Note: This material is related to a section in *AP42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the file number, the AP42 chapter and then the section. The file name "rel01_c01s02.pdf" would mean the file relates to AP42 chapter 1 section 2. The document may be out of date and related to a previous version of the section. The document has been saved for archival and historical purposes. The primary source should always be checked. If current related information is available, it will be posted on the AP42 webpage with the current version of the section.

These are the source test reports for AP 42 section 11.17 Lime Manufacturing.
They are referenced in the database as a group, Lime Manufacturing source tests.

Commonwealth of Pennsylvania
Environmental Resources
September 16, 1992

Subject: Stack Test Review

To: Data File
Warner Company, Inc.
East Whiteland Township, Chester County

From: Jaydeb Pai
Air Pollution Control Engineer
Division of Source Testing and Monitoring
Bureau of Air Quality Control

Through: Acting Chief, Division of Source Testing and Monitoring

Warner Company, Inc. operates a lime kiln, designated as Kiln No. 2, with a rated production capacity of 375 tons per day at the aforementioned location. The sloped rotary kiln is 350 feet long and 9 feet in diameter. Limestone, mined and crushed at the site, is introduced to the kiln at the high end. The residence time for limestone in the kiln is three to four hours. The product is discharged at the low end of the kiln. Heat is supplied by firing pulverized coal at the low end. The emissions from the kiln travel through cooling tubes before entering a baghouse. Exhaust gas from the baghouse is discharged to the atmosphere through a 5 feet inside diameter stack having an exit point 55 feet above grade.

RMC Environmental Services, Inc. conducted a trial burn testing program on the kiln on March 25-28, 1992, to determine the effects of using a fuel mixture, proportioned based on heat content, of 10% alternative fuel pellets and 90% coal. The alternative fuel pellets were composed of non-recyclable waste paper and sewage biosolids. The test program consisted of particulate, sulfur oxides (SO_2/SO_3), chlorides (HCl/Cl_2), volatile organic compounds (VOC), heavy metals, and dioxins/furans (PCDD/PCDF) determination in the exhaust stack. All tests were performed in accordance with a preapproved test protocol and are acceptable to the Department. Some calculation errors were found in all tests. The consultant resubmitted the corrected results with the summary table below reflecting those results.

Baseline emission testing was performed in June, September and October, 1991 while the kiln was firing 100% coal. Chlorides (HCl/Cl_2) and VOC tests were not performed during baseline testing.

The following trial burn test data was extracted from the test report:

Particulate and VOC Tests

Test run no.	1	2
Test date	3/25/92	3/25/92
Coal feed rate (ton/hr.)	3.6	3.6
Pellet feed rate (ton/hr.)	0.6	0.6
Rated lime production capacity (ton/hr.)	15.6	15.6
Lime production rate during test (ton/hr.)	12.8	12.8
Volumetric flow rate (dscfm)	39012	36212
Particulate emission concentration (gr./dscf)	0.004	0.003
Particulate emission rate (lb./hr.)	1.3	1.1
Total VOC emission concentration, as methane (ppm)	28	30
Total VOC emission rate, as methane (lb./hr.)	2.7	2.7

SO_3/SO_2 Tests

Test run no.	1	2
Test date	3/25/92	3/25/92
Coal feed rate (ton/hr.)	3.6	3.6
Pellet feed rate (ton/hr.)	0.6	0.6
Rated lime production capacity (ton/hr.)	15.6	15.6
Lime production rate during test (ton/hr.)	12.8	12.8
Volumetric flow rate (dscfm)	38681	36044
SO_3 emission rate (lb./hr.)	0	0
SO_2 emission concentration (ppm)	173	215
SO_2 emission rate (lb./hr.)	66.4	76.6

Multimetals tests

Test run no.	1	2
Test date	3/26/92	3/26/92
Coal feed rate (ton/hr.)	3.67	3.67
Pellet feed rate (ton/hr.)	0.6	0.6
Rated lime production capacity (ton/hr.)	15.6	15.6
Lime production rate during test (ton/hr.)	13	13
Volumetric flow rate (dscfm)	36780	42914
Emission concentration (mg/dscm):		
Arsenic	0	0
Beryllium	0	0
Cadmium	1.83×10^{-3}	1.21×10^{-3}
Chromium	3.66×10^{-3}	8.08×10^{-4}
Lead	4.16×10^{-2}	1.62×10^{-2}
Mercury	1.28×10^{-3}	1.01×10^{-3}
Nickel	6.86×10^{-3}	9.69×10^{-3}
Emission rate (lb./hr.):		
Arsenic	0	0
Beryllium	0	0
Cadmium	2.52×10^{-4}	1.95×10^{-4}
Chromium	5.03×10^{-4}	1.3×10^{-4}
Lead	5.73×10^{-3}	2.59×10^{-3}
Mercury	1.76×10^{-4}	1.62×10^{-4}
Nickel	9.44×10^{-4}	1.56×10^{-3}

HCl/Cl_2 tests

Test run no.	1	2
Test date	3/26/92	3/26/92
Coal feed rate (ton/hr.)	3.67	3.67
Pellet feed rate (ton/hr.)	0.6	0.6
Rated lime production capacity (ton/hr.)	15.6	15.6
Lime production rate during test (ton/hr.)	13	13
Volumetric flow rate (dscfm)	36999	40810
HCl emission concentration (ppm)	34.4	38.3
HCl emission rate (lb./hr.)	7.1	8.7
Chlorine emission concentration (ppm)	0.48	0.15
Chlorine emission rate (lb./hr.)	0.19	0.07

Dioxins and Furans (PCDD and PCDF) tests

Test run no.	1	2
Test date	3/28/92	3/28/92
Coal feed rate (ton/hr.)	3.66	3.66
Pellet feed rate (ton/hr.)	0.6	0.6
Rated lime production capacity (ton/hr.)	15.6	15.6
Lime production rate during test (ton/hr.)	13	13
Volumetric flow rate (dscfm)	41360	41167
PCDD and PCDF emission rate expressed as 2, 3, 7, 8-TCDD equivalent (lb./hr.)	2.62×10^{-9}	3.24×10^{-9}

cc: John Petrella, Southeastern Regional Office
File No. 15-305-003
EPA/RSL
Reading File
Krishnan Ramamurthy, Central Office

JP:fms

RMC ENVIRONMENTAL SERVICES, Inc

RMC
ENVIRONMENTAL
SERVICES

3450 Schuylkill Road
Spring City, PA 19475

215•948•4700
215•948•4752 FAX

9 September 1992

RECEIVED
DER AIR QUALITY CONTROL
DIV. OF TECH SERVICES

Jaydeb Pai
PA DER Bureau of Air Quality Control
Quality Assurance Unit
1st Floor Executive House
Second and Chestnut Streets
Harrisburg, PA 17105-2357

Subject: Initial PA DER Technical Review Comments
Warner Test Burn Report
RMC Project No. 4031

Dear Mr. Pai:

This letter summarizes your technical review comments on the above-referenced test report, relayed during a phone conversation with Tim Harvey on August 18, 1992. The comments were limited to pointing out three isolated calculation errors in data reduction procedures. Tim Harvey responded by checking the calculations that were identified, and making necessary adjustments to the reported results. Copies of corrected pages were transmitted by facsimile to your office, although there seems to be some question as to whether they reached your desk. In any case, the corrected pages are attached.

The errors and related implications are discussed below.

1. RMC used the correct reference for dioxin/furan toxic equivalent factors (TEF) but misinterpreted the use of some of the factors. The correction increases the total toxic equivalent emissions as 2,3,7,8 TCDD to approximately twice those reported. The correction does not affect the order of magnitude of reported emissions. The predicted maximum ambient concentration is increased to 1.4×10^{-9} $\mu g/m^3$, which is still well under regulatory criteria.

2. A transpositional error was noted on dioxin test run #1. The erroneous term affected the reported stack gas velocity, thereby affecting flow rate and emission rate calculations. The correction effected a minor reduction in emission rates for that test run.

3. An erroneous term was used in water vapor volume calculations. The method published term is 0.0471 ft^3/gm, while we used 0.04071 ft^3/gm. The effect of the correction is to increase stack gas moisture content, reduce the standard flow rate of stack gases, and thereby reduce emission rates slightly for most other reported results.

Enclosed you will find copies of all corrected Appendix A data tables, and Tables 5 through 8 of the narrative section of the report. These corrections have no significant bearing on the discussion or conclusions of the report, but some minor revisions to the text are warranted. I have elected to await all comments from PA DER prior to issuing an errata for the report text.

WMNA is anxious to meet with PA DER to discuss the project, but has been informed that no meeting can be scheduled with the Southeast Regional office until comments from the Central office have been received. We would appreciate it if you could please forward your comments to the Southeast Regional office as soon as possible.

If you have any further questions or comments, or if we can be of assistance in relaying your comments to the Southeast Regional office, do not hesitate to contact us.

Sincerely,

Geoffrey A. Rogalsky, P.E.
Senior Project Engineer

enclosure

cc: B. Rieder, WMNA
D. Painter, Warner
T. Harvey, RMC
M. Wisniewski, RMC

Table 5: TRIAL BURN EMISSION TEST RESULTS SUMMARY

Parameter	Units	Run Number 1	Run Number 2	Average*
Particulate	grains/dscf	0.004	0.003	0.004
	lbs/hr	1.29	1.06	1.18
Sulfur Oxides	ppmv	173	215	194
	lbs/hr	66	77	72
Heavy Metals				
As	lbs/hr	<0.65 E-04	<0.65 E-04	<0.65 E-04
Be	lbs/hr	<0.65 E-04	<0.65 E-04	<0.65 E-04
Cd	lbs/hr	2.52 E-04	1.95 E-04	2.24 E-04
Cr	lbs/hr	5.03 E-04	1.30 E-04	3.17 E-04
Pb	lbs/hr	5.73 E-03	2.59 E-03	4.16 E-03
Hg	lbs/hr	1.76 E-04	1.62 E-04	1.69 E-04
Ni	lbs/hr	9.44 E-04	1.56 E-03	1.25 E-03
Dioxin/Furan**	lbs/hr	2.62 E-09	3.24 E-09	2.93 E-09
HCl	ppmv	34	38	36
	lb/hr	7.2	8.8	8.0
Cl2	ppmv	0.48	<0.15	0.28
	lb/hr	0.19	<0.07	0.11
VOC's as Methane	ppmv	28	30	29
	lb/hr	2.71	2.7	2.71

* - Where data below detection limit and measurable quantities are mixed, one-half the detection limit is used for averaging.

** - See Table 6 for individual compounds.

Table 6: DIOXIN/FURAN TOXIC EQUIVALENCY EMISSIONS SUMMARY

Dioxin/Furan Species	Toxic Equivalency Factor (TEF)	Actual Emission Rate, lbs/hr Run #1	Actual Emission Rate, lbs/hr Run #2
2,3,7,8-TCDD	1.000	0.00 E+00	0.00 E+00
1,2,3,7,8-PeCDD	0.500	6.26 E-10	0.00 E+00
1,2,3,4,7,8-HxCDD	0.100	3.13 E-10	0.00 E+00
1,2,3,6,7,8-HxCDD	0.100	9.39 E-10	1.25 E-08
1,2,3,7,8,9-HxCDD	0.100	1.25 E-09	0.00 E+00
1,2,3,4,6,7,8-HpCDD	0.010	7.20 E-09	5.02 E-09
OCDD	0.001	2.82 E-08	8.47 E-09
2,3,7,8-TCDF	0.100	4.38 E-09	4.39 E-09
1,2,3,7,8-PeCDF	0.050	1.25 E-09	1.25 E-09
2,3,4,7,8-PeCDF	0.500	1.25 E-09	1.25 E-09
1,2,3,4,7,8-HxCDF	0.100	4.70 E-09	4.39 E-09
1,2,3,6,7,8-HxCDF	0.100	1.25 E-09	1.57 E-09
2,3,4,6,7,8-HxCDF	0.100	1.57 E-09	1.57 E-09
1,2,3,7,8,9-HxCDF	0.100	0.00 E+00	0.00 E+00
1,2,3,4,6,7,8-HpCDF	0.010	5.95 E-09	4.39 E-09
1,2,3,4,7,8,9-HpCDF	0.010	1.25 E-09	0.00 E+00
OCDF	0.001	3.76 E-09	4.39 E-09
Total TCDD	N/A	1.19 E-08	1.00 E-08
Total PeCDD	N/A	1.47 E-08	7.84 E-09
Total HxCDD	N/A	1.53 E-08	1.22 E-08
Total HpCDD	N/A	1.69 E-08	1.35 E-08
Total TCDF	N/A	1.63 E-08	1.29 E-08
Total PeCDF	N/A	9.08 E-09	8.15 E-09
Total HxCDF	N/A	1.19 E-08	1.10 E-08
Total HpCDF	N/A	1.03 E-08	5.65 E-09
Total Toxic Equivalent* (as 2,3,7,8-TCDD)		2.62 E-09	3.24 E-09

N/A - Not Applicable

* - Total Toxic Equivalent equals the sum of individual actual emissions rates multiplied by their respective TEF.

Table 7: COMPARISON OF EMISSION TEST RESULTS WITH BASELINE TESTING

Parameter	Units	Baseline Highest	Baseline Average*	Test Burn Highest	Test Burn Average*
Particulate**	lbs/hr	2.17	1.47	1.3	1.19
Sulfur Oxides**	ppmv	392	261	215	194
	lbs/hr	210	137	77	72
Heavy Metals***					
As	lbs/hr	5.96 E-04	4.49 E-04	<0.65 E-04	<0.65 E-04
Be	lbs/hr	1.90 E-05	1.50 E-05	<0.65 E-04	<0.65 E-04
Cd	lbs/hr	1.30 E-04	7.50 E-05	2.52 E-04	2.24 E-04
Cr	lbs/hr	6.48 E-04	4.71 E-04	5.03 E-04	3.17 E-04
Pb	lbs/hr	1.23 E-03	6.43 E-04	5.73 E-03	4.16 E-03
Hg	lbs/hr	4.50 E-05	3.80 E-05	1.76 E-04	1.69 E-04
Ni	lbs/hr	2.39 E-03	1.14 E-03	1.56 E-03	1.25 E-03
Dioxin/Furan**	lbs/hr	2.26 E-11	1.48 E-11	3.24 E-09	2.93 E-09
HCl	lbs/hr	N/S	N/S	8.8	8
Cl2	lbs/hr	N/S	N/S	0.194	0.11
VOC's as Methane	lbs/hr	N/S	N/S	2.71	2.71

* - Where data below detection limit and measurable quantities are mixed, one-half the detection limit is used for averaging.

** - Baseline tests conducted Sept/Oct 1991

*** - Baseline tests conducted June 1991

N/S - Parameter not sampled during baseline testing.

Table 8: PREDICTED MAXIMUM AMBIENT CONCENTRATIONS AND AMBIENT AIR IMPACT CRITERIA FOR ALTERNATIVE FUEL / COAL USAGE

Parameter	Highest Emission Rate		Ambient Concentrations in ug/m3		
			Predicted	Strictest Regulatory Limits**	
			Maximum	PA DER	US EPA
	lbs/hr	g/sec	Annual*	(Annual)	(Annual)
Heavy Metals					
As	<0.65 E-04	<0.08 E-04	<2.8 E-05	2.3 E-04	2.3 E-03
Be	<0.65 E-04	<0.08 E-04	<2.8 E-05	4.2 E-04	4.2 E-03
Cd	2.52 E-04	3.18 E-05	1.1 E-04	5.6 E-04	5.6 E-03
Cr	5.03 E-04	6.35 E-05	2.2 E-04	NS***	1.0 E-03
Pb	5.73 E-03	7.23 E-04	2.5 E-03	1.5 E-01	9.0 E-02
Hg	1.76 E-04	2.22 E-05	7.6 E-05	2.4 E-02	3.0 E-01
Ni	1.56 E-03	1.97 E-04	6.8 E-04	3.3 E-03	4.2 E-02
Dioxin/Furan	3.24 E-09	4.09 E-10	1.4 E-09	3.0 E-08	2.2 E-07
HCl	8.8	1.11	3.82	NS	7
Cl2	0.19	0.02	0.08	NS	NS
VOC's					
as Methane	2.71	0.34	1.18	NS	NS

* - Determined using normalized dispersion analysis. See Appendix G.

** - No specific emissions or ambient air standards apply to the burning of alternative fuels at the Warner facility for these parameters. Strictest PA DER ambient air impact criteria for burning of anything are found in "Air Quality Permitting Criteria . . . for Municipal Waste Incineration Facilities." Similarly, strictest US EPA ambient air impact standards are ambient criteria found in "Burning of Hazardous Waste in Boilers and Industrial Furnaces."

*** - PA DER criterion is for hexavalent chromium only.

NS - No ambient air impact standard or criterion available.

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SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	764	755
Stack static pressure, in. H2O (Pg)	-0.32	-0.32
Stack velocity pressure (sqrt dlt P)	0.786	0.731
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	543	542
Metered sample volume, cu. ft. (Vm)	73.04	67.25
Water volume collected, ml/gm (Vlc)	152.3	157.9
Test duration, min. (theta)	96	96
Sampling nozzle diameter, in. (Dn)	0.255	0.255
Orifice press. drop, in. H2O (dlt H)	1.54	1.34
Flue gas composition		
% CO2	8.6	8.6
% O2	15.4	15.4
% CO	0.5	0.5

Particulate

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2	Run #3
Stack abs. pressure, in. Hg (Ps)	29.58	29.58	
Sample vol. standard, scf (Vmstd)	71.208	65.652	
Water vapor vol., scf (Vwstd)	7.17	7.44	
Stack gas moisture, pct. (Bws)	9.2%	10.2%	
Stack gas velocity, ft/sec (Vs)	53.37	49.38	
Stack gas flow Rate, dscfh (Q)	2340709	2172702	
dscfm	39012	36212	
acfm	62857	58160	

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	8.6	8.6
Percent O2	15.4	15.4
Percent CO	0.5	0.5
Percent N2	75.5	75.5
Bws	9.2%	10.2%
Md	29.99	29.99
Ms	28.89	28.77

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	754	753
Ps	29.58	29.58
Bws	9.2%	10.2%
Vmstd	71.21	65.65
Vs	55.37	49.38
An	0.000355	0.000355
theta	95	95
I, pct.	105%	105%

STACK TEST RESULTS - PARTICULATES

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Particulate matter collected		
Filter + rinse residue, gm	0.0173	0.0144
Back half condensible	0.0000	0.0000
Back half water insoluble	0.0005	0.0001
Back half dissolved	0.0325	0.0495
Total residue weight, gm (mn)	0.0178	0.0145
EMISSION CALCULATIONS		
Particulate conc., actual, gr/dscf (cs)		
Front half only (filterable)	0.004	0.003
Total residue (incl. back half)	0.004	0.003
Particulate emission rate, actual, lbs/hr (E)	1.29	1.06

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SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	764	753
Stack static pressure, in. H2O (Pg)	-0.32	-0.32
Stack velocity pressure (sqrt dlt P)	0.786	0.731
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	543	542
Metered sample volume, cu. ft. (Vm)	73.04	67.26
Water volume collected, ml/gm (Vlc)	152.3	157.9
Test duration, min. (theta)	95	96
Orifice press. drop, in. H2O (dlt H)	1.54	1.36
Flue gas composition		
% CO2	8.6	8.5
% O2	15.4	15.4
% CO	0.5	0.5

Total Hydrocarbons

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.58	29.58
Sample vol. standard, scf (Vmstd)	71.208	65.662
Water vapor vol., scf (Vwstd)	7.17	7.44
Stack gas moisture, pct. (Bws)	9.2%	10.2%
Stack gas velocity, ft/sec (Vs)	53.37	49.38
Stack gas flow Rate, dscfh (Q)	2540709	2172702
dscfm	39012	36212
acfm	62857	58160
FLUE GAS ANALYSIS		
Percent CO2	8.6	8.6
Percent O2	15.4	15.4
Percent CO	0.5	0.5
Percent N2	75.5	75.5
Bws	9.2%	10.2%
Md	29.99	29.99
Ms	28.89	28.77

STACK TEST RESULTS - TOTAL HYDROCARBONS

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Total Hydrocarbon Concentration, ppm, as Methane		
condensible fraction	0.0	0.0
dry gas fraction	28.0	30.0
total VOC's	28.0	30.0
EMISSION CALCULATIONS		
Total Hydrocarbon Emission Rate, lb/hr, as Methane	2.750	2.695

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DIV. OF TECH SERVICES

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	764	753
Stack static pressure, in. H2O (Pg)	-0.32	-0.32
Stack velocity pressure (sqrt dlt P)	0.786	0.751
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	558	542
Metered sample volume, cu. ft. (Vm)	45.29	40.71
Water volume collected, ml/gm (Vlc)	101.2	100.6
Test duration, min. (theta)	60	60

Flue gas composition

% CO2	8.6	8.6
% O2	15.4	15.4
% CO	0.5	0.5

SO_2 / SO_3

RMC Environmental Services, Inc.

