	261	247	69.0	993	80.5
1997	261	302	68.8	993	82.4
1997	261	317	67.2	993	85.1
1997	261	332	66.2	993	82.3
1997	261	347	66.4	993	79.4
1997	261	402	66.9	993	78.1
1997	261	417	66.1	994	82.4
1997	261	432	64.9	994	91.0
1997	261	447	64.6	994	91.9
1997	261	502	66.0	994	77.1
1997	261	517	66.5	994	73.3
1997	261	532	66.3	994	72.9
1997	261	547	66.2	994	72.0
1997	261	602	65.6	995	73.8
1997	261	617	65.2	995	75.7
1997	261	632	65.3	995	77.2
1997	261	647	65.5	995	78.3

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	261	702	64.8	995	84.0
1997	261	717	65.3	996	80.7
1997	261	732	65.6	996	80.2
1997	261	747	67.1	996	80.6
1997	261	802	68.5	996	79.6
1997	261	817	69.1	996	77.7
1997	261	832	70.7	996	75.9
1997	261	847	71.4	996	75.7
1997	261	902	72.2	997	74.5
1997	261	917	72.8	997	72.4
1997	261	932	73.3	996	77.4
1997	261	947	77.4	997	74.1
1997	261	1002	77.0	997	69.5
1997	261	1017	80.0	997	70.6
1997	261	1032	80.0	997	64.9
1997	261	1047	80.1	997	60.3
1997	261	1102	80.3	997	59.6
1997	261	1117	80.2	997	62.0
1997	261	1132	80.8	996	60.3
1997	261	1147	82.5	996	58.2
1997	261	1202	82.7	996	54.7
1997	261	1217	81.5	996	50.0
1997	261	1232	82.0	995	48.0
1997	261	1247	82.4	995	55.9
1997	261	1302	83.3	995	60.8
1997	261	1317	84.2	995	59.6
1997	261	1332	85.0	995	57.3
1997	261	1347	85.9	995	57.3
1997	261	1402	86.0	994	55.0
1997	261	1417	87.9	994	55.6
1997	261	1432	88.3	994	54.6
1997	261	1447	89.7	994	54.6
1997	261	1502	88.1	993	54.3
1997	261	1517	87.5	993	53.4
1997	261	1532	88.9	993	53.3
1997	261	1547	86.0	993	56.3
1997	261	1602	81.4	993	59.7
1997	261	1617	81.0	993	52.3
1997	261	1632	80.5	993	53.8
1997	261	1647	79.4	993	46.4
1997	261	1702	78.1	993	49.0
1997	261	1717	77.3	993	51.6

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	261	1732	77.2	993	50.2
1997	261	1747	76.9	993	51.0
1997	261	1802	77.0	993	49.1
1997	261	1817	77.0	992	47.9
1997	261	1832	77.2	992	47.0
1997	261	1847	76.9	993	49.0
1997	261	1902	75.6	993	54.9
1997	261	1917	75.0	993	56.9
1997	261	1932	74.6	992	57.1
1997	261	1947	73.8	993	60.3
1997	261	2002	73.4	993	60.2
1997	261	2017	73.3	993	60.3
1997	261	2032	73.3	993	60.4
1997	261	2047	73.2	993	61.7
1997	261	2102	73.6	993	60.6
1997	261	2117	73.8	994	60.0
1997	261	2132	74.0	994	58.9
1997	261	2147	73.7	994	60.9
1997	261	2202	73.4	994	61.8
1997	261	2217	73.4	994	60.2
1997	261	2232	73.3	994	59.8
1997	261	2247	73.5	994	58.0
1997	261	2302	73.5	994	58.5
1997	261	2317	73.5	994	60.4
1997	261	2332	73.5	994	60.7
1997	261	2347	73.3	994	60.7
1997	262	2	72.8	994	61.0
1997	262	17	72.6	994	61.3
1997	262	32	72.2	994	61.3
1997	262	47	71.7	994	61.9
1997	262	102	70.2	994	63.7
1997	262	117	69.6	994	65.5
1997	262	132	69.0	994	64.8
1997	262	147	68.0	994	66.0
1997	262	202	67.9	993	66.7
1997	262	217	68.0	993	70.2
1997	262	232	67.6	993	71.9
1997	262	247	66.9	993	72.6
1997	262	302	66.0	993	74.9
1997	262	317	66.5	993	71.8
1997	262	332	65.9	993	73.3
1997	262	347	65.3	993	74.9