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.58	29.58
Sample vol. standard, scf (Vmstd)	62.434	39.611
Water vapor vol., scf (Vwstd)	6.77	4.74
Stack gas moisture, pct. (Bws)	10.1%	10.7%
Stack gas velocity, ft/sec (Vs)	53.67	49.43
Stack gas flow Rate, dscfh (Q)	2320883	2152655
dscfm	38681	36064
acfm	62981	58222

FLUE GAS ANALYSIS

Percent CO2	8.6	8.6
Percent O2	15.4	15.4
Percent CO	0.5	0.5
Percent N2	75.5	75.5
Bws	10.1%	10.7%
Md	29.99	29.99
Ms	28.78	28.71

STACK TEST RESULTS - SO2 + SO3

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Sulfate in first impinger, as H2SO4, total mg.	0.00	0.00
Sulfate in filter, as H2SO4, total mg.	0.00	0.00
Sulfate in impingers 2 & 3, as SO2, total mg.	551.00	657.00
Sulfate in impinger 4, as SO2, total mg.	0.00	0.00
EMISSION CALCULATIONS		
H2SO4 conc., mg/dscm	0.00	0.00
H2SO4 conc., ppmvd	0.000	0.000
H2SO4 emission rate, lb/hr	0.000	0.000
SO2 conc., mg/dscm	458.49	567.84
SO2 conc., ppmvd	173.33	215.19
SO2 emission rate, lb/hr	66.379	75.605

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SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 26 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	763	774
Stack static pressure, in. H2O (Ps)	-0.35	-0.36
Stack velocity pressure (sqrt dlt P)	0.758	0.844
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	544	537
Metered sample volume, cu. ft. (Vm)	79.30	88.54
Water volume collected, ml/gm (Vlc)	94.3	89.3
Test duration, min. (theta)	95	96
Sampling nozzle diameter, in. (Dn)	0.272	0.272
Orifice press. drop, in. H2O (dlt H)	1.88	2.28
Flue gas composition		
% CO2	14.4	13.3
% O2	9.6	10.5
% CO	0.5	0.5

Heavy Metals

RMC Environmental Services, Inc.

SUMMARY OF STACK TEST RESULTS

SOURCE: Warrier Company Lime Kiln #2 TEST DATE: 26 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.57	29.57
Sample vol. standard, scf (Vmstd)	77.234	87.444
Water vapor vol., scf (Vwstd)	4.44	4.21
Stack gas moisture, pct. (Bws)	5.4%	4.6%
Stack gas velocity, ft/sec (Vs)	48.28	56.64
Stack gas flow Rate, dscfh (Q)	2206773	2574849
dscfm	36780	42914
acfm	56854	66707

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	14.6	13.3
Percent O2	9.6	10.5
Percent CO	0.5	0.5
Percent N2	75.5	75.7
Bws	5.4%	4.6%
Md	30.69	30.55
Ms	30.00	29.97

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	763	774
Ps	29.57	29.57
Bws	5.4%	4.6%
Vmstd	77.23	87.44
Vs	48.28	56.64
An	0.000404	0.000404
theta	96	96
I, pct.	106%	103%

STACK TEST RESULTS - HEAVY METALS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 26 March, 1992

LABORATORY DATA

Sample Contaminant Mass, mg

	Run #1	Run #2
arsenic	0.0000	0.0000
beryllium	0.0000	0.0000
cadmium	0.0040	0.0030
chromium(tot.)	0.0080	0.0020
lead	0.0910	0.0400
mercury	0.0028	0.0025
nickel	0.0150	0.0240

EMISSION CALCULATIONS

Contaminant Concentration, mg/dscm

	Run #1	Run #2
arsenic	0.00E+00	0.00E+00
beryllium	0.00E+00	0.00E+00
cadmium	1.83E-03	1.21E-03
chromium(tot)	3.66E-03	8.08E-04
lead	4.16E-02	1.62E-02
mercury	1.28E-03	1.01E-03
nickel	6.86E-03	9.69E-03

Contaminant Emission Rate, lbs/hr

	Run #1	Run #2
arsenic	0.00E+00	0.00E+00
beryllium	0.00E+00	0.00E+00
cadmium	2.52E-04	1.95E-04
chromium(tot)	5.03E-04	1.30E-04
lead	5.73E-03	2.59E-03
mercury	1.75E-04	1.62E-04
nickel	9.44E-04	1.56E-03

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SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 26 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	763	774
Stack static pressure, in. H2O (Pg)	-0.36	-0.36
Stack velocity pressure (sqrt dlt P)	0.775	0.807
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	533	536
Metered sample volume, cu. ft. (Vm)	76.73	83.79
Water volume collected, ml/gm (Vlc)	83.5	95
Test duration, min. (theta)	95	96
Sampling nozzle diameter, in. (Dn)	0.272	0.272
Orifice press. drop, in. H2O (dlt H)	2.33	2.55
Flue gas composition		
% CO2	16.4	13.3
% O2	9.6	10.5
% CO	0.5	0.5

HCl/Chlorine

RMC Environmental Services, Inc.

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.57	29.57
Sample vol. standard, scf (Vmstd)	76.358	80.982
Water vapor vol., scf (Vwstd)	3.93	4.47
Stack gas moisture, pct. (Bws)	4.9%	5.2%
Stack gas velocity, ft/sec (Vs)	48.28	54.23
Stack gas flow Rate, dscfh (Q)	2219369	2448599
dscfm	36989	40810
acfm	56854	63869

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	14.4	13.3
Percent O2	9.6	10.5
Percent CO	0.5	0.5
Percent N2	75.5	75.7
Bws	4.9%	5.2%
Md	30.69	30.55
Ms	30.07	29.89

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	763	774
Ps	29.57	29.57
Bws	4.9%	5.2%
Vmstd	76.35	80.98
Vs	48.28	54.23
An	0.000404	0.000404
theta	96	96
I, pct.	105%	101%

STACK TEST RESULTS - HCL AND CHLORINE

SOURCE: Warner Company Lime Kiln #2 — TEST DATE: 26 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Sample Contaminant Mass, mg		
HCl	111.0000	151.0000
Chlorine	3.0000	1.0300
EMISSION CALCULATIONS		
Contaminant Concentration, ppmv		
HCl	34.42	38.30
Chlorine	0.48	0.15
Contaminant Emission Rate, lbs/hr		
HCl	7.106	8.725
Chlorine	0.192	0.069

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 28 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	780	775
Stack static pressure, in. H2O (Pg)	-0.36	-0.36
Stack velocity pressure (sqrt dlt P)	0.825	0.818
Barometric pressure, in. Hg (Pbar)	29.72	29.72
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	557	564
Metered sample volume, cu. ft. (Vm)	182.92	184.07
Water volume collected, ml/gm (Vlc)	220	215
Test duration, min. (theta)	240	240
Sampling nozzle diameter, in. (Dn)	0.250	0.250
Orifice press. drop, in. H2O (dlt H)	1.53	1.53
Flue gas composition		
% CO2	15.0	15.0
% O2	9.5	9.8
% CO	0.5	0.5

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DIV. OF TECH SERVICES

RMC Environmental Services, Inc.

Darwin [illegible]

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.69	29.69
Sample vol. standard, dscf (Vmstd)	174.548	173.466
Water vapor vol., scf (Vwstd)	10.36	10.13
Stack gas moisture, pct. (Bws)	5.6%	5.5%
Stack gas velocity, ft/sec (Vs)	55.38	56.71
Stack gas flow Rate, dscfh (Q)	2481605	2470001
dscfm	41360	41167
acfm	65221	66440

FLUE GAS ANALYSIS

Percent CO2	15.0	15.0
Percent O2	9.6	9.8
Percent CO	0.5	0.5
Percent N2	74.9	74.7
Bws	5.6%	5.5%
Md	30.78	30.79
Ms	30.07	30.09

STACK TEST ISOKINETIC RATE CALCULATION

Ts	780	775
Ps	29.69	29.69
Bws	5.6%	5.5%
Vmstd	174.55	173.47
Vs	55.38	56.71
An	0.000341	0.000341
theta	240	240
I, pct.	105%	101%

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 28 March, 1992

LABORATORY DATA	Run #1	Run #2
Contaminant Mass, ng		
2378-TCDD	0.00	0.00
12378-PeCDD	0.02	0.00
123478-HxCDD	0.01	0.00
123678-HxCDD	0.03	0.40
123789-HxCDD	0.04	0.00
1234678-HpCDD	0.23	0.16
OCDD	0.90	0.27
2378-TCDF	0.14	0.14
12378-PeCDF	0.04	0.04
23478-PeCDF	0.04	0.04
123478-HxCDF	0.15	0.14
123678-HxCDF	0.04	0.05
234678-HxCDF	0.05	0.05
123789-HxCDF	0.00	0.00
1234678-HpCDF	0.19	0.14
1234789-HpCDF	0.04	0.00
OCDF	0.12	0.14
TOTAL TCDD	0.38	0.32
TOTAL PeCDD	0.47	0.25
TOTAL HxCDD	0.49	0.39
TOTAL HpCDD	0.54	0.43
TOTAL TCDF	0.52	0.41
TOTAL PeCDF	0.29	0.25
TOTAL HxCDF	0.38	0.35
TOTAL HpCDF	0.33	0.18

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

EMISSION CALCULATIONS	Run #1	Run #2
Contaminant Concentration, ng/dscm		
2378-TCDD	0.00E+00	0.00E+00
12378-PeCDD	4.05E-03	0.00E+00
123478 HxCDD	2.02E-03	0.00E+00
123678-HxCDD	6.07E-03	8.14E-02
123789-HxCDD	8.09E-03	0.00E+00
1234678-HpCDD	6.65E-02	3.26E-02
OCDD	1.82E-01	5.50E-02
2378-TCDF	2.83E-02	2.85E-02
12378-PeCDF	8.09E-03	6.14E-03
23478-PeCDF	8.09E-03	6.14E-03
123478-HxCDF	3.03E-02	2.85E-02
123678-HxCDF	8.09E-03	1.02E-02
234678-HxCDF	1.01E-02	1.02E-02
123789-HxCDF	0.00E+00	0.00E+00
1234678-HpCDF	3.84E-02	2.85E-02
1234789-HpCDF	6.09E-03	0.00E+00
OCDF	2.43E-02	2.85E-02
TOTAL TCDD	7.69E-02	6.51E-02
TOTAL PeCDD	9.51E-02	5.09E-02
TOTAL HxCDD	9.91E-02	7.94E-02
TOTAL HpCDD	1.09E-01	8.75E-02
TOTAL TCDF	1.05E-01	8.35E-02
TOTAL PeCDF	5.87E-02	5.29E-02
TOTAL HxCDF	7.69E-02	7.12E-02
TOTAL HpCDF	6.68E-02	3.65E-02

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2 — TEST DATE: 28 March, 1992

Contaminant Emission Rate, lb/hr	TEF *	Run #1	Run #2
2378-TCDD	1.000	0.00E+00	0.00E+00
12378-PeCDD	0.500	6.26E-10	0.00E+00
123478-HxCDD	0.100	3.13E-10	0.00E+00
123678-HxCDD	0.100	9.39E-10	1.25E-08
123789-HxCDD	0.100	1.25E-09	0.00E+00
1234678-HpCDD	0.010	7.20E-09	5.02E-09
OCDD	0.001	2.82E-08	8.47E-09
2378-TCDF	0.100	4.38E-09	6.39E-09
12378-PeCDF	0.050	1.25E-09	1.25E-09
23478-PeCDF	0.500	1.25E-09	1.25E-09
123478-HxCDF	0.100	4.70E-09	6.39E-09
123678-HxCDF	0.100	1.25E-09	1.57E-09
234678-HxCDF	0.100	1.57E-09	1.57E-09
123789-HxCDF	0.100	0.00E+00	0.00E+00
1234678-HpCDF	0.010	5.95E-09	4.39E-09
1234789-HpCDF	0.010	1.25E-09	0.00E+00
OCDF	0.001	5.75E-09	4.39E-09
TOTAL TCDD		1.19E-08	1.00E-08
TOTAL PeCDD		1.47E-08	7.84E-09
TOTAL HxCDD		1.55E-08	1.22E-08
TOTAL HpCDD		1.69E-08	1.35E-08
TOTAL TCDF		1.65E-08	1.29E-08
TOTAL PeCDF		9.08E-09	8.15E-09
TOTAL HxCDF		1.19E-08	1.10E-08
TOTAL HpCDF		1.03E-08	5.65E-09
Total Toxic Equivalent as 2378-TCDD, lb/hr		2.62E-09	3.24E-09

* TEF is toxic equivalent factor, as per EPA 1989 dioxin/furan exposure risk assessment update.

TEF x emission rate = 2378-TCDD equivalent rate

FUEL SUBSTITUTION TEST BURN REPORT
WARNER LIME KILN

Warner Company, Inc.
Alternative Fuel Study
Trial Burn Test Report

Prepared for:

Warner Company, Inc.
Lime Division Cedar Hollow Plant

Prepared by:

RMC Environmental Services, Inc.

July 1992

FUEL SUBSTITUTION TEST BURN REPORT
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Warner Company, Inc.
Alternative Fuel Study
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Prepared for:

Warner Company, Inc.
Lime Division Cedar Hollow Plant
R D #5, Box 10A
Yellow Springs Road
Malvern, PA 19355

Prepared by:

RMC Environmental Services, Inc.
3450 Schuylkill Road
Spring City, PA 19475

July 1992

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

A test burn of a coal/pelletized alternative fuel mixture was conducted in the Warner Company, Inc's (Warner's) Lime Kiln Number 2, located in East Whiteland Township, Chester County, Pennsylvania. The alternative fuel pellets are composed of non-recyclable waste paper and sewage biosolids. Emissions from the kiln were sampled by RMC Environmental Services, Inc. (RMC) according to a project-specific, PA DER-approved protocol. Sampling parameters included particulates, sulfur oxides, chlorides, volatile organic compounds, seven heavy metals, and dioxins/furans. The test burn was conducted on 25 through 28 March 1992.

The test burn represents the second phase of a feasibility study for use of the alternative fuel pellets at the Warner facility. The initial study involved baseline testing of Lime Kiln No. 2 and chemical analysis of the alternative fuel in order to predict the impact on emissions that would be caused by burning a mixture, proportioned based on heat content, of 10% alternative fuel and 90% coal. The study, summarized in "Warner Lime Kiln Trial Burn Intermediate Report and Trial Burn Plan" dated 30 October 1991, predicted that air emissions would remain well within applicable regulatory standards.

The results of the test burn confirm the predictions in the "Intermediate Report." Emissions generated by the coal/pelletized fuel mixture are generally similar to the baseline emissions (during which coal was the only fuel burned) under similar kiln operating conditions. Particulate and sulfur oxides emissions are reduced, and are less than half of allowable emissions levels. Four of the seven heavy metals tested (arsenic, beryllium, chromium and nickel) are unchanged or reduced compared to baseline rates. The remaining three heavy metals (cadmium, lead and mercury) have higher emissions rates than baseline, but are within the same order of magnitude as baseline emissions. Off-site ambient concentrations of each metal resulting from its respective emission rate were determined by dispersion modeling to be well within strictest US EPA and PA DER standards.

Dioxin/furan emissions represent the only notable departure from baseline emissions levels. However, off-site ambient concentrations determined using dispersion modeling indicate the dioxin/furan emissions produced while burning the coal/alternative fuel mixture are well within strictest US EPA and PA DER standards, despite the large percentage increase over baseline emissions levels.

Chlorides and volatile organic compounds emissions were not measured during baseline testing, so no comparison can be made. Ambient concentration analysis shows hydrogen chloride emissions produced by the coal/alternative fuel mixture to be acceptable. No standards were found that apply to chloride or volatile organic compounds emissions.

1.0 INTRODUCTION

1.1 Background and Purpose

The Warner Company, Inc. (Warner) retained RMC Environmental Services, Inc. (RMC) to conduct a test burn of a coal/alternative fuel mixture in their Number 2 Lime Kiln on 25 through 28 March 1992. The Warner facility is located in East Whiteland Township, Chester County, Pennsylvania. Testing was conducted in accordance with a project-specific, PA DER-approved "Fuel Substitution Test Burn Protocol" dated February 1992. Emissions test parameters include particulates, sulfur oxides (SO_2/H_2SO_4), chlorides (HCl/Cl_2), volatile organic compounds (VOCs), seven heavy metals, and dioxins/furans.

The alternative fuel material consists of a pelletized mixture of non-recyclable paper and biosolids. The fuel mixture feed was proportioned so that ten percent of the heating requirement for the lime manufacturing process was provided by the alternative fuel pellets. During the fuel substitution burn, the lime kiln and baghouse were otherwise operated normally. Use of the alternative fuel will reduce Warner's overall lime manufacturing fuel costs, while conserving coal, a non-renewable natural resource. In addition, burning of the alternative fuel material provides a beneficial use of material that would otherwise require disposal, a less environmentally-conscious option.

1.2 Previous Studies

Impacts to air quality of burning the 90% coal/10% alternative fuel mixture were predicted in a pre-test burn report titled "Warner Lime Kiln Trial Burn Intermediate Report and Trial Burn Plan" dated 30 October 1991, which was authored by RMC. The "Intermediate Report" documents emissions testing conducted on the kiln under current coal-fired operating conditions and includes chemical analyses of the coal, raw limestone, lime product, and baghouse dust. The "Intermediate Report" then presents a chemical analysis of the alternative fuel and uses this data to project changes to baseline emissions that will be caused by use of the alternative fuel in the kiln. Parameters for analysis and testing for the intermediate study were selected based on anticipated concerns of the regulatory community, and included most of the parameters called for in the testing protocol that PA DER subsequently approved for the trial burn which are reported herein.

The study concluded that:

> "the alternative fuel material will have little effect on emissions from the kiln stack. Of the contaminants investigated, only mercury emissions are predicted to increase. However, the predicted future maximum ambient concentration is extremely low (0.00005 ug/m^3), as is the magnitude of the predicted increase."

Data generated for the intermediate study will be used in this report, where applicable.

1.3 Overview of Report

A description of the kiln is presented in Section 2. The test methodology section, copied from the PA DER-approved protocol, follows the kiln description. Results from the alternative fuel test burn emission testing appear in Section 4 and are summarized in Tables 2 through 6. A comparison of results from the baseline versus alternative fuel studies concludes this report. All field data and calculations are presented in Appendix A. Supporting laboratory data are contained in Appendix B.

2.0 SOURCE DESCRIPTION

2.1 Location

The Warner lime manufacturing facility is located on the south side of Yellow Springs Road between the unincorporated towns of Devault and Cedar Hollow, approximately 1,500 feet east of Pa Route 29. The bulk of the facility lies in East Whiteland Township, but a portion extends eastward into neighboring Tredyffrin Township. Figure 1 shows the site location on the Malvern USGS quadrangle map. The tested lime kiln (Kiln #2) is located approximately in the center of the circle on Figure 1.

2.2 Kiln Operation

The Warner facility is a standard lime kiln. Limestone (calcium and magnesium carbonates) mined and crushed at the site is used as the starting material, and coal as the energy source.

A schematic of the facility is presented in Figure 2. The rotating kiln is 350 feet long and 9 feet in diameter. The residence time for the limestone, introduced at the high (cold) end, is three to four hours.

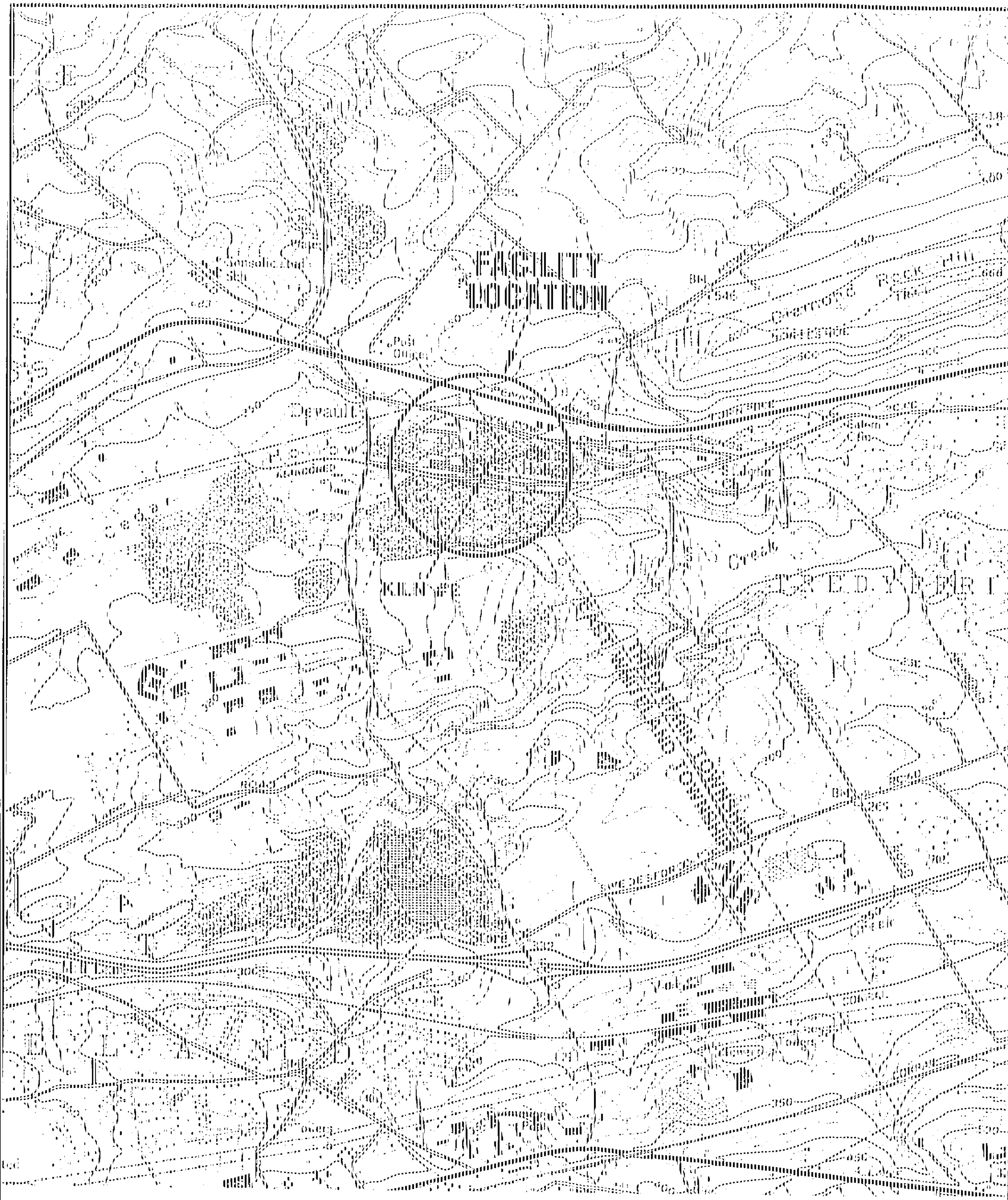
Pulverized coal is blown into the lower (hot) end. Gases and dust exhaust through the cold end and travel through cooling tubes (hairpin heat exchangers) before entering a baghouse. Maximum temperature for the baghouse is 500 °F. Exhaust from the baghouse is discharged to the stack.

The maximum lime production rate of lime is 375 tons/day, which produces 2 tons/hour of baghouse dust byproduct.

2.3 Control

Warner's kiln operators make use of fully-automated recording control devices. Kiln conditions are monitored at all times. In addition to other variables, the operators can control feed rates of stone, coal, makeup air, temperature, and kiln rotation rate, which in turn affects residence time of the stone in the kiln.

In general, all such controlled variables are completely automated. Normally, the feed rate of the crushed stone is fixed, and the feed rate of the coal is adjusted to provide the desired temperature profile in the kiln. Continuous recording of kiln variables is provided, and the appropriate alarms. Operators can override controller setpoints at all times. All variables will be monitored throughout testing, and the test report will discuss the overall operation of the kiln during the tests.



0 MILES 1/2
0 FEET 2000

N

RMC
ENVIRONMENTAL
SERVICES

SPRING CITY, PA
215-948-4700

FIGURE 1. SITE LOCATION MAP
WARNER LIME DIVISION
CEDAR HOLLOW PLANT
Source: USGS Malvern Quad, 1983

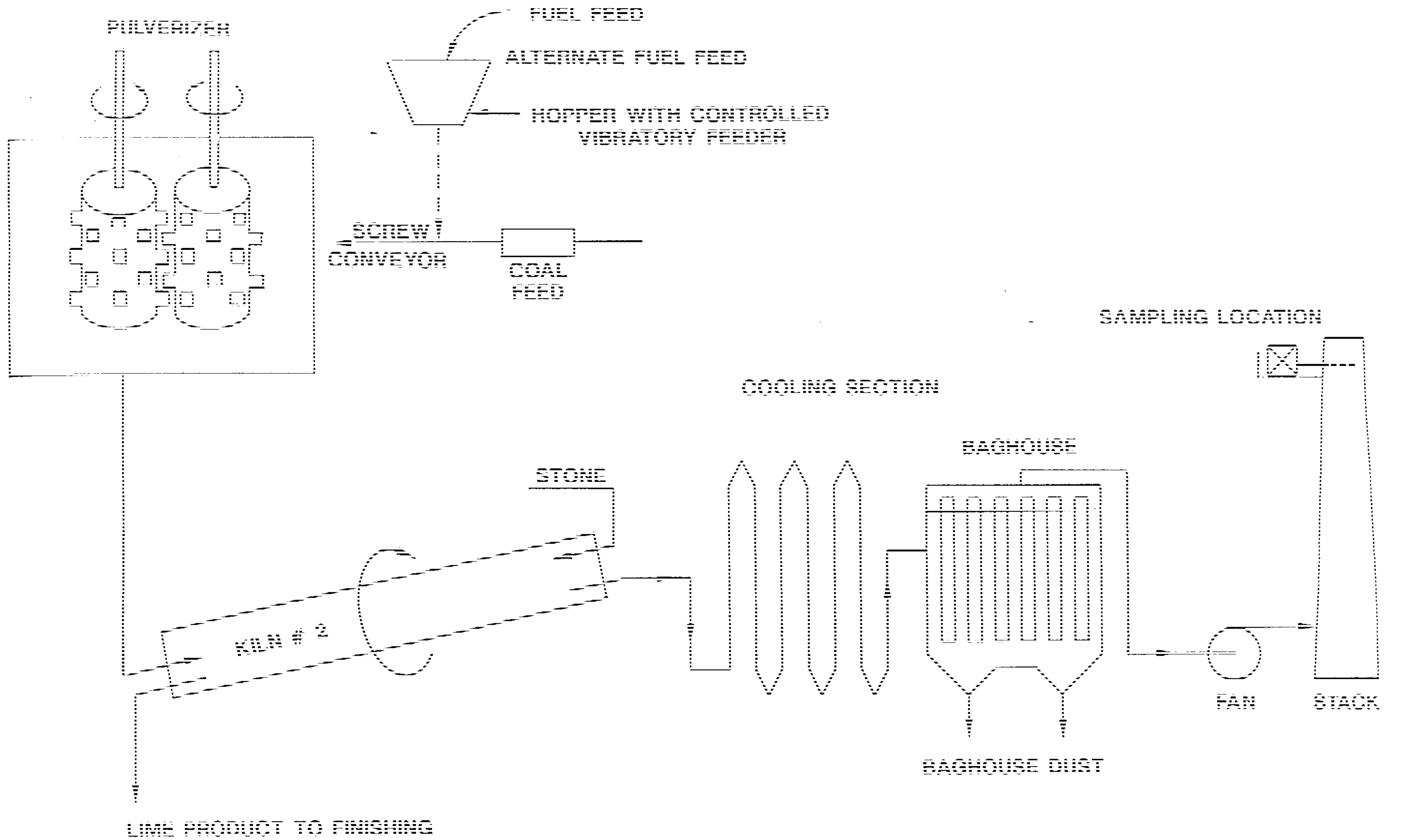


FIGURE 2. LIME KILN SCHEMATIC
WARNER LIME DIVISION
CEDAR HOLLOW PLANT

NOT DRAWN TO SCALE

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3.0 EMISSION TEST PARAMETERS AND METHODS

The testing program reported in this document was designed to provide comprehensive information on kiln operation as well as the emissions resulting from use of the alternative fuel. The program was developed in consultation with Rick St. Louis, Chief, Source Testing Unit, PA DER Bureau of Air Quality Control, and is documented in "Fuel Substitution Test Burn Protocol" dated February 1992. The protocol received PA DER's approval prior to initiation of the testing program.

Data collection efforts covered kiln operating parameters, raw materials and products, and stack emission rates of particulates, sulfuric acid/SO_2, HCl, total VOC's, seven heavy metals (arsenic, beryllium, cadmium, chromium (total), lead, mercury, and nickel), and dioxins/furans. This sampling program covers the same list of parameters sampled in the baseline testing with the exception that HCl and total VOC's have been added. The results of these tests will be compared to the baseline testing results documented in the Intermediate Report.

3.1 Kiln Operation

Tests were conducted under full or near-full production conditions. Following introduction of alternative fuel and prior to stack testing, the system was allowed to achieve steady state conditions. Steady state conditions were considered achieved when the following factors were under satisfactory control:

- burning zone temperature
- exit gas temperature
- excess air
- quality of product

Testing did not commence until at least 1 hour of steady conditions had been observed. Operating parameters including kiln temperature, kiln rotation rate, baghouse pressure, and feed and production rates were monitored and recorded throughout the burn to demonstrate that steady conditions were maintained within the kiln.

The 10% alternative fuel/90% coal portions (proportioned according to heat content) were introduced to the system at the pulverizing mill to make a homogeneous fuel. The fuel was transferred from a covered stockpile to the feeder in containers. A "Bobcat" was used to load the containers; forklifts transported the containers to the feed location. The container was then lifted to the kiln burn platform and dumped into a hopper. The hopper had a controlled vibratory feeder on the bottom that was used to properly proportion the fuel material as it was fed to the pulverizer. The fuel emptied from the hopper onto a screw conveyor and through a rotary airlock into the coal pulverizing machinery. The pulverizing process served to mix the fuels.

3.2 Raw Materials and Products

Prior to initiation of testing, a representative sample of the alternative fuel pellets (pellets average 1-inch long and 0.5-inch in diameter) was scooped from the stockpile and analyzed for heat content. The material loading, transport, and dumping operations are assumed to provide adequate mixing of the material such that a single scoop will be representative. The measured heat content was used to set the final weight proportions to achieve the 10% heat requirement substitution.

Samples of mixed fuel, limestone, lime product and baghouse dust were collected every six hours during the test burn, commencing after steady conditions had been established. The samples were analyzed for a similar set of parameters as in the stack testing, including total metal analyses for arsenic, barium, beryllium, cadmium, chromium, lead, mercury, and nickel. The fuel samples were also analyzed for heat content.

3.3 Stack Test Methods

The appropriate US EPA test methods were utilized, as modified by PA DER Source Test Manual requirements. In conjunction with each stack test run, exhaust gases were characterized for moisture content, specific gravity, and volumetric flow rate. A detailed description of each method is given below. A summary of the test methods and the stack sampling schedule is presented in Table 1. Sampling train schematics are presented in Figures 3 through 8. Samples of the fuel mix were collected every 6 hours during the test burn. Note that all stack testing was conducted in duplicate, as stated in the protocol.

The test location and number of sampling points were determined by 40 CFR 60, Appendix A, EPA Reference Method 1. According to the method, a flow profile study was conducted to investigate the presence of cyclonic flow at the test site. Results of the profile study indicated an acceptable test location. These data are presented in Appendix D.

Flue gas molecular weight (specific gravity) was determined by 40 CFR 60, Appendix A, EPA Reference Method 3. An integrated stack gas sample was collected over the entire run-time for each test. Samples were analyzed for percent CO_2, O_2, CO, and N_2 (by difference) utilizing an Orsat apparatus.

Particulates

Particulate testing was conducted in accordance with the principles of EPA Method 5, 40 CFR 60, Appendix A, and the PA DER Source Test Manual. Isokinetic samples were collected in duplicate during normal maximum kiln operation. Test time was 96 minutes per run, and sample volumes exceeded 70 dscf.

Analysis was conducted to determine the water soluble and insoluble components of the flue gas samples. The front half samples, consisting of the filters and associated water and acetone probe rinse residues of the nozzle, probe, and front half filter glassware, were analyzed for total particulates. The filters and associated residues were desiccated and weighed to a constant weight; the probe rinse residues were evaporated, desiccated and weighed to a constant weight. The back half samples, consisting of aqueous impinger solutions and impinger acetone rinse residues, were analyzed for water soluble, water insoluble and acetone soluble materials.

The entire impinger solution from each test was filtered through a tared 0.22 micron filter. Each filter was subsequently desiccated and weighed to constant weight with positive weight gain attributed to water insoluble material. An aliquot of each filtrate was evaporated, desiccated and weighed to a constant weight. Sample blanks for all components received identical analyses, with final results adjusted to reflect blank values. Note that only front half residue and back half water insoluble matter are used to determine particulate emissions.

TABLE 1

WMNA/Warner Alternative Fuel Study, Emission Test Schedule

TEST PARAMETER	METHOD REFERENCE	TEST SCHEDULE
sample and velocity traverse	40CFR60, App. A EPA Method 1	all days
stack gas velocity and volumetric flow rate	EPA Method 2	all days
flue gas analysis, molecular weight	EPA Method 3	all days
stack gas moisture content	EPA Method 4	all days
particulate emissions	EPA Method 5 PA DER Manual	March 25
sulfur oxides (SO_3, SO_2) emissions	EPA Method 8 PA DER Manual	March 25
heavy metals	EPA multi-metals sampling train	March 26
total VOC's	NJDEPE Method 3.9	March 25
dioxin/furans	EPA Method 23	March 28
HCl (hydrogen chloride)	SW846 Method 0050 isokinetic	March 26

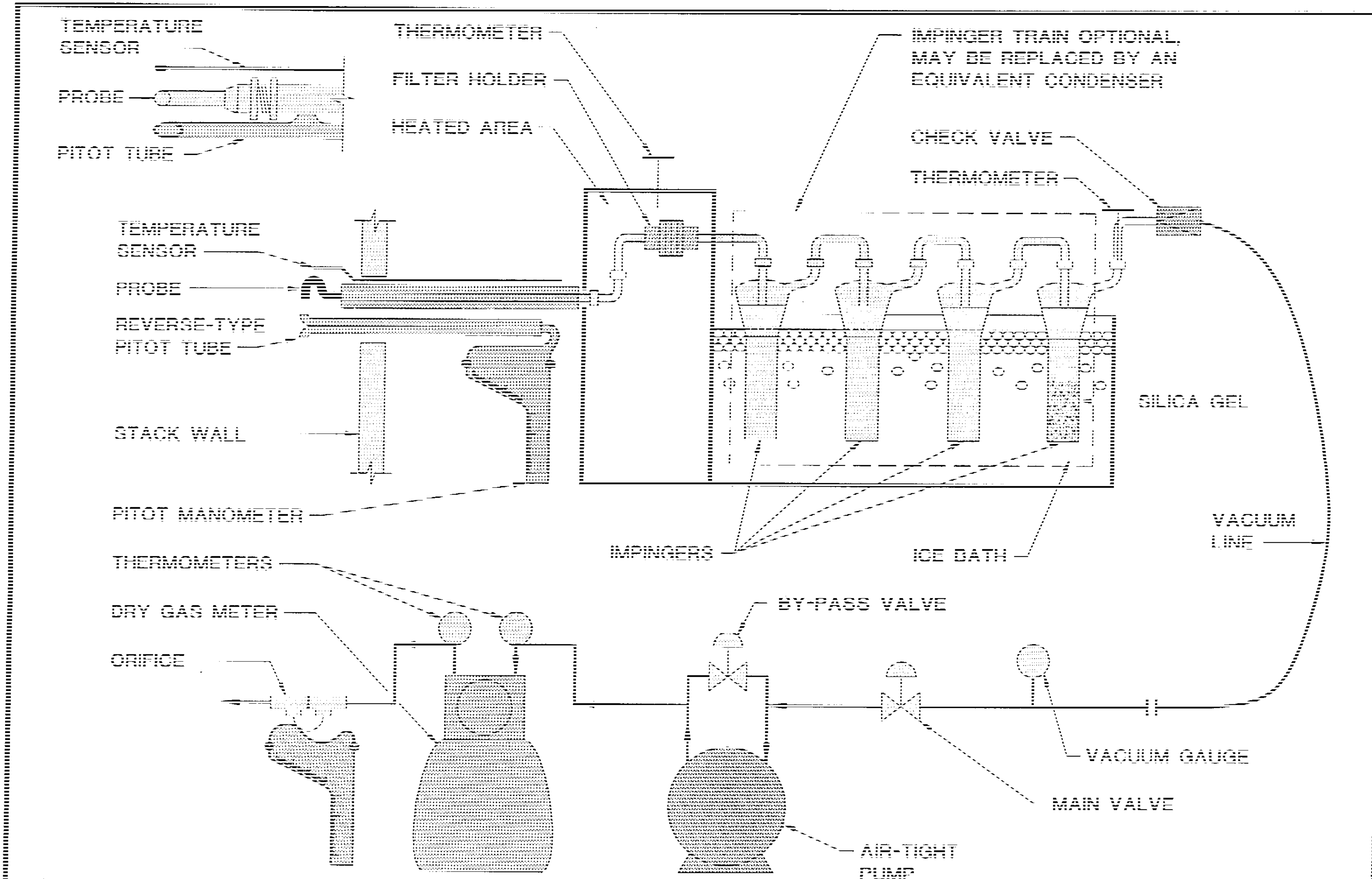

FIGURE 3. PARTICULATE-SAMPLING TRAIN
WARNER LIME KILN

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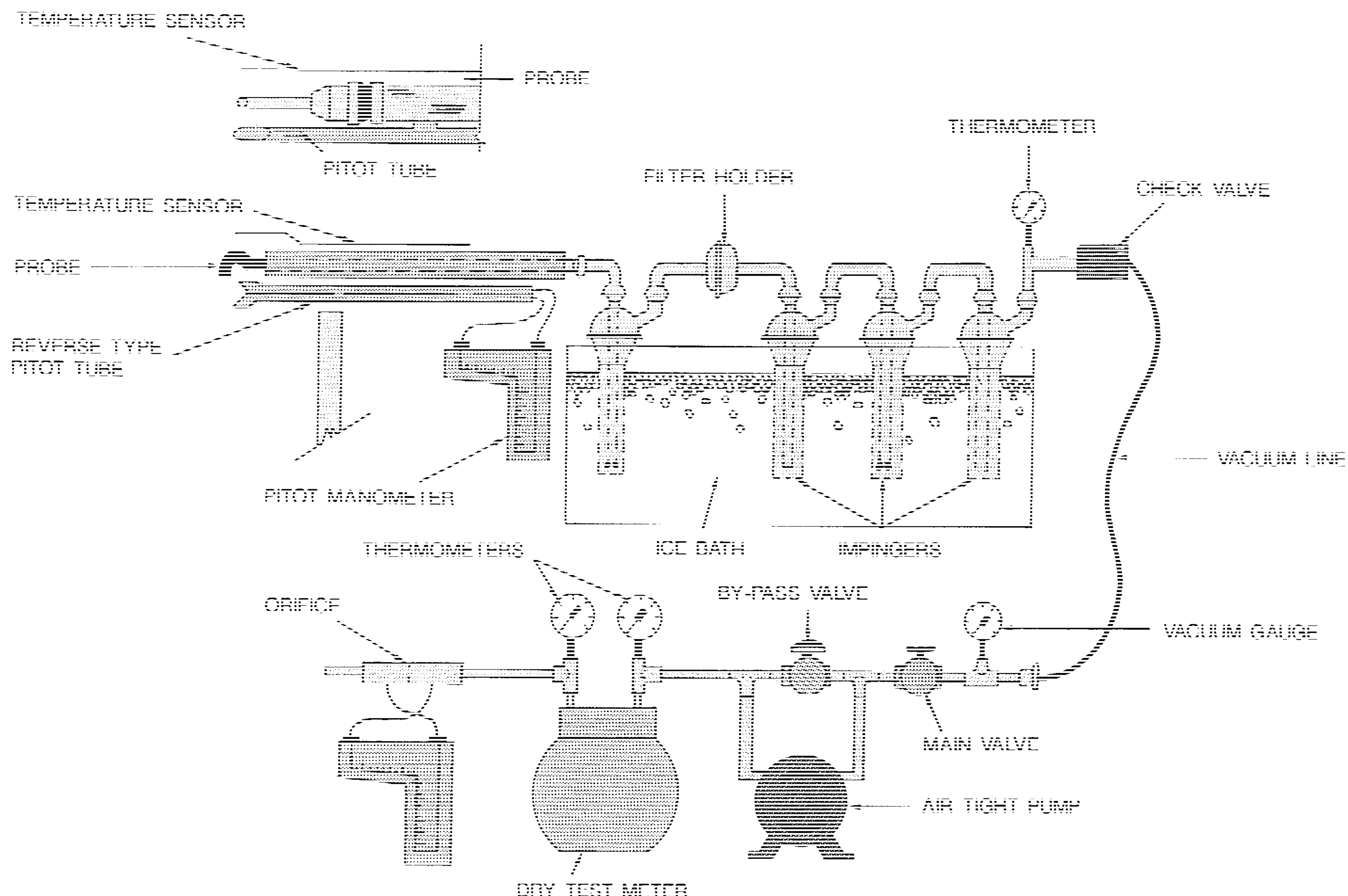