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	262	402	64.4	993	74.8
1997	262	417	64.2	993	77.1
1997	262	432	63.9	993	76.6
1997	262	447	64.2	993	76.6
1997	262	502	64.3	994	74.5
1997	262	517	64.0	994	71.4
1997	262	532	63.9	994	67.7
1997	262	547	63.6	994	66.3
1997	262	602	62.8	994	67.3
1997	262	617	61.8	994	69.4
1997	262	632	60.3	994	72.1
1997	262	647	59.6	994	71.8
1997	262	702	60.7	994	71.4
1997	262	717	61.1	994	73.7
1997	262	732	62.7	994	71.8
1997	262	747	64.0	995	70.3
1997	262	802	66.1	995	68.5
1997	262	817	69.3	995	63.7
1997	262	832	71.9	995	61.9
1997	262	847	71.5	995	61.3
1997	262	902	73.6	995	55.7
1997	262	917	74.1	995	51.7
1997	262	932	75.2	995	48.0
1997	262	947	74.2	995	46.8
1997	262	1002	75.1	995	44.2
1997	262	1017	75.1	995	42.4
1997	262	1032	75.9	995	38.8
1997	262	1047	75.4	995	40.5
1997	262	1102	76.6	995	39.8
1997	262	1117	76.7	995	35.0
1997	262	1132	78.3	995	40.6
1997	262	1147	80.0	995	43.1
1997	262	1202	80.0	995	40.3
1997	262	1217	80.7	994	36.1
1997	262	1232	81.1	994	35.5
1997	262	1247	81.2	994	37.6
1997	262	1302	81.4	994	33.2
1997	262	1317	82.2	994	30.8
1997	262	1332	82.7	994	28.8
1997	262	1347	83.4	994	27.9
1997	262	1402	84.8	994	26.4
1997	262	1417	85.5	993	33.8

LINURON APPLICATION METEOROLOGICAL DATA (15 min. averages)

Year	Julian Date	Time	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)
1997	262	1432	84.7	993	29.7
1997	262	1447	85.3	993	33.2
1997	262	1502	86.1	993	27.5
1997	262	1517	85.7	993	26.3

APPENDIX VII

AIRS METEOROLOGICAL DATA

Arithmetic Wind Speed and Direction for Bakersfield (Airs ID #060290010)

Wind Speed (mph)

Date	Begin Hour (PST)																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
970915	7	5	4	3	2	1	3	5	7	8	4	4	4	6	6	8	8	6	5	4	3	3	4	4
970916	5	5	4	2	3	3	3	4	5	4	3	3	4	4	3	3	3	3	5	3	2	1	2	2
970917	2	1	1	1	1	2	2	2	2	3	3	3	4	5	8	8	6	5	3	2	2	3	2	2
970918	2	2	2	2	2	2	4	3	5	4	3	4	5	5	7	11	11	7	6	6	3	4	4	2
970919	2	2	2	3	4	3	4	2	3	5	6	7	7	6	8	8	9	6	5	4	3	3	3	3

Wind Direction (degrees oriented to compass north)

970915	301	266	270	324	28	65	328	325	325	343	52	197	189	286	308	324	317	322	306	277	297	308	318	311
970916	309	293	277	8	117	110	139	146	141	156	331	352	316	333	303	23	233	191	164	142	85	54	121	118
970917	49	64	76	353	205	54	66	272	248	274	237	322	335	291	293	294	309	340	65	237	298	319	97	162
970918	263	4	287	242	162	98	323	29	128	161	305	278	300	273	308	344	358	358	302	279	263	153	114	65
970919	32	21	333	327	335	347	321	330	239	291	307	299	312	314	301	319	320	316	310	320	9	50	153	121