FIGURE 4. SULFUR OXIDES
WARNER LIME KILN

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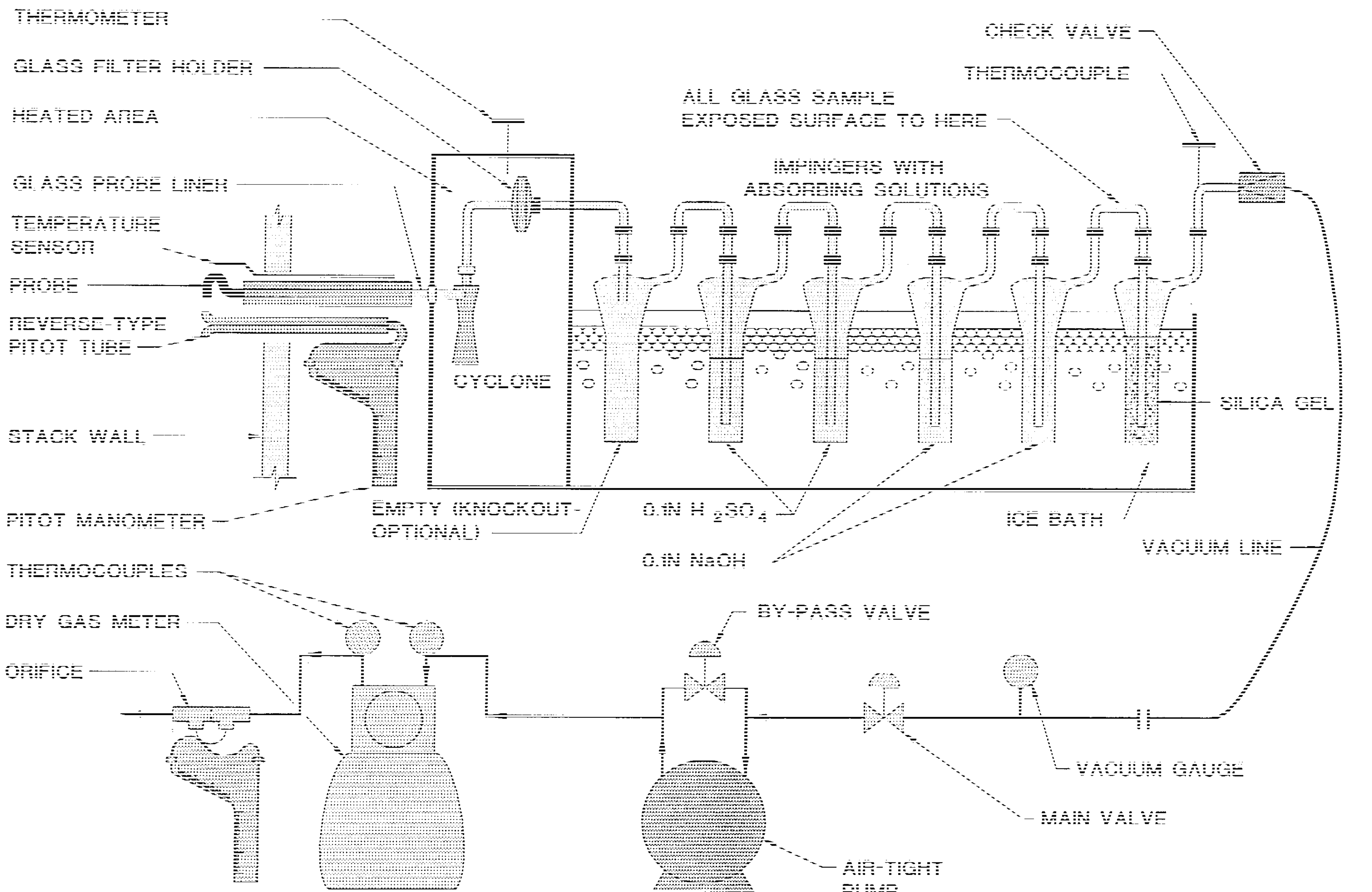

FIGURE 5. ISOKINETIC HCl/CL$_2$ SAMPLING TRAIN
WARNER LIME KILN

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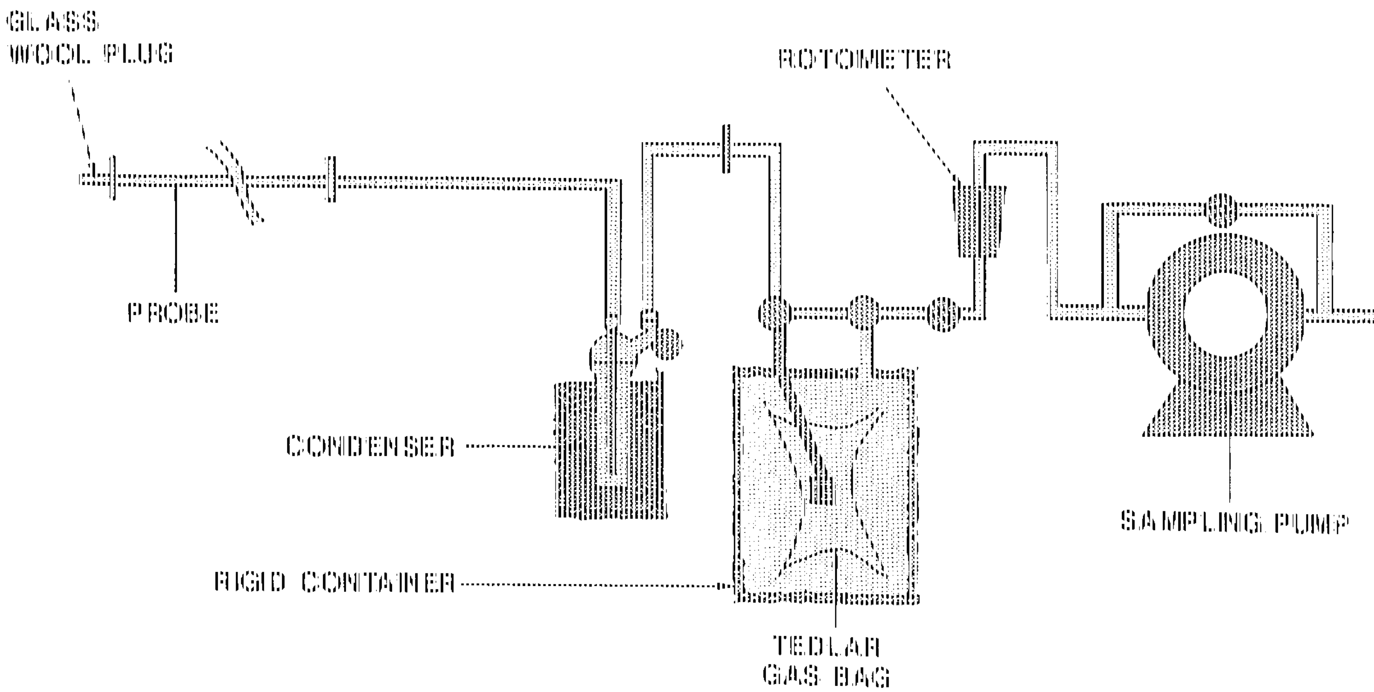

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FIGURE 6. VOS SAMPLING TRAIN
WARNER LIME KILN

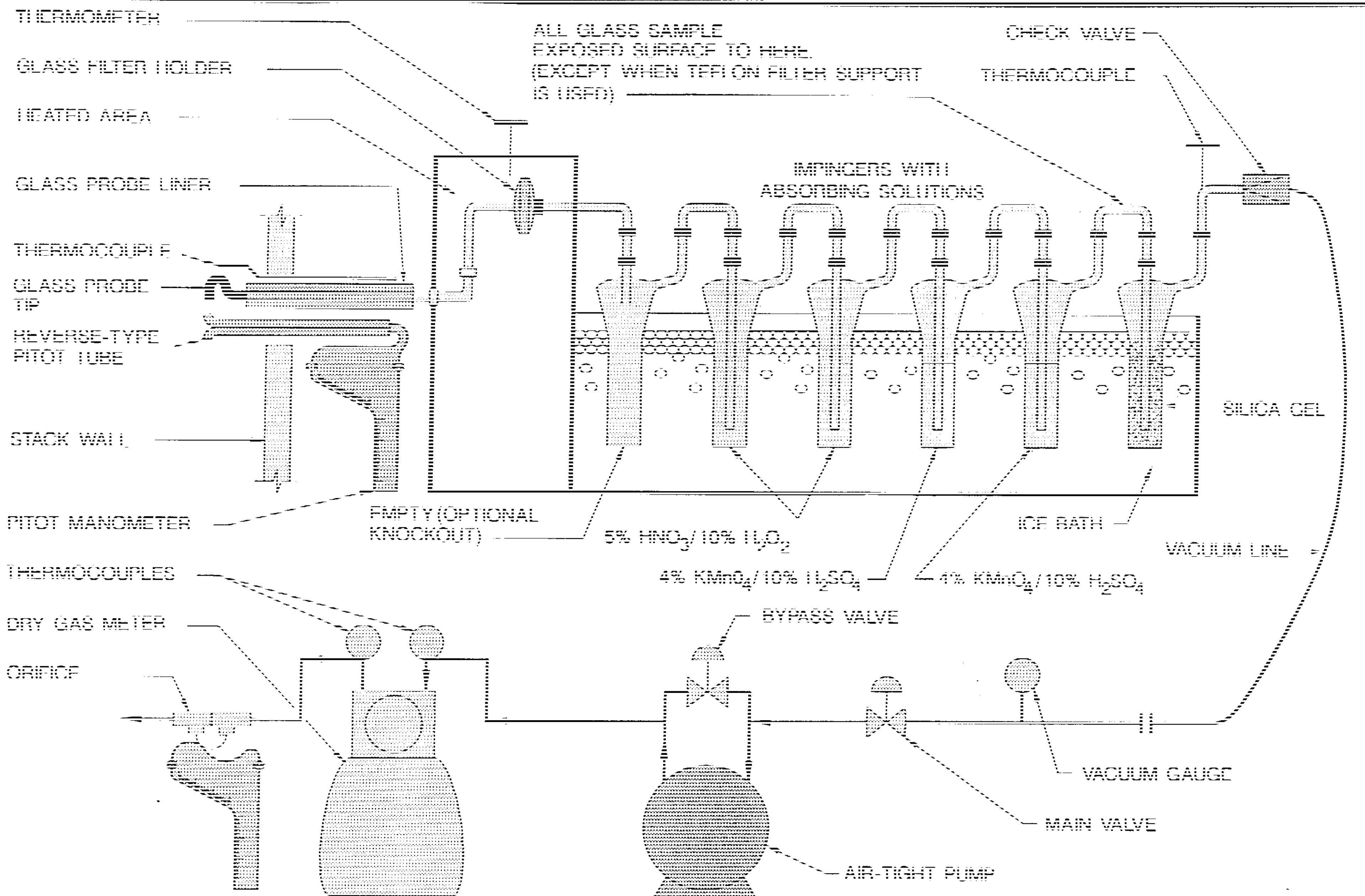

FIGURE 7. **MULTIPLE METALS SAMPLING TRAIN WARNER LIME KILN**

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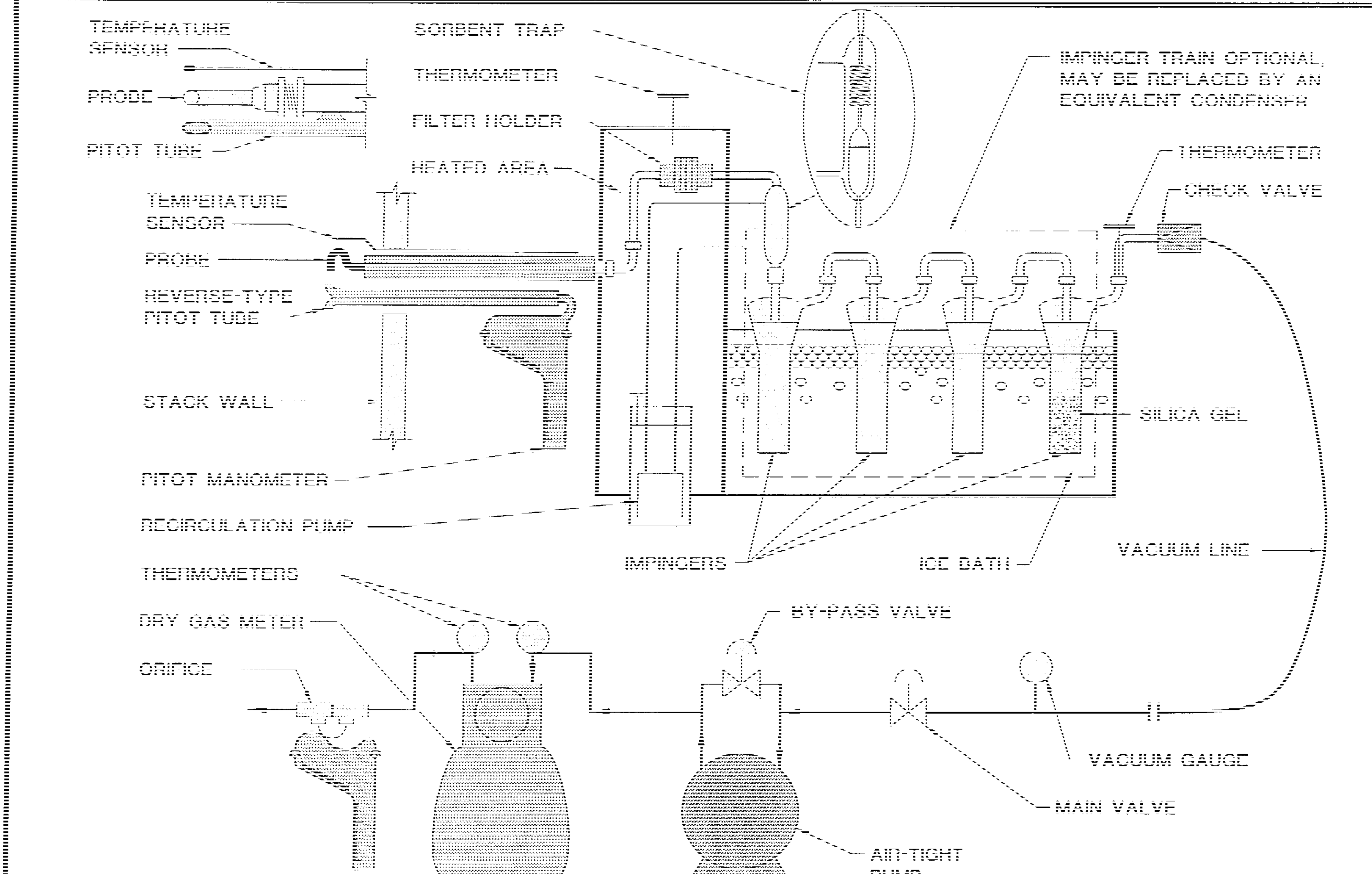

FIGURE 8. DIOXIN/FURAN SAMPLING TRAIN
WARNER LIME KILN

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SO_2/H_2SO_4

Sulfur dioxide emissions were determined utilizing the principles of 40 CFR 60, Appendix A, EPA Reference method 8, using the reagents and analytical techniques required by the PA DER Source Test Manual. An integrated sample was collected from the stack centroid, and corresponded to a simultaneous particulate run. Duplicate samples were collected with each run lasting 60 minutes. Sample volumes approximated 40 dscf for each run.

The PA DER SO_2 sampling train consists of one impinger containing 150 ml of 80 percent isopropanol, followed by a glass-fiber filter, then three impingers each containing approximately 100 ml of 5 percent sodium hydroxide solution. The final impinger contains 100 gm of an indicating desiccant. After the run, the train was purged with ambient air for 15 minutes.

Contents of the first impinger (isopropanol) were analyzed and reported, and were used for determining H_2SO_4 emissions. The remaining NaOH impingers were split with the last impinger being analyzed separately to determine sampling train collection efficiency. After reacting the sodium hydroxide samples with barium chloride, the resulting barium sulfate precipitate was determined gravimetrically. These data were used to calculate sulfur dioxide concentrations. Note that sampling train collection efficiencies were excellent, with no sulfate detected in the final impinger.

HCl/Cl_2

HCl testing was conducted according to SW846 Method 0050. Gaseous and particulate pollutants were withdrawn isokinetically from the source and collected on a filter, and in absorbing solutions. The quartz-fiber filter collects particulate matter including chloride salts. Acidic and alkaline absorbing solutions collect gaseous HCl and Cl_2, respectively. In the acidified water absorbing solution, the HCl gas is solubilized and forms chloride (CL^-) ions. The Cl_2 gas present in the emissions has a very low solubility in acidified water and passes through to the alkaline absorbing solution where it undergoes hydrolysis to form a proton (H^+), Cl^-, and hypochlorous acid (HClO). The Cl^- ions in the separate solutions are measured by ion chromatography. Each test run lasted 96 minutes and sample volumes exceeded 75 dscf.

Total VOC's

Total VOC emission testing was conducted in accordance with the NJDEPE Air Test Method 3.9. The method is based upon the principle of condensing the moisture and VOS in the source gas and subsequently collecting the dry gas sample in a Tedlar bag. The resulting condensate is analyzed by a purge and trap gas chromatography technique, with the gas bag sample analyzed by a direct injection GC technique. In both instances, the instruments are calibrated with a series of simple hydrocarbon standards such as methane. The total area of each resulting chromatograph is compared to the methane response factors.

A representative source gas sample was drawn at a constant rate (1 LPM) through a heated sample line to a series of two midget impinger condensers in an ice bath. The dry gas sample was then collected in a Tedlar bag within a rigid sampling apparatus. A static leak check of all sampling components upstream of the rigid container was conducted after each run. A precision rotameter was utilized to control the sampling rate, and was located between the impingers and the rigid container. East test run lasted 60 minutes.

Condensate samples were stored on ice for shipment to the laboratory. Analysis of condensates and gas bag samples was conducted within 24 hours of collection.

Heavy Metals

Heavy metals testing was conducted following the Methodology for the Determination of Metals Emissions in Exhaust Gases from Hazardous Waste Incineration (DRAFT). The stack sample was withdrawn isokinetically from the source, with particulate emissions collected in the probe and on a heated filter. Gaseous emissions were subsequently collected in a series of four chilled impingers; two contain a solution of dilute nitric acid in hydrogen peroxide and two contain acidic potassium permanganate solution.

Sampling train components were recovered and digested in separate front and back half fractions. Materials collected in the sampling train were digested with acid solutions to dissolve inorganics and to remove organic constituents that may create analytical interferences. Acid digestion was performed using conventional microwave digestion techniques. The nitric acid and hydrogen peroxide impinger solution, the acidic potassium permanganate impinger solution, and the probe rinse and digested filter solutions were analyzed for mercury by cold vapor atomic absorption spectroscopy (CVAAS). Except for the permanganate solution, the remainder of the sampling train catches were analyzed by inductively coupled argon plasma emission spectroscopy (ICAP) or atomic absorption spectroscopy (AAS), utilizing a graphite furnace.

Graphite furnace atomic absorption spectroscopy (GRAAS) is used if certain elements require greater analytical sensitivity than can be obtained by ICAP. To improve in-stack detection limits, each test run was 2 hours in duration. Sample volumes exceeded 75 dscf for each run.

Dioxin/Furan

Dioxin/Furan testing was conducted according to EPA Method 23, and the principles of SW846 Method 0100. Testing was conducted in duplicate, with each run lasting four (4) hours. Sample volumes exceeded 170 dscf for each run.

Stack emission samples were collected for PCDD and PCDF measurements using an EPA Method 5 train modified by the addition of a condenser to cool the gases and an adsorbent cartridge to trap organics. This sampling train is generally referred to as a Modified Method 5 (MM5). Particulates were collected in the filter and vaporous emissions were retained by the cartridge. The distribution of PCDDs and PCDFs between the particulate catch and the cartridge are likely altered during sampling. However, the sum of PCDDs and PCDFs collected by the train represents the total concentrations in the stack emissions. Following sampling, the components of the train were recovered and transferred to the laboratory for analysis. The components were extracted, the extracts were cleaned to remove excessive levels of potential interferences, and the cleaned extracts were analyzed for PCDDs and PCDFs using combined gas chromatography/mass spectrometry (GC/MS).

3.4 Quality Assurance

All field testing equipment, i.e., gas meters, thermocouples, pitot tubes, and direct reading instruments were serviced and calibrated prior to testing. Equipment calibration data are presented in Appendix E.

4.0 TEST RESULTS

4.1 Kiln Operation

Pellet feed rates were based on heat content analysis conducted a few days prior to testing; coal heat content data from the baseline testing was considered adequate for use in proportioning. Ultimate analyses of the fuels used during the test burn are presented in Table 2.

Kiln operation during the testing periods was normal. Operational data for the test dates is summarized in Table 3. Production averaged 12.9 tons per hour for the test dates, roughly 83% of the plant capacity. Average heat use was 2,610 million BTU per day.

CO testing conducted on 23 March showed flue gas concentrations of 5,865 and 6,800 ppm for tests #1 and #2, respectively. A review of the flue gas analyses (EPA Method 3, Orsat Analysis) for all test periods leads to the conclusion that carbon monoxide was present on all days of testing at approximately the same concentrations. Quantifiable amounts were found approximating 0.5% (5000 ppm).

4.2 Raw Materials and Products

Prior to testing, a Pennsylvania Module 1 (MOD 1) analysis was completed for the alternative fuel and for a 10:90 mixture (by heat content) of alternative fuel and coal. The results show the alternative fuel to be non-hazardous. TCLP metals are mostly non-detectable; boron and mercury had low, but detectable concentrations. Pesticides and herbicides are undetectable. Only low concentrations of 3- & 4-methylphenol and 2-butanone were detected of the semivolatile and volatile organics. In the mixed sample, all total metals concentrations except silver and zinc are higher than for the alternative fuel alone. The MOD 1 laboratory analysis sheets can be found in Appendix B.

The only parameters of concern that may be introduced in significant quantities by the non-fuel raw material (limestone) are heavy metals. Table 4 presents data showing the concentrations of metals in the limestone feed, as well as the fuel, product, and baghouse dust. The results indicate that, for all metals, the alternative fuel has lower concentrations than coal. and the concentrations in the mixed fuel are comparable to 100% coal. Note that the average values reported for the fuel mix are based on fewer samples than the coal (see Table B2 in Appendix B).

4.3 Stack Testing

Results of the test burn emission testing are presented in Table 5. Field data and calculations can be found in Appendix A; supporting laboratory data are presented in Appendix B. As the table shows, resulting particulate concentrations were consistent between runs and very low at 0.003 and 0.004 grains/dscf. Corresponding emission rates were 1.1 and 1.3 lb/hour respectively, well within allowable emission rates calculated in Table 3. Results of the sulfur oxides testing indicate that no sulfuric acid or sulfite (SO_3) component was detectable. Thus, sulfur dioxide (SO_2) is the sole contributor to the sulfur oxides (SO_x) emissions. As shown, SO_2 concentrations were measured at 172 and 214 ppmv (parts per million, by volume) for runs 1 and 2, corresponding to emission rates of 67 and 78 lb/hr respectively. The permitted maximum emission concentration is 500 ppmv (25 PA Code 123.21(b)).

Total VOC levels were very similar between runs, at 28 and 30 ppm, as methane. Hydrocarbon emission rate was approximately 2.74 lb/hr for both test runs. As the heavy metals results indicate, arsenic and beryllium emissions were below detectable limits. In rank of prevalence, the remaining metals were emitted in the following amounts, as the high result of the duplicate runs: lead, 5.77 x10$_{3}$ lb/hr; nickel, 1.57 x10$_{3}$ lb/hr; total chromium, 5.08 x10$_{4}$ lb/hr; cadmium, 2.54 x10$_{4}$ lb/hr; and mercury, 1.78 x10$_{4}$ lb/hr. There are no emissions standards that currently apply to the kiln.

Chloride emissions results indicate that HCl prevails, and chlorine concentrations are very low. HCl concentrations were between 34 and 38 ppm, corresponding to 7.2 to 8.8 lb/hr. Chlorine concentration was non-detectable in run 2, but was detected in run 1 at levels approximating 0.5 ppm. This chlorine concentration relates to an emission rate of approximately 0.2 lb/hr. Again, no emissions standards have been set for lime kilns.

Emission rates for 25 dioxin and furan compounds are presented in Table 6. For comparative purposes, the compound toxic equivalency factors (TEF) were applied to compare total emissions as 2,3,7,8-TCDD. As such, dioxin/furan emissions, total toxic equivalent as 2,3,7,8-TCDD, were found to be 1.21 x10$_{9}$ and 1.15 x10$_{9}$ lb/hr for test runs 1 and 2, respectively. No emissions standards exist for lime kilns.

All field and analytical quality assurance check points fell within reference method limits. Contaminant levels in field and method blank samples were well below, or non-detectable compared to actual sample values. Sampling component leak tests were acceptable for all test runs, at <0.02 cfm (or 4% of average sampling rate, whichever is most stringent). Isokinetic sampling rates were well within the 100 ± 10% method limit. There were no production perturbations during testing periods, and we experienced no equipment component breakdowns or malfunctions were experienced.

Table 2: ULTIMATE ANALYSIS OF ALTERNATIVE FUEL AND COAL

Parameter		Alternative Fuel*		Coal Samples**		Combined Analyses** (10% AF : 90% Coal)	
		Wet Basis	Dry Basis	Wet Basis	Dry Basis	Wet Basis	Dry Basis
Moisture	(%)	7.5	N/A	0.7	N/A	2.3	N/A
Carbon	(%)	40.2	43.4	76.3	76.9	71.6	73.2
Hydrogen	(%)	5.5	5.9	3.9	4.0	4.6	4.7
Nitrogen	(%)	0.5	0.5	1.3	1.4	1.3	1.3
Sulfur	(%)	0.1	0.1	1.6	1.6	1.4	1.5
Ash	(%)	9.9	10.7	12.7	12.8	10.2	10.4
Oxygen***	(%)	36.4	39.4	3.4	3.5	8.6	8.9
Total		100.0	100.0	100.0	100.0	100.0	100.0
Heat Content	(BTU/lb)	8,519	N/A	13,504	13,602	13,060	13,366

* - Ultimate analysis data from "Intermediate Report," with exception of heat content data which is from analysis of samples collected on 24 March.

** - Ultimate analysis averages from data presented in Appendix B.

*** - Oxygen content is remainder not accounted for in other measured parameters.

N/A - Not Applicable or Not Analysed

Table 3: TRIAL BURN TEST RUN FEED / PRODUCTION RATES

		Test Dates			
		25-Mar-92	26-Mar-92	28-Mar-92	Average
Coal Feed	(ton/hr)	3.6	3.67	3.66	3.6
Pellet Feed	(ton/hr)	0.6	0.6	0.6	0.6
Limestone Feed	(ton/hr)	27.8	28.3	28.3	28.1
Lime Production	(ton/hr)	12.8	13.0	13.0	12.9
Percent of Plant Capacity*	(%)	82%	83%	83%	83%
Avg Heat Use**	(MBTU/day)	2,579	2,624	2,618	2,607
Pellet BTU Contrib.	(%)	9.5%	9.3%	9.4%	9.4%
Allowable Particulate Emissions***	(lb/hr)	20.5	20.7	20.7	20.6

* - Based on 375 tons/day (15.6 tons/hr) nominal production capacity.

** - See Table 2 for heat content of fuel samples.

*** - Allowable emissions based on lime production rate per 25 Pa Code 123.21(b).

Table 4: POTENTIAL METAL CONTAMINANTS OF CONCERN IN RAW MATERIALS AND PRODUCTS

Parameter	Alt. Fuel* (mg/kg)	Coal** (mg/kg)	10%:90% Fuel Mix** (mg/kg)	Limestone Feed** (mg/kg)	Lime Product** (mg/kg)	Kiln Dust** (mg/kg)
As	<0.2	4.2	2.0	1.0	0.8	2.3
Be	0.07	1.71	1.38	0.19	0.18	0.16
Cd	<1.0	6.1	8.1	0.7	0.8	2.4
Cr	2.2	46.6	33.7	1.8	2.6	28.8
Pb	7.2	43.0	47.3	32.0	29.9	74.3
Hg	<0.07	0.29	0.29	<0.05	<0.05	0.28
Ni	<1.0	<5.0	<5.0	<5.0	<5.0	<5.0

* - Data from MOD1 analysis presented in Appendix B.

** Values are averages for samples taken during test runs; data are presented in Appendix B.

PROPERTIES OF METALS

Parameter	Molec. Wt (g/mole)	Melting Point (Deg. C)	Melting Point (Deg. F)	Boiling Point (Deg. C)	Boiling Point (Deg. F)
As	74.92	817	1,503	N/A	N/A
Be	9.01	1,278	2,332	2,970	5,378
Cd	112.40	321	610	765	1,409
Cr	52.00	1,890	3,434	2,482	4,500
Pb	207.19	328	622	1,744	3,171
Hg	200.59	-39	-38	357	674
Ni	58.71	1453	2,647	2730	4,946

N/A - Not Applicable

Table 5: TRIAL BURN EMISSION TEST RESULTS SUMMARY

Parameter	Units	Run Number 1	Run Number 2	Average*
Particulate	grains/dscf	0.003	0.004	0.004
	lbs/hr	1.3	1.07	1.19
Sulfur Oxides	ppmv	172	214	193
	lbs/hr	67	78	73
Heavy Metals				
As	lbs/hr	<0.65 E-04	<0.65 E-04	<0.65 E-04
Be	lbs/hr	<0.65 E-04	<0.65 E-04	<0.65 E-04
Cd	lbs/hr	2.54 E-04	1.96 E-04	2.25 E-04
Cr	lbs/hr	5.08 E-04	1.30 E-04	3.19 E-04
Pb	lbs/hr	5.77 E-03	2.61 E-03	4.19 E-03
Hg	lbs/hr	1.78 E-04	1.63 E-04	1.71 E-04
Ni	lbs/hr	9.52 E-04	1.57 E-03	1.26 E-03
Dioxin/Furan**	lbs/hr	1.21 E-09	1.15 E-09	1.18 E-09
HCl	ppmv	34	38	36
	lb/hr	7.2	8.8	8.0
Cl2	ppmv	0.48	<0.15	0.28
	lb/hr	0.19	<0.07	0.11
VOC's as Methane	ppmv	28	30	29
	lb/hr	2.74	2.73	2.74

* - Where data below detection limit and measurable quantities are mixed, one-half the detection limit is used for averaging.

** - See Table 6 for individual compounds.

Table 6: DIOXIN/FURAN TOXIC EQUIVALENCY EMISSIONS SUMMARY

Dioxin/Furan Species	Toxic Equivalency Factor (TEF)	Actual Emission Rate, lbs/hr Run #1	Actual Emission Rate, lbs/hr Run #2
2,3,7,8-TCDD	1.0 E+00	0.00 E+00	0.00 E+00
1,2,3,7,8-PeCDD	0.0 E+00	6.51 E-10	0.00 E+00
1,2,3,4,7,8-HxCDD	0.0 E+00	3.26 E-10	0.00 E+00
1,2,3,6,7,8-HxCDD	0.0 E+00	9.77 E-10	1.26 E-08
1,2,3,7,8,9-HxCDD	0.0 E+00	1.30 E-09	0.00 E+00
1,2,3,4,6,7,8-HpCDD	0.0 E+00	7.49 E-09	5.05 E-09
OCDD	1.0 E-03	2.93 E-08	8.52 E-09
2,3,7,8-TCDF	1.0 E-01	4.56 E-09	4.42 E-09
1,2,3,7,8-PeCDF	5.0 E-02	1.30 E-09	1.26 E-09
2,3,4,7,8-PeCDF	5.0 E-01	1.30 E-09	1.26 E-09
1,2,3,4,7,8-HxCDF	0.0 E+00	4.88 E-09	4.42 E-09
1,2,3,6,7,8-HxCDF	0.0 E+00	1.30 E-09	1.58 E-09
2,3,4,6,7,8-HxCDF	0.0 E+00	1.63 E-09	1.58 E-09
1,2,3,7,8,9-HxCDF	0.0 E+00	0.00 E+00	0.00 E+00
1,2,3,4,6,7,8-HpCDF	0.0 E+00	6.19 E-09	4.42 E-09
1,2,3,4,7,8,9-HpCDF	0.0 E+00	1.30 E-09	0.00 E+00
OCDF	1.0 E-03	3.91 E-09	4.42 E-09
Total TCDD	N/A	1.24 E-08	1.01 E-08
Total PeCDD	N/A	1.53 E-08	7.89 E-09
Total HxCDD	N/A	1.60 E-08	1.23 E-08
Total HpCDD	N/A	1.76 E-08	1.36 E-08
Total TCDF	N/A	1.69 E-08	1.29 E-08
Total PeCDF	N/A	9.44 E-09	8.21 E-09
Total HxCDF	N/A	1.24 E-08	1.10 E-08
Total HpCDF	N/A	1.07 E-08	5.68 E-09
Total Toxic Equivalent[a] (as 2,3,7,8-TCDD)		1.21 E-09	1.15 E-09

N/A - Not Applicable

[a] - Total Toxic Equivalent equals the sum of individual actual emissions rates multiplied by their respective TEF.

8.0 COMPARISON OF EMISSIONS RESULTS WITH BASELINE TESTING

Table 7 presents a summary of baseline test data along with test burn results. The average lime production rate for the test burn (12.9 tons per hour) is close to the average for the baseline testing (12.3 tons per day), substantiating a basis for comparison. A comparison reveals that emissions of particulates and sulfur oxides are lower when using the alternate fuel. Of the seven heavy metals, emissions of four (arsenic, beryllium, chromium and nickel) were roughly the same or slightly reduced during the test burn as the baseline burn. Cadmium, lead and mercury emissions increased, but are within the same order of magnitude as the baseline test results. Thus, results from the trial burn show that total quantities of emitted metals that were tested will not change significantly due to use of the alternative fuel in the amounts proposed. This conclusion was predicted fairly accurately by the metals emissions analysis presented in the "Trial Burn Intermediate Report" issued 30 October 1991.

A larger percentage change in emissions rate was noted for the dioxins/furans. However, the emissions rates remain extremely low (average 1.2×10^{-9}, or 0.0000000012 lb/hr), despite the increase over baseline emissions results.

In order to more completely assess the test burn results, State and Federal regulations establishing ambient air impact standards were evaluated regardless of whether the standards legally apply only to the facility. Examination of PA DER's "Permit Manual" for air testing reveals ambient air impact criteria covering heavy metals and dioxin/furan under Section 7.5, "Air Quality Permitting Criteria Including Best Available Technology for Municipal Waste Incineration Facilities." US EPA ambient air impact criteria are found in 40 CFR 266 *et al.*, "Burning of Hazardous Waste in Boilers and Industrial Furnaces" (known as BIF). The criteria for each are shown in Table 8. PA DER's criteria are stricter than US EPA's generally by an order of magnitude.

To facilitate evaluation against the PA DER and US EPA ambient air impact criteria, the Warner test results were processed using a dispersion model to obtain maximum ambient air impact predictions. The results of the modeling are presented in Table 8. These values were calculated running a representative emission concentration through a dispersion model, and proportioning the representative concentration to the actual emissions. The modeling analysis, which is presented in Appendix G, followed US EPA and PA DER guidelines.

The maximum expected off-site concentrations were determined to occur at the property line along Yellow Springs Road, to the north of the stack. Predicted concentrations at the property boundary during use of the coal/alternative fuel mixture are shown in the table. The model demonstrates that emissions from the Warner facility while burning the alternative fuel will comply with the acceptable levels of contaminants set by both PA DER and US EPA. In particular, predicted asbestos, beryllium, chromium, lead and mercury ambient concentrations are at least an order of magnitude lower than the criteria. Dioxin/furan ambient impacts are almost two orders of magnitude lower than the PA DER criterion. It should be noted that US EPA considers its dioxin/furan standard, which is less stringent than PA DER's, to be "very conservative" (56 FR 7162).

The results were also compared to the National Ambient Air Quality Standards (NAAQS), which have been adopted by reference by 25 Pa Code 131. NAAQS have been promulgated for only two of the seven metals: lead and beryllium. The modelled maximum 1-hour ambient concentration of lead emitted by the kiln (0.1524 ug/m^3) is roughly one-tenth the National primary AAQS of 1.5 ug/m^3 (adopted per 25 Pa Code 131.2). Model results for beryllium (0.000015 ug/m^3) are nearly 1000 times less than Pennsylvania's maximum 30-day average concentration of 0.01 ug/m^3 (25 Pa Code 131.3).

Table 7: COMPARISON OF EMISSION TEST RESULTS WITH BASELINE TESTING

Parameter	Units	Baseline		Test Burn	
		Highest	Average*	Highest	Average*
Particulate**	lbs/hr	2.17	1.47	1.3	1.19
Sulfur Oxides**	ppmv	392	261	214	193
	lbs/hr	210	137	78	73
Heavy Metals***					
As	lbs/hr	5.96 E-04	4.49 E-04	<0.65 E-04	<0.65 E-04
Be	lbs/hr	1.90 E-05	1.50 E-05	<0.65 E-04	<0.65 E-04
Cd	lbs/hr	1.30 E-04	7.50 E-05	2.54 E-04	2.25 E-04
Cr	lbs/hr	6.48 E-04	4.71 E-04	5.08 E-04	3.19 E-04
Pb	lbs/hr	1.23 E-03	6.43 E-04	5.77 E-03	4.19 E-03
Hg	lbs/hr	4.50 E-05	3.60 E-05	1.78 E-04	1.71 E-04
Ni	lbs/hr	2.38 E-03	1.14 E-03	1.57 E-03	1.26 E-03
Dioxin/Furan**	lbs/hr	2.26 E-11	1.48 E-11	1.21 E-09	1.18 E-09
HCl	lbs/hr	N/S	N/S	6.78	7.97
Cl2	lbs/hr	N/S	N/S	0.194	0.11
VOC's as Methane	lbs/hr	N/S	N/S	2.74	2.74

* - Where data below detection limit and measurable quantities are mixed, one-half the detection limit is used for averaging.

** - Baseline tests conducted Sept/Oct 1991

*** - Baseline tests conducted June 1991

N/S - Parameter not sampled during baseline testing.

Table 8: PREDICTED MAXIMUM AMBIENT CONCENTRATIONS AND AMBIENT AIR IMPACT CRITERIA FOR ALTERNATIVE FUEL / COAL USAGE

Parameter	Highest Emission Rate		Ambient Concentrations in ug/m3		
			Predicted Maximum Annual*	Strictest Regulatory Limits**	
	lbs/hr	g/sec		PA DER (Annual)	US EPA (Annual)
Heavy Metals					
As	<0.65 E-04	<0.08 E-04	<2.8 E-05	2.3 E-04	2.3 E-03
Be	<0.65 E-04	<0.08 E-04	<2.8 E-05	4.2 E-04	4.2 E-03
Cd	2.54 E-04	3.20 E-05	1.1 E-04	5.6 E-04	5.6 E-03
Cr	5.08 E-04	6.41 E-05	2.2 E-04	NS***	1.0 E+03
Pb	5.77 E-03	7.28 E-04	2.5 E-03	1.5 E-01	9.0 E-02
Hg	1.78 E-04	2.25 E-05	7.7 E-05	2.4 E-02	3.0 E-01
Ni	1.57 E-03	1.98 E-04	6.8 E-04	3.3 E-03	4.2 E-02
Dioxin/Furan	1.21 E-09	1.53 E-10	5.3 E-10	3.0 E-08	2.2 E-07
HCl	8.78	1.11	3.81	NS	7
Cl2	0.194	0.02	0.08	NS	NS
VOC's					
as Methane	2.74	0.35	1.19	NS	NS

* - Determined using normalized dispersion analysis. See Appendix G.

** - No specific emissions or ambient air standards apply to the burning of alternative fuels at the Warner facility for these parameters. Strictest PA DER ambient air impact criteria for burning of anything are found in "Air Quality Permitting Criteria . . . for Municipal Waste Incineration Facilities." Similarly, strictest US EPA ambient air impact standards are ambient criteria found in "Burning of Hazardous Waste in Boilers and Industrial Furnaces."

*** - PA DER criterion is for hexavalent chromium only.

NS - No ambient air impact standard or criterion available.

6.0 REFERENCES

40 CFR 60, Appendix A. EPA Reference Methods 1-6, 23, 26.

40 CFR 266 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities, Subpart H - Hazardous Waste Burned in Boilers and Industrial Furnaces.

PA DER, January 1983. "Source Test Manual."

PA DER, not dated. "Permit Manual - Section 7.5 Municipal Waste Incinerators - Air Quality permitting Criteria Including Best Available Technology for Municipal Waste Incineration Facilities."

RMC Environmental Services, Inc., February 1992. "Fuel Substitution Test Burn Protocol - Warner Lime Kiln." Prepared for Warner Company, Inc.

RMC Environmental Services, Inc., October 1991. "Warner Lime Kiln Trial Burn Intermediate Report and Trial Burn Plan." Prepared for Warner Company, Inc.

US EPA, March 1989. "Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs) and 1989 Update." EPA/625/3-89/016.

US EPA, November 1990. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods." SW-846, 3rd Edition.

US EPA, February 1991. "Burning of Hazardous Waste in Boilers and Industrial Furnaces; Final Rule." Federal Register, Volume 56, No. 35, pp. 7134-7240.

US EPA, December 1991. "Methods Manual for Compliance With the BIF Regulations." EPA/530-SW-91-010.

NOMENCLATURE

A	=	Flue Cross Sectional Area
ACFM	=	Actual Cubic Foot per Minute
An	=	Sampling Nozzle Cross Sectional Area; Square Feet
B_{ws}	=	Proportion by Volume of Water Vapor in Gas Stream
C_p	=	Pitot Tube Coefficient, Dimensionless
C_s	=	Particulate Concentration, Grains/Dry Standard Cubic Foot
DSCFM	=	Dry Standard Cubic Foot per Minute
D_n	=	Sampling Nozzle Diameter; Inches
E	=	Particulate Emission Rate, lbs/hr
ft/sec	=	Feet per Second
dlt H	=	Average Pressure Drop Across Orifice Meter, Inches H_2O
I	=	Isokinetic Variation, %
M_d	=	Flue Gas Molecular Weight, Dry Basis
M_s	=	Flue Gas Molecular Weight, Wet Basis
m_n	=	Total Particulate Residue Collected, Grams
P_{bar}	=	Barometric Pressure, Inches Hg
P_g	=	Stack Static Pressure, Inches H_2O
P_s	=	Stack Absolute Pressure, Inches H_g
P_{std}	=	Standard Absolute Pressure, 29.92 Inches H_g
sqrt dlt p	=	Velocity Head of Stack Gas, Inches H_2O
Q	=	Stack Gas Flow Rate, Dry Standard Cubic Foot Per Hour (dscfh)
T_m	=	Absolute Average Dry Gas Meter Temperature, °R
T_s	=	Absolute Average Stack Gas Temperature, °R
T_{std}	=	Standard Absolute Temperature, 528°R
V_{lc}	=	Total Liquid Collected in Impingers, ml. (gm)
V_m	=	Sample Volume - As Measured by Dry Gas Meter, dcf
V_s	=	Stack Gas Velocity, ft/sec
Vm_{std}	=	Sample Volume - Corrected to Standard Conditions, dscf
Y	=	Dry Gas Meter Calibration Factor, dimensionless
Θ	=	Total Sample Time, Minutes
13.6	=	Specific Gravity of H_g

RMC Environmental Services, Inc.

STACK TEST CALCULATIONS

stack absolute pres., "Hg, Ps	Pg/13.6 + Pbar
sample volume, standard cond., Vm std	$17.64 \times Vm \times Y \times \dfrac{Pbar + (\text{delta } H/13.6)}{Tm}$
water vapor volume, Vw std	Vlc x 0.04071
stack gas moisture content, %, Bws	$\dfrac{Vw\ std}{Vm\ std + Vw\ std}$
stack gas velocity, ft/sec, vs	$85.49 \times Cp \times \text{sq rt delta } P \times \left(\dfrac{Ts}{Ps\ Ms}\right)^{-1}$
stack gas flow rate, dscfh, Q	$3600 \times (1\text{-}Bws) \times vs \times A \times \dfrac{Tstd \times Ps}{Ts \quad Pstd}$
particulate concentration, grn/dscf, cs	mn x 15.43 / Vm std
particulate emission rate, lb/hr, E	$\dfrac{cs \times Q}{7000}$
flue gas molecular weight, dry, Md	0.44(%CO2) + 0.32(%O2) + 0.28(%N2 + % CO)
flue gas molecular weight, wet, Ms	Md (1-Bws) + 18.0 x Bws
isokinetic sampling rate, % I	$I = \dfrac{0.0944 \times Ts \times Vm\ std}{Ps \times vs \times An \times theta \times (1\text{-}Bws)}$

EMISSION TESTING

25 MARCH 1992

PARTICULATE EMISSIONS

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	764	753
Stack static pressure, in. H2O (Pg)	0.01	0.01
Stack velocity pressure (sqrt dlt P)	0.786	0.731
Barometric pressure, in. Hg (Pbar)	29.50	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	543	542
Metered sample volume, cu. ft. (Vm)	75.04	67.26
Water volume collected, ml/gm (Vlc)	152.3	157.9
Test duration, min. (theta)	95	96
Sampling nozzle diameter, in. (Dn)	0.255	0.255
Orifice press. drop, in. H2O (dlt H)	1.54	1.34
Flue gas composition		
% CO2	8.6	8.6
% O2	15.4	15.4
% CO	0.5	0.5

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.60	29.60
Sample vol. standard, scf (Vmstd)	71.208	65.662
Water vapor vol., scf (Vwstd)	6.20	6.43
Stack gas moisture, pct. (Bws)	8.0%	8.9%
Stack gas velocity, ft/sec (Vs)	53.22	49.23
Stack gas flow Rate, dscfh (Q)	2365509	2198264
dscfm	39425	36638
acfm	62683	57984

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	8.6	8.6
Percent O2	15.4	15.4
Percent CO	0.5	0.5
Percent N2	75.5	75.5
Bws	8.0%	8.9%
Md	29.99	29.99
Ms	29.03	28.92

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	754	753
Ps	29.60	29.50
Bws	8.0%	8.9%
Vmstd	71.21	65.66
Vs	53.22	49.23
An	0.000355	0.000355
theta	96	96
I, pct.	104%	105%

STACK TEST RESULTS - PARTICULATES

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Particulate matter collected		
Filter + rinse residue, gm	0.0173	0.0144
Back half condensible	0.0030	0.0000
Back half water insoluble	0.0005	0.0001
Back half dissolved	0.0325	0.0496
Total residue weight, gm (mn)	0.0178	0.0145
EMISSION CALCULATIONS		
Particulate conc., actual, gr/dscf (cs)		
Front half only (filterable)	0.006	0.005
Total residue (incl. back half)	0.006	0.005
Particulate emission rate, actual, lbs/hr (E)	1.30	1.07

PARTICULATE FIELD DATA FORM

Plant Wrenn Lime (?)
City DeWault, P.A. (?)
Location
Operator
Date 3-23-92 (?)
Run number VM-5-1 (?)
Stack diam, mm (in.) 60

Sample box number
Meter box number AMC-01
Meter ΔH@ 1.39

Meter calibration (Y) 1.01
Pitot tube (C_p) .84
Probe length 5'
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture 5
Static pressure (P_s) mm (in.) H_2O
C Factor .75
Reference ΔP mm (in.) H_2O

Sheet 1 of 2
Nozzle identification number
Nozzle diameter .255 mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C (°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C (°F)	Outlet, °C (°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp. °C (°F)
	0	1032	3	296	.46	1.15	519.52 / 522.32 / 525.3	64	64	68	245
A 1	6			303	.50	1.25	533.08	78	73	64	255
2	12			305	.57	1.30	531.70	77	76	65	250
# 3	18	1121	5	292	.53	1.30	—	81	77	66	254
4	24		5	300	.60	1.50	546.5	86	77	62	250
5	30		5	304	.65	1.60	551.0	87	80	62	246
6	36		6	308	.75	1.85	—	87	80	63	250
7	42		6	307	.75	1.85	555.44	88	80	63	250
8	48		6								
	48										
	Total		Max	Avg 304 F / 764 R	$\sqrt{\Delta P}$ = ~~.450~~ .708 ~~.33~~	$\bar{X}$ = 1.54	Total 73.04	Avg 78 F / 538 R	Avg	Max	

at 1052 –
1118 am – shut down – fuel mill block

1121 – back up.

PARTICULATE FIELD DATA FORM

Plant Wallis Lime
City
Location
Operator
Date
Run number WL-5-1
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) 29.46 mm (in.) Hg
Assumed moisture
Static pressure (P_s) -.32 mm (in.) H_2O
C Factor
Reference Δp mm (in.) H_2O

Sheet 2 of 2
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm) 0.000 cfm
Vacuum during leak check 8 in Hg mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h) (20?)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m) m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Gas sample temperature at dry gas meter: Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
	0		5	304	.46	1.15	559.8	77	77	68	250
B 1	6		6	309	.60	1.50	564.20	81	79	66	245
2	12		6	308	.60	1.50	—	92	82	—	—
3	18		6	305	.60	1.50	573.2	94	84	66	250
4	24		6	306	.70	1.75	—	95	84	67	245
5	30		6	307	.75	1.85	582.75	99	85	68	250
6	36		7	308	.78	1.90	588.2	98	86	69	249
7	42		6	304	.69	1.70	592.56	99	87		
8	48										
	Total		Max	Avg			Total	Avg	Avg	Max	

Tmk

PARTICULATE FIELD DATA FORM

Plant Warren Lime
City Devault, Pa
Location
Operator
Date 3-25-92
Run number WL-5-2
Stack diam, mm (in.)

Sample box number
Meter box number RWC-01
Meter ΔH@ 1.39

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 1 of 2
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

2:31 — Leak 5 2:37 — 597.33

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C (°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C (°F)	Outlet, °C (°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C (°F)
	0										
B1	6		4	297	.45	1.15	597.30	72	74	70	245
2	12		5	300	.50	1.25	601.35	75	75	66	250
3	18		5	302	.55	1.35	—	84	76	66	245
4	24		5	302	.55	1.35	—	86	77	64	255
5	30		5	303	.58	1.45	614.20	88	78	66	—
6	36		6	298	.63	1.60	—	91	80	64	250
7	42		6	297	.65	1.65	623.15	94	82	64	248
8	48		5	292	.56	1.35	627.51	89	82	64	250
	Total		Max	Avg 293 F 753 R	$\overline{\sqrt{\Delta p}}$ = .731	$\overline{\Delta H}$ = 1.34	Total 67.26	Avg 82 F 542 R	Avg	Max	

PARTICULATE FIELD DATA FORM

Plant Whitman Lime
City Daventh, Pa
Location
Operator
Date 3-25-92
Run number
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 2 of 2
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp. °C(°F)
	0										
#1	6		4	291	0.42	1.95	631.5	79	77	64	250
2	12		4	290	0.42	1.05	655.25	84	78	—	
3	18		5	290	0.46	1.13	6 ???	85	79	64	250
4	24		5	290	0.60	1.50	—	85	77	64	250
5	30		4	290	0.42	1.05	—	86	80	64	250
6	36		6	288	0.70	1.65		86	80	64	250
7	42		5	286	0.642	1.55	6??.??	89	80	62	248
8	48		5	271	0.50	1.25	660.59	91	80	62	255
	Total		Max	Avg			Total	Avg	Avg	Max	

H_2SO_4/SO_2 EMISSIONS

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	766	753
Stack static pressure, in. H2O (Pg)	0.01	0.01
Stack velocity pressure (sqrt dlt P)	0.785	0.731
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	538	542
Metered sample volume, cu. ft. (Vm)	45.29	60.71
Water volume collected, ml/gm (Vlc)	101.2	100.6
Test duration, min. (theta)	60	60
Orifice Press. Drop, in. H2O (dlt H)	1.700	1.700

Flue gas composition

	Run #1	Run #2
% CO2	8.6	8.6
% O2	15.4	15.4
% CO	0.5	0.5

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.60	29.60
Sample vol. standard, scf (Vmstd)	42.613	39.778
Water vapor vol., scf (Vwstd)	4.12	4.10
Stack gas moisture, pct. (Bws)	8.8%	9.3%
Stack gas velocity, ft/sec (Vs)	58.31	69.27
Stack gas flow Rate, dscfh (Q)	2348695	2190077
dscfm	39145	36501
acfm	62758	58035

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	8.6	8.6
Percent O2	15.4	15.4
Percent CO	0.5	0.5
Percent N2	75.5	75.5
Bws	8.8%	9.3%
Md	29.99	29.99
Ms	28.93	28.87

STACK TEST RESULTS - SO2 + SO3

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Sulfate in first impinger, as H2SO4, total mg.	0.00	0.00
Sulfate in filter, as H2SO4, total mg.	0.00	0.00
Sulfate in impingers 2 & 3, as SO2, total mg.	551.00	537.00
Sulfate in impinger 4, as SO2, total mg.	0.00	0.00
EMISSION CALCULATIONS		
H2SO4 conc., mg/dscm	0.00	0.00
H2SO4 conc., ppmvd	0.000	0.000
H2SO4 emission rate, lb/hr	0.000	0.000
SO2 conc., mg/dscm	456.55	565.45
SO2 conc., ppmvd	171.68	213.08
SO2 emission rate, lb/hr	66.892	77.250

PARTICULATE FIELD DATA FORM

Plant: Wabash Lime
City: Decatur PA
Location:
Operator:
Date: 3-25-92
Run number: SOx-1
Stack diam, mm (in.):

Sample box number:
Meter box number:
Meter ΔH@:

Meter calibration (Y):
Pitot tube (C_p):
Probe length:
Probe liner material:
Probe heater setting:
Ambient temperature:
Barometric pressure (P_b): ____ mm (in.) Hg
Assumed moisture:
Static pressure (P_s): ____ mm (in.) H_2O
C Factor:
Reference ΔP: ____ mm (in.) H_2O

Sheet 1 of 1
Nozzle identification number:
Nozzle diameter: ____ mm (in.)
Thermometer number:
Final leak rate: ____ m^3/min (cfm)
Vacuum during leak check: ____ mm (in.) Hg
Filter number:
Remarks:

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Gas sample temperature at dry gas meter: Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp. °C(°F)
		1132					592.11				
	5		5			1.70		68	68	68	
	10										
	15		5			1.70	602.9	85	75	68	
	20										
	25		5			1.70	611.4	87	82		
	30										
	35		5			1.70		95	85	64	
	40							95	85		
	45		5			1.70					
	50						626.86	96	85		
	55		6								
	60						635.40				
	Total		Max	Avg			Total	Avg	Avg	Max	
						1.70	43.29	83 F 543 R			

Final leak rate 0.00 cfm @ 6" Hg

Shut down, change pots

502-2

PARTICULATE FIELD DATA FORM

Plant Walnut Lime
City Dunmore, PA
Location
Operator
Date 3-25-92
Run number 502-2
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 1 of 1
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
		start 2:51					647.54				
	5		5			1.70		79	79	68	
	10					1.70		84	80		
	15					1.70		96	80		
	20					1.70		90	82		
	25							92	83		
	30					1.70		94	83		
	35					1.70		96	86		
	40					/		92	88		
	45					1.70		85	84		
	50		6			1.70		87	84		
	55							87	84		
	60					1.70	688.25	90	85		
	Total		Max	Avg			Total	Avg	Avg	Max	

1.70 40.71 86 F

546 R

TMK

TOTAL HYDROCARBON EMISSIONS

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	754	753
Stack static pressure, in. H2O (Pg)	0.01	0.01
Stack velocity pressure (sqrt dlt P)	0.786	0.731
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	543	542
Metered sample volume, cu. ft. (Vm)	73.04	67.26
Water volume collected, ml/gm (Vlc)	152.3	157.9
Test duration, min. (theta)	96	96
Orifice press. drop, in. H2O (dlt H)	1.54	1.34
Flue gas composition		
% CO2	8.5	8.6
% O2	15.4	15.4
% CO	0.5	0.5

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.60	29.60
Sample vol. standard, scf (Vmstd)	71.208	65.662
Water vapor vol., scf (Vwstd)	6.20	6.43
Stack gas moisture, pct. (Bws)	8.0%	8.9%
Stack gas velocity, ft/sec (Vs)	53.22	49.25
Stack gas flow Rate, dscfh (Q)	2365509	2198264
dscfm	39425	36638
acfm	62583	57984

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	8.5	8.6
Percent O2	15.4	15.6
Percent CO	0.5	0.5
Percent N2	75.5	75.5
Bws	8.0%	8.9%
Md	29.99	29.99
Ms	29.05	28.92

STACK TEST RESULTS - TOTAL HYDROCARBONS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Total Hydrocarbon Concentration, ppm, as Methane		
condensible fraction	0.0	0.0
dry gas fraction	28.0	30.0
total VOC's	28.0	30.0
EMISSION CALCULATIONS		
Total Hydrocarbon Emission Rate, lb/hr, as Methane	2.738	2.727

EMISSION TESTING

26 MARCH 1992

HEAVY METAL EMISSIONS

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 26 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	783	774
Stack static pressure, in. H2O (Pg)	0.01	0.01
Stack velocity pressure (sqrt dlt P)	0.768	0.844
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	544	537
Metered sample volume, cu. ft. (Vm)	79.30	80.54
Water volume collected, ml/gm (Vlc)	96.3	89.3
Test duration, min. (theta)	96	96
Sampling nozzle diameter, in. (Dn)	0.272	0.272
Orifice press. drop, in. H2O (dlt H)	1.88	2.28
Flue gas composition		
% CO2	14.4	13.3
% O2	9.6	10.5
% CO	0.5	0.5

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 26 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.60	29.50
Sample vol. standard, scf (Vmstd)	77.236	87.644
Water vapor vol., scf (Vwstd)	3.84	3.64
Stack gas moisture, pct. (Bws)	4.7%	4.0%
Stack gas velocity, ft/sec (Vs)	48.28	56.54
Stack gas flow Rate, dscfh (Q)	2225220	2588935
dscfm	37087	43149
acfm	56864	66593

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	14.4	13.3
Percent O2	9.6	10.5
Percent CO	0.5	0.5
Percent N2	75.5	75.7
Bws	4.7%	4.0%
Md	30.59	30.55
Ms	30.09	30.05

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	765	774
Ps	29.60	29.50
Bws	4.7%	4.0%
Vmstd	77.23	87.64
Vs	48.28	56.54
An	0.000404	0.000404
theta	96	96
I, pct.	106%	103%

STACK TEST RESULTS - HEAVY METALS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 26 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Sample Contaminant Mass, mg		
arsenic	0.0000	0.0000
beryllium	0.0000	0.0000
cadmium	0.0060	0.0050
chromium(tot.)	0.0080	0.0020
lead	0.0910	0.0400
mercury	0.0028	0.0025
nickel	0.0150	0.0260
EMISSION CALCULATIONS		
Contaminant Concentration, mg/dscm		
arsenic	0.00E+00	0.00E+00
beryllium	0.00E+00	0.00E+00
cadmium	1.83E-03	1.21E-03
chromium(tot)	3.66E-03	8.08E-04
lead	4.16E-02	1.52E-02
mercury	1.28E-03	1.01E-03
nickel	6.86E-03	9.59E-03
Contaminant Emission Rate, lbs/hr		
arsenic	0.00E+00	0.00E+00
beryllium	0.00E+00	0.00E+00
cadmium	2.54E-04	1.96E-04
chromium(tot)	5.08E-04	1.30E-04
lead	5.77E-03	2.61E-03
mercury	1.78E-04	1.63E-04
nickel	9.52E-04	1.57E-03

PARTICULATE FIELD DATA FORM

Plant Wabash
City
Location
Operator
Date 3-26-72
Run number Wabash 1
Stack diam, mm (in.)

Sample box number
Meter box number R-01
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 1 of 2
Nozzle identification number
Nozzle diameter mm (in.) ; .272
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3) 664.24	Gas sample temperature at dry gas meter Inlet, °C(°F)	Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
A 1	6		7	280	0.50	1.60	665.1	57	62	~~65~~ 62	260
2	12		7	314	.54	1.79	670.5	72	63	62	255
3	18		7	316	.54	1.79	675.2	78	66	62	250
4	24		7	315	.55	1.75	679.45	86	69	62	255
5	30		8	314	.65	2.05	—	90	72	62	255
6	36		9	315	.73	2.30	680.1	96	74	62	255
7	42		9	314	.72	2.30	[illegible]	101	79	62	245
8	48		9	—	[illegible]	1.20	700.30	104	81	62	250
	Total		Max	Avg	$\sqrt{\Delta P}$ =	ΔH =	Total	Avg	Avg	Max	
				303 F	.768	1.68	79.30	84 F			
				763 R		1.89		544 R			

PARTICULATE FIELD DATA FORM

Plant Wheeler Lime
City Donald PA
Location
Operator
Date 5-24-92
Run number Mill 1
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 2 of 2
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h) 12:45	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head ($ΔP_s$), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Gas sample temperature at dry gas meter: Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
B1	6		4	303	.40	1.25	—	70	76	62	260
2	12		4	286	.60	4.90	—	78	76	62	255
3	18		4	285	.62	1.45	—	80	78	62	250
4	24		5	272	.63	1.45	—	82	74	62	250
5	30		5	300	.56	1.35	—	80 81	74 74	62 62	255
6	36		6	303	.70	2.20	721.9	84 84	74	62	250
7	42		6	303	.70	2.20	—	86	74	62	250
8	48		6	302	.70	2.20	740.58	86	74	62	240
	Total		Max	Avg			Total	Avg	Avg	Max	

Weather heavy
Sun - rain at
1215

Final leak rate
@ 0.00 cfm at
9" Hg Vac.

[illegible]

PARTICULATE FIELD DATA FORM

Plant [illegible]	Meter calibration (Y) 1.01	Sheet 1 of 2
City [illegible], Pa.	Pitot tube (C_p) .84	Nozzle identification number
Location	Probe length	Nozzle diameter mm (in.)
Operator	Probe liner material	Thermometer number
Date 3-26-96	Probe heater setting	Final leak rate m^3/min (cfm)
Run number [illegible] - 2	Ambient temperature	Vacuum during leak check mm (in.) Hg
Stack diam, mm (in.)	Barometric pressure (P_b) mm (in.) Hg	Filter number
Sample box number	Assumed moisture	Remarks
Meter box number R-01	Static pressure (P_s) = .36 mm (in.) H_2O	
Meter ΔH@	C Factor	
	Reference ΔP mm (in.) H_2O	

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3) 748.9	Gas sample temperature at dry gas meter Inlet, °C(°F)	Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
1	6		5	310	0.85	2.10	—	56	56	62	240
2	12		6	310	0.89	2.20	752.-	73	57	62	245
3	18		7	321	0.94	2.35	754.0	80	63	62	250
4	24		6	320	.78	2.45	—	85	65	62	255
5	30		6	322	.72	2.45	770	95	68	62	250
6	36		5	319	.64	2.05	776.40	87	69	62	250
7	42		5	316	.66	2.10	781.3	89	72	—	—
8	48		4	315	.50	1.60	785.89	90	74	63	255
	Total		Max	Avg	$\sqrt{\Delta p}$ =	ΔH =	Total	Avg	Avg	Max	
				314 F 774 R	0.844	2.28	88.54	77 F 537 R			

TMH

PARTICULATE FIELD DATA FORM

Plant Wheeling Pittsburgh(?)
City Dunbar(?), PA
Location
Operator
Date 3-24-92
Run number M-5 - 2(?)
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) 29.50 mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 2 of 2
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head ($ΔP_s$), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
A 1	6		4	310	.56	1.65	791.72	72	72	63	255
2	12		6	299	.77	2.85	796.20	62	74	64	250
3	18		5	311	.72	2.30	802.3	86	75	62	254
4	24		5	312	.78	2.50	804.1	88	75	63	250
5	30		5	310	.66	2.10	813.6	90	76	63	245
6	36		5	316	~~.60~~ .66	~~2.15~~ 2.19	818.9	90	76	64	240
7	42		4	315	.60	1.90	823.92	90	78	64	245
8	48		4	316	.58	1.85	824.45	90	80	64	250
	Total		Max	Avg			Total	Avg	Avg	Max	

105°F

765 Pa

Final leak 0.005 cfm @ 14 Vac

TMH

HCl EMISSIONS

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 26 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	753	774
Stack static pressure, in. H2O (Pg)	0.01	0.01
Stack velocity pressure (sqrt dlt P)	0.775	0.807
Barometric pressure, in. Hg (Pbar)	29.60	29.60
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	533	535
Metered sample volume, cu. ft. (Vm)	76.73	81.79
Water volume collected, ml/gm (Vlc)	83.5	95
Test duration, min. (theta)	96	95
Sampling nozzle diameter, in. (Dn)	0.272	0.272
Orifice press. drop, in. H2O (dlt H)	2.33	2.55
Flue gas composition		
% CO2	14.4	13.3
% O2	9.6	10.5
% CO	0.5	0.5

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 25 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.60	29.50
Sample vol. standard, scf (Vmstd)	75.358	80.982
Water vapor vol., scf (Vwstd)	3.60	3.87
Stack gas moisture, pct. (Bws)	4.3%	6.6%
Stack gas velocity, ft/sec (Vs)	48.28	54.13
Stack gas flow Rate, dscfh (Q)	2236272	2463748
dscfm	37271	41062
acfm	56864	63769

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	14.4	13.3
Percent O2	9.6	10.5
Percent CO	0.5	0.5
Percent N2	75.5	75.7
Bws	6.3%	4.6%
Md	30.69	30.55
Ms	30.15	29.98

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	763	774
Ps	29.50	29.60
Bws	6.3%	4.6%
Vmstd	76.36	80.98
Vs	68.28	54.13
An	0.000406	0.000404
theta	96	96
I, pct.	104%	100%

STACK TEST RESULTS - HCL AND CHLORINE

SOURCE: Warner Company Lime Kiln #2

TEST DATE: 26 March, 1992

	Run #1	Run #2
LABORATORY DATA		
Sample Contaminant Mass, mg		
HCL	111.0000	131.0000
Chlorine	3.0000	<1.0500
EMISSION CALCULATIONS		
Contaminant Concentration, ppmv		
HCl	34.42	38.30
Chlorine	0.48	<0.15
Contaminant Emission Rate, lbs/hr		
HCL	7.160	8.779
Chlorine	0.194	<0.059

PARTICULATE FIELD DATA FORM

Plant: WAAAA
City: Dunmrlk, Pa.
Location:
Operator:
Date: 5-26-92
Run number: HC 1-1
Stack diam, mm (in.):

Sample box number: A
Meter box number: A-07
Meter ΔH@:

Meter calibration (Y):
Pitot tube (C_p):
Probe length:
Probe liner material:
Probe heater setting:
Ambient temperature:
Barometric pressure (P_b): ____ mm (in.) Hg
Assumed moisture:
Static pressure (P_s): ____ mm (in.) H_2O
C Factor:
Reference ΔP: ____ mm (in.) H_2O

Sheet 1 of 2
Nozzle identification number:
Nozzle diameter: ____ mm (in.) .272
Thermometer number:
Final leak rate: ____ m^3/min (cfm)
Vacuum during leak check: ____ mm (in.) Hg
Filter number:
Remarks:

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
	0	1143					[illegible].20				
B 1	6		4	290	0.55	2.10	697.7	55	55	64	250
2	12		4	314	0.60	2.30	—	62	56	62	245
3	18		4	316	0.60	2.30	703.1	66	57	62	250
4	24		4	315	.59	2.25	712.4	74	60	62	245
5	30		4	314	.59	2.25	713.5	76	62	62	250
6	36		4	315	.65	2.55	717.5	86	66	62	255
7	42		4	314	.62	2.40		93	77	62	250
8	48				.53	2.25	724.98				
	Total		Max	Avg	$\overline{\sqrt{\Delta p}}$ =	$\overline{\Delta H}$ =	Total	Avg	Avg	Max	
				~~304 F~~	0.775	2.33	76.73	73 F			
				~~744 R~~				533 R			
				303 F							
				763 R							

TMH

PARTICULATE FIELD DATA FORM

Plant Warren Kiln
City Demark, V[illegible]
Location
Operator TMH.
Date 3-26-96
Run number HCl-1
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 2 of 2
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h) [illegible]	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
A 1	6		8	303	.44	1.70	–	68	70	62	245
2	12		8	286	.54	2.00	–	76	74	62	250
3	18		6	285	.52	2.00	–	–	–	63	255
4	24		9	292	.55	2.15	–	86	74	62	256
5	30		8	300	.68	2.60	–	88	76	62	250
6	36		11	303	.77	3.00	755.40	90	74	62	250
7	42		12	303	.82	3.15	761.02	90	75	62	255
8	48		9	302	.59	4.30	765.93	90	75	62	245
	Total		Max	Avg			Total	Avg	Avg	Max	

TMH.

PARTICULATE FIELD DATA FORM

Plant Warren Lime
City Dinall PA
Location
Operator Phil.
Date 3-26-92
Run number HCl-2
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 1 of 1
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3) 766.24	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
A 1	6		8	310	.70	2.70	—	56	57	62	250
2	12		17	313	.90	3.40	—	64	60	—	—
3	18		11	321	.86	3.30	782.9	70	64	62	250
4	24		10	320	.76	2.95	—	80	66	—	—
5	30		7	319	.56	2.20	794.2	80	68	62	255
6	36		7	316	.50	1.95	—	84	70	62	250
7	42		7	316	.50	1.95	—	86	71	—	—
8	48		6	313	.49	1.65	807.00	88	73	63	255
	Total		Max	Avg	$\overline{\sqrt{\Delta P}}$ =	$\overline{\Delta H}$ =	Total	Avg	Avg	Max	
				314 F 774 R	0.807	2.55	81.74	76 F 536 R			

TMH

PARTICULATE FIELD DATA FORM

Plant Warner Lime
City Devault, PA
Location ______
Operator TMH.
Date 3-26-92
Run number HCl-2
Stack diam, mm (in.) ______

Sample box number ______
Meter box number ______
Meter ΔH@ ______

Meter calibration (Y) ______
Pitot tube (C_p) ______
Probe length ______
Probe liner material ______
Probe heater setting ______
Ambient temperature ______
Barometric pressure (P_b) ______ mm (in.) Hg
Assumed moisture ______
Static pressure (P_s) ______ mm (in.) H_2O
C Factor ______
Reference ΔP ______ mm (in.) H_2O

Sheet 2 of 2
Nozzle identification number ______
Nozzle diameter ______ mm (in.)
Thermometer number ______
Final leak rate ______ m^3/min (cfm)
Vacuum during leak check ______ mm (in.) Hg
Filter number ______
Remarks ______

Traverse point number	Sampling time, (θ), min	1040 Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	807.50 Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
B 1	6		8	310	.60	2.35	812.4	72	72	65	250
2	12		9	309	.73	2.80	817.2	80	73	63	245
3	18		10	311	.80	3.10	822.52	86	75	63	240
4	24		10	312	.75	2.90	—	88	75	—	—
5	30		9	310	.66	2.55	833.9	90	76	62	250
6	36		9	316	.64	2.45	838.47	91	75	64	255
7	42		9	315	.66	2.55	843.63	91	77	64	253
8	48		7	316	.45	1.75	848.03	91	80	64	250
	Total		Max	Avg			Total	Avg	Avg	Max	

Final leak 0.00 cfm at 10" Hg

TMH

EMISSION TESTING

28 MARCH 1992

DIOXIN AND FURAN EMISSIONS

SUMMARY OF STACK TEST FIELD DATA

SOURCE: Warner Company Line Kiln #2

TEST DATE: 28 March, 1992

	Run #1	Run #2
Stack cross-sectional area, sq. ft. (A)	19.63	19.63
Avg. stack gas temp, deg. R (Ts)	780	775
Stack static pressure, in. H2O (Pg)	0.015	0.015
Stack velocity pressure (sqrt dlt P)	0.852	0.818
Barometric pressure, in. Hg (Pbar)	29.72	29.72
Pitot tube coeff. (Cp)	0.84	0.84
Dry gas meter coeff. (Y)	1.010	1.010
Dry gas meter temp., deg. R (Tm)	557	554
Metered sample volume, cu. ft. (Vm)	182.92	184.07
Water volume collected, ml/gm (Vlc)	220	215
Test duration, min. (theta)	240	240
Sampling nozzle diameter, in. (Dn)	0.250	0.250
Orifice press. drop, in. H2O (dlt H)	1.53	1.53
Flue gas composition		
% CO2	15.0	15.0
% O2	9.6	9.8
% CO	0.5	0.5

SUMMARY OF STACK TEST RESULTS

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

	Run #1	Run #2
Stack abs. pressure, in. Hg (Ps)	29.72	29.72
Sample vol. standard, dscf (Vmstd)	176.568	173.466
Water vapor vol., scf (Vwstd)	8.96	8.75
Stack gas moisture, pct. (Bws)	4.9%	4.8%
Stack gas velocity, ft/sec (Vs)	57.07	54.60
Stack gas flow Rate, dscfh (Q)	2579589	2486017
dscfm	42995	41434
acfm	67221	64313

FLUE GAS ANALYSIS

	Run #1	Run #2
Percent CO2	15.0	15.0
Percent O2	9.6	9.8
Percent CO	0.5	0.5
Percent N2	74.9	74.7
Bws	4.9%	4.8%
Md	30.78	30.79
Ms	30.16	30.18

STACK TEST ISOKINETIC RATE CALCULATION

	Run #1	Run #2
Ts	780	775
Ps	29.72	29.72
Bws	4.9%	4.8%
Vmstd	176.55	173.47
Vs	57.07	54.60
An	0.000341	0.000341
theta	240	240
I, pct.	97%	100%

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

LABORATORY DATA	Run #1	Run #2
Contaminant Mass, ng		
2378-TCDD	0.00	0.00
12378-PeCDD	0.02	0.00
123478-HxCDD	0.01	0.00
123678-HxCDD	0.03	0.40
123789-HxCDD	0.06	0.00
1234678-HpCDD	0.23	0.16
OCDD	0.90	0.27
2378-TCDF	0.16	0.14
12378-PeCDF	0.06	0.04
23478-PeCDF	0.06	0.04
123478-HxCDF	0.15	0.14
123678-HxCDF	0.06	0.05
234678-HxCDF	0.05	0.05
123789-HxCDF	0.00	0.00
1234678-HpCDF	0.19	0.14
1234789-HpCDF	0.06	0.00
OCDF	0.12	0.14
TOTAL TCDD	0.38	0.32
TOTAL PeCDD	0.47	0.25
TOTAL HxCDD	0.49	0.39
TOTAL HpCDD	0.56	0.43
TOTAL TCDF	0.52	0.41
TOTAL PeCDF	0.29	0.26
TOTAL HxCDF	0.38	0.35
TOTAL HpCDF	0.33	0.18

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

EMISSION CALCULATIONS	Run #1	Run #2
Contaminant Concentration, ng/dscm		
2378-TCDD	0.00E+00	0.00E+00
12378-PeCDD	4.05E-03	0.00E+00
123478-HxCDD	2.02E-03	0.00E+00
123678-HxCDD	6.07E-03	8.14E-02
123789-HxCDD	8.09E-03	0.00E+00
1234678-HpCDD	4.65E-02	3.26E-02
OCDD	1.82E-01	5.50E-02
2378-TCDF	2.83E-02	2.85E-02
12378-PeCDF	8.09E-03	8.14E-03
23478-PeCDF	8.09E-03	8.14E-03
123678-HxCDF	3.03E-02	2.85E-02
123678-HxCDF	8.09E-03	1.02E-02
234678-HxCDF	1.01E-02	1.02E-02
123789-HxCDF	0.00E+00	0.00E+00
1234678-HpCDF	3.84E-02	2.85E-02
1234789-HpCDF	8.09E-03	0.00E+00
OCDF	2.63E-02	2.85E-02
TOTAL TCDD	7.69E-02	6.51E-02
TOTAL PeCDD	9.51E-02	5.09E-02
TOTAL HxCDD	9.91E-02	7.94E-02
TOTAL HpCDD	1.09E-01	8.75E-02
TOTAL TCDF	1.05E-01	8.35E-02
TOTAL PeCDF	5.87E-02	5.29E-02
TOTAL HxCDF	7.59E-02	7.12E-02
TOTAL HpCDF	6.58E-02	3.65E-02

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

	TEF *	Run #1	Run #2
Contaminant Emission Rate, lb/hr			
2378-TCDD	1.00E+00	0.00E+00	0.00E+00
12378-PeCDD	0.00E+00	6.51E-10	0.00E+00
123478 HxCDD	0.00E+00	3.25E-10	0.00E+00
123678-HxCDD	0.00E+00	9.77E-10	1.26E-08
123789-HxCDD	0.00E+00	1.30E-09	0.00E+00
1234678-HpCDD	0.00E+00	7.49E-09	5.05E-09
OCDD	1.00E-03	2.95E-08	8.52E-09
2378-TCDF	1.00E-01	4.56E-09	4.42E-09
12378-PeCDF	5.00E-02	1.30E-09	1.26E-09
23478-PeCDF	5.00E-01	1.30E-09	1.26E-09
123478-HxCDF	0.00E+00	4.88E-09	4.42E-09
123678-HxCDF	0.00E+00	1.30E-09	1.58E-09
234678-HxCDF	0.00E+00	1.63E-09	1.58E-09
123789-HxCDF	0.00E+00	0.00E+00	0.00E+00
1234678-HpCDF	0.00E+00	6.19E-09	4.42E-09
1234789-HpCDF	0.00E+00	1.30E-09	0.00E+00
OCDF	1.00E-03	3.91E-09	4.42E-09
TOTAL TCDD	0.00E+00	1.24E-08	1.01E-08
TOTAL PeCDD	0.00E+00	1.53E-08	7.89E-09
TOTAL HxCDD	0.00E+00	1.60E-08	1.23E-08
TOTAL HpCDD	0.00E+00	1.76E-08	1.36E-08
TOTAL TCDF	0.00E+00	1.69E-08	1.29E-08
TOTAL PeCDF	0.00E+00	9.44E-09	8.21E-09
TOTAL HxCDF	0.00E+00	1.24E-08	1.10E-08
TOTAL HpCDF	0.00E+00	1.07E-08	5.68E-09
Total Toxic Equivalent as 2378-TCDD, lb/hr		1.21E-09	1.15E-09

* TEF is toxic equivalent factor, as per EPA 1989 dioxin/furan exposure risk assessment update.

TEF x emission rate = 2378-TCDD equivalent rate

PARTICULATE FIELD DATA FORM

Plant Wamin
City Damuth, PA
Location
Operator TW
Date ~~8-27-49~~ 3-28-92
Run number TCDDF - 1
Stack diam, mm (in.)

Sample box number
Meter box number K-01
Meter ΔH@ ~~K-01~~ 1.74

Meter calibration (Y) 1.01
Pitot tube (C_p) .84
Probe length 60 "
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) -.36 mm (in.) H_2O
C Factor 0.84
Reference ΔP mm (in.) H_2O

Sheet 1 of 4
Nozzle identification number
Nozzle diameter .250 mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h) 0855	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3) 832.85	Gas sample temperature at dry gas meter Inlet, °C(°F)	Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp. °C(°F)
A 1	5		6	316	.80	1.80	[illegible]	72	72	50	240
2	10		6	316	.80	1.80	840.8	88	74	50	240
3	15		6	314	.80	1.80	844.67	90	75	50	245
B 2	20		6	314	.82	1.85	848.72	92	76	60	245
5	25		6	312	.83	1.85	853.01	95	78	50	250
6	30		6	312	.83	1.85	857.00	96	80	50	250
C 3	35		6	313	.80	1.80	861.01	99	82	50	250
8	40		6	314	.80	1.80	865.17	101	83	55	260
9	45		6	314	.80	1.80	869.19	102	85	55	260
4	50		6	312	.75	1.70	—	104	87	50	250
	55		6	318	.75	1.70	877.23	105	89	50	250
	60		6	324	.75	1.70		106	90	50	250
	Total		Max	Avg	$\sqrt{\Delta P}$ =	$\overline{\Delta H}$ =	Total	Avg	Avg	Max	
				320 F 780 R	0.825	1.53	183.92	97 F 557			

PARTICULATE FIELD DATA FORM

Plant [illegible]
City Danville, VA
Location
Operator [illegible]
Date 3-27-92
Run number TCDF-1
Stack diam, mm (in.)
Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 2 of 4
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Gas sample temperature at dry gas meter: Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
A 5	65		6	322	.65	~~1.50~~ 1.45	—	105	91	50	250
4	70		6	324	.65	1.45	886.67	106	92	50	250
-	75		6	325	.65	1.45	~~890.80~~	106	92	50	250
6	80		6	325	.65	1.45	896.65	106	93	50	250
	85		6	325	.65	1.45	900.07	106	94	55	250
	90		6	325	.65	1.45	903.79	106	94	55	250
7	95		5	323	.55	1.20	907.28	105	94	50	255
	100		5	322	.55	1.20	910.71	105	94	50	255
	105		5	323	.55	1.20	914.14	105	94	50	255
8	110		5	323	.55	1.20	917.56	105	94	50	255
	115		5	324	.55	1.20	920.97	107	95	50	255
	120		5	324	.55	1.20	924.39	105	96	50	255
	Total		Max	Avg			Total	Avg	Avg	Max	

TMK

PARTICULATE FIELD DATA FORM

Plant: Wunna Lime
City: Dranell?, WA.
Location:
Operator: TH / MM
Date: 3-28-92
Run number: TCDDF 1
Stack diam, mm (in.):

Sample box number:
Meter box number: RAC-01
Meter ΔH@: 1.49

Meter calibration (Y): 1.01
Pitot tube (C_p):
Probe length:
Probe liner material:
Probe heater setting:
Ambient temperature:
Barometric pressure (P_b): mm (in.) Hg
Assumed moisture:
Static pressure (P_s): mm (in.) H_2O
C Factor:
Reference ΔP: mm (in.) H_2O

Sheet 3 of 4
Nozzle identification number:
Nozzle diameter .250 mm (in.)
Thermometer number:
Final leak rate: m^3/min (cfm)
Vacuum during leak check: mm (in.) Hg
Filter number:
Remarks:

Traverse point number	Sampling time, (Θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
B 1	5		6	328	.65	1.45	928.15	95	93	60	245
	10		6	328	.65	1.45	931.84	100	93	60	250
	15		6	328	.65	1.45	935.52	105	94	65	250
2	20		6	326	.65	1.45	939.17	106	94	65	250
	25		6	326	.65	1.45	942.86	107	95	70	260
	30		6	326	.65	1.45	946.53	108	96	70	260
3	35		6	324	.65	1.45	950.22	108	96	75	260
	40		6	324	.65	1.45	953.88	109	96	75	260
	45		6	322	.65	1.45	957.56	110	98	75	260
4	50		6	321	.60	1.35	961.23	110	98	70	250
	55		6	321	.60	1.35	—	111	98	70	250
	60		6	321	.60	1.35	969.4	111	99	68	260
	Total		Max	Avg			Total	Avg	Avg	Max	

TMK

PARTICULATE FIELD DATA FORM

Plant	Winn Lime	Meter calibration (Y)	1.01	Sheet	4 of 4
City	Donald, WA	Pitot tube (C_p)	.84	Nozzle identification number	
Location		Probe length		Nozzle diameter	mm (in.)
Operator	TMH	Probe liner material		Thermometer number	
Date	3-24-92	Probe heater setting		Final leak rate	m^3/min (cfm)
Run number	PCAD/F 1	Ambient temperature		Vacuum during leak check	mm (in.) Hg
Stack diam, mm (in.)		Barometric pressure (P_b)	mm (in.) Hg	Filter number	
		Assumed moisture		Remarks	
Sample box number		Static pressure (P_s)	-.38 mm (in.) H_2O		
Meter box number	K-01	C Factor			
Meter ΔH@	1.39	Reference ΔP	mm (in.) H_2O		

Traverse point number	Sampling time, (θ), min		Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m) m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
B-5	65	5		6	318	.65	1.45	972.34	111	100	65	255
	70	10		6	317	.65	1.45	976.15	111	100	62	260
	75	15		6	318	.65	1.45	979.94	112	101	62	255
6	80	20		7	314	.75	1.75	983.99	111	99	62	255
	85	25		7	314	.75	1.75	987.99	111	99	62	255
	90	30		7	315	.75	1.75	992.07	112	99	62	258
7	95	35		7	314	.75	1.75	996.14	113	99	65	255
	100	40		7	313	.75	1.75	1000.20	113	100	65	255
	105	45		7	311	.75	1.75	1004.27	114	100	65	260
8	110	50		6	315	.65	1.45	1008.12	114	101	65	260
	115	55		6	314	.65	1.45	1011.95	112	100	64	250
	120	60		6	316	.65	1.45	1015.77	112	100	64	250
	Total			Max	Avg			Total	Avg	Avg	Max	

Final leak rate = 0.011 cfm @ 10" Hg vac. TMH

TMH

PARTICULATE FIELD DATA FORM

Plant	Warren	Meter calibration (Y)		Sheet	1 of 4
City	Detroit, PP	Pitot tube (C_p)		Nozzle identification number	
Location		Probe length		Nozzle diameter	mm (in.)
Operator	TMH	Probe liner material		Thermometer number	
Date	5-28-90	Probe heater setting		Final leak rate	m^3/min (cfm)
Run number	Dox - 2	Ambient temperature		Vacuum during leak check	mm (in.) Hg
Stack diam, mm (in.)		Barometric pressure (P_b)	mm (in.) Hg	Filter number	
Sample box number		Assumed moisture		Remarks	
Meter box number		Static pressure (P_s)	mm (in.) H_2O		
Meter ΔH@		C Factor			
		Reference ΔP	mm (in.) H_2O		

Traverse point number	Sampling time, (θ), min	Clock time, (24 h) 2:19 pm	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3) 15.94	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
6 1	5		7	322	0.55	1.20	—	84	84	62	235
	10		7	322	0.55	1.20	1002.69	93	86	60	240
	15		7	323	0.57	1.20	1025.46	98	86	60	240
2	20		8	324	0.60	1.35	1029.34	103	90	60	260
	25		8	322	0.60	1.35	32.53	106	93	60	250
	30		8	321	0.60	1.35	36.40	107	93	60	255
3	35		9	322	0.65	1.45	40.11	109	95	60	260
	40		9	322	0.65	1.45	43.81	111	96	60	255
	45		9	322	0.65	1.45	47.53	111	97	62	260
4	50		9	320	0.65	1.45	51.25	111	98	62	255
	55		9	319	0.65	1.45	—	112	99	60	250
	60		9	319	0.65	1.45	58.50	114	106	60	250
	Total		Max	Avg	$\sqrt{\Delta P}$ =	$\overline{\Delta H}$ =	Total	Avg	Avg	Max	
				315 F 775 R	0.818	1.50	184.07	104F 564R			

PARTICULATE FIELD DATA FORM

Plant Wynn
City
Location
Operator TMH
Date 3-24-92
Run number Htg-2
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 2 of 4
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min		Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter Inlet, °C(°F)	Gas sample temperature at dry gas meter Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
5	65	5		9	310	0.70	1.55	62.55	114	102	60	250
	70	10		9	315	0.70	1.55	66.43	114	102	60	250
	75	15		9	315	0.70	1.55	70.40	115	103	60	250
6	80	20		9	312	0.75	1.65	74.50	114	104	62	250
	85	25		9	313	0.76	1.65	—	115	104	62	250
	90	30		9	312	0.75	1.65	82.52	116	104	62	240
7	95	35		9	309	0.64	1.45	86.49	116	105	60	250
	100	40		10	309	0.75	1.65	90.40	116	106	60	245
	105	45		10	310	0.75	1.65	94.5	117	105	61	255
8	110	50		10	310	0.75	1.65	98.53	117	105	62	250
	115	55		10	314	0.75	1.65	—	116	105	65	255
	120	60		9	314	0.74	1.55	106.57	116	105	66	250
	Total			Max	Avg			Total	Avg	Avg	Max	

PARTICULATE FIELD DATA FORM

Plant Wumen
City Damik, VA
Location
Operator TMH.
Date 3-27-7_
Run number Disk. 2
Stack diam, mm (in.)

Sample box number
Meter box number
Meter ΔH@

Meter calibration (Y)
Pitot tube (C_p)
Probe length
Probe liner material
Probe heater setting
Ambient temperature
Barometric pressure (P_b) mm (in.) Hg
Assumed moisture
Static pressure (P_s) mm (in.) H_2O
C Factor
Reference ΔP mm (in.) H_2O

Sheet 3 of 4
Nozzle identification number
Nozzle diameter mm (in.)
Thermometer number
Final leak rate m^3/min (cfm)
Vacuum during leak check mm (in.) Hg
Filter number
Remarks

Traverse point number	Sampling time, (θ), min	Clock time, (24 h)	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Gas sample temperature at dry gas meter: Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
		16 30					106.57				
#1	5		10	311	0.75	1.70	—	104	100	65	250
	10		10	310	0.75	1.70	116.58	110	100	60	250
	15		10	313	0.75	1.70	120.59	112	101	60	250
2	20		10	320	0.85	1.95	124.88	114	102	60	250
	25		10	318	0.85	1.95	129.20	114	102	60	250
	30		10	318	0.85	1.95	133.52	115	102	60	250
3	35		10	318	0.85	1.95	137.84	115	103	60	250
	40		10	317	0.85	1.95	142.17	115	102	60	250
	45		10	318	0.85	1.95	146.49	115	102	60	250
4	50		10	316	0.75	1.70	150.62	114	102	60	250
	55		10	316	0.75	1.70	154.68	114	102	60	250
	60		10	316	0.75	1.70	158.10	114	102	60	250
	Total		Max	Avg			Total	Avg	Avg	Max	

PARTICULATE FIELD DATA FORM

Plant Weirton(?)
City Dewalt(?) PA
Location ______
Operator TMH(?)
Date 5-28-7?
Run number Dice(?) 2
Stack diam, mm (in.) ______

Sample box number ______
Meter box number ______
Meter ΔH@ ______

Meter calibration (Y) ______
Pitot tube (C_p) ______
Probe length ______
Probe liner material ______
Probe heater setting ______
Ambient temperature ______
Barometric pressure (P_b) ______ mm (in.) Hg
Assumed moisture ______
Static pressure (P_s) ______ mm (in.) H_2O
C Factor ______
Reference ΔP ______ mm (in.) H_2O

Sheet 4 of 4
Nozzle identification number ______
Nozzle diameter ______ mm (in.)
Thermometer number ______
Final leak rate ______ m^3/min (cfm)
Vacuum during leak check ______ mm (in.) Hg
Filter number ______
Remarks ______

Traverse point number	Sampling time, (θ), min		Clock time, (24 h) 630	Vacuum, mm (in.) Hg	Stack temperature (T_s), °C(°F)	Velocity head (ΔP_s), mm (in.) H_2O	Pressure differential across orifice meter (ΔH), mm (in.) H_2O	Gas sample volume (V_m), m^3 (ft^3)	Gas sample temperature at dry gas meter: Inlet, °C(°F)	Gas sample temperature at dry gas meter: Outlet, °C(°F)	Temperature of gas leaving condenser or last impinger, °C (°F)	Filter temp, °C(°F)
#5	65	5		9	312	.62	1.35	—	110	102	~~60~~ 60	250
	70	10		9	310	.62	1.35	166.16	110	102	62	255
	75	15		9	311	.62	1.35	—	110	102	62	255
6	80	20		8	308	.54	1.20	173.17	108	98	62	250
	85	25		9	308	.54	1.20	176.61	108	99	62	250
	90	30		8	306	.54	1.20	180.4	108	100	62	250
7	95	35		9	305	.50	1.10	—	104	97	60	250
	100	40		8	305	.50	1.10	177.1(?)	104	97	60	245
	105	45		8	306	.50	1.10	—	104	96	60	250
8	110	50		8	308	.52	1.15	192.50(?)	105	96	60	250
	115	55		8	306	.52	1.15	—	105	96	60	250
	120	60		8	309	.52	1.15	200.01	105	97	60	255
	Total			Max	Avg			Total	Avg	Avg	Max	

240

Final leak rate - 0.00 CFM at 13" Hg(?)

RAW MATERIALS/PRODUCTS ANALYSES

Table B1: Ultimate Analyses of Fuels Used During Testing

Coal Fed To Grinding Mill

Parameter	Sample Identification Number									
	1.10	1.11	1.12	2.10	2.11	2.12	3.10	3.11	3.12	Avg
As Received										
% Moisture	0.28	0.6	0.8	0.89	0.99	0.79	0.86	0.9	0.44	0.7
% Carbon	73.95	75.63	75.89	74.99	76.85	77.25	75.73	77.68	78.70	76.3
% Hydrogen	3.96	4.08	3.78	3.94	3.96	3.88	3.92	3.91	4.06	3.9
% Nitrogen	1.32	1.36	1.32	1.31	1.37	1.40	1.34	1.35	1.34	1.3
% Sulfur	1.61	1.66	1.58	1.63	1.52	1.39	1.72	1.56	1.66	1.6
% Ash	12.72	11.11	13.01	14.83	13.10	14.83	12.86	11.36	10.20	12.7
% Oxygen	6.16	5.56	3.62	2.41	2.21	0.46	3.57	3.24	3.60	3.4
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
BTU/lb	13,340	13,822	13,487	13,151	13,255	13,725	13,232	13,760	13,766	13,604
Dry Basis										
% Carbon	74.16	76.08	76.50	75.66	77.61	77.86	76.38	78.38	79.05	76.9
% Hydrogen	3.97	4.10	3.81	3.98	4.00	3.91	3.95	3.95	4.08	4.0
% Nitrogen	1.32	1.37	1.33	1.32	1.38	1.41	1.35	1.36	1.35	1.4
% Sulfur	1.61	1.67	1.59	1.64	1.54	1.40	1.73	1.57	1.67	1.6
% Ash	12.76	11.18	13.11	14.86	13.23	14.95	12.97	11.46	10.24	12.8
% Oxygen	6.18	5.6	3.66	2.54	2.24	0.47	3.62	3.28	3.61	3.5
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0
BTU/lb	13,377	13,905	13,595	13,268	13,386	13,833	13,346	13,884	13,827	13,602

Table B1 continued

Alternative Fuel / Coal Mixture Fired in Kiln

Parameter	Sample Identification A	B	C	Avg
As Received				
% Moisture	1.93	3.28	1.83	2.3
% Carbon	73.10	72.08	69.48	71.6
% Hydrogen	4.74	4.67	4.35	4.6
% Nitrogen	1.31	1.27	1.22	1.3
% Sulfur	1.54	1.48	1.31	1.4
% Ash	10.97	10.02	9.57	10.2
% Oxygen	6.41	7.20	12.24	8.6
Total	100.00	100.00	100.00	100.0
BTU/lb	13,243	12,920	13,018	13,060
Dry Basis				
% Carbon	74.51	74.44	70.75	73.2
% Hydrogen	4.83	4.82	4.43	4.7
% Nitrogen	1.34	1.31	1.24	1.3
% Sulfur	1.57	1.53	1.33	1.5
% Ash	11.18	10.35	9.75	10.4
% Oxygen	6.57	7.55	12.5	8.9
Total	100.00	100.00	100.00	100.0
BTU/lb	13,499	13,344	13,256	13,366
Maf Btu	15,498	14,902	14,693	15,031

Table B2: Laboratory Analyses of Raw Materials / Products

All Data µg/g (mg/kg) Unless Noted

Averages calculated using half the detection limit, where appropriate.

Kiln Dust

Sample	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	Avg.
As	1.8	1.1	0.7	1	3.8	3.4	2.8	3.6	2.7	2.3
Be	0.06	0.53	<0.03	<0.03	0.34	<0.03	<0.03	<0.03	0.47	0.16
Cd	1.98	1.95	2.13	2.36	3.99	2.68	1.30	3.50	1.84	2.41
Cr	29	26	21	10	32	38	39	24	40	29
Pb	74	110	67	52	107	56	73	49	81	74
Hg	0.30	0.29	0.33	0.27	0.32	0.30	0.26	0.25	0.23	0.28
Ni	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Coal

Sample	1.10	1.11	1.12	2.10	2.11	2.12	3.10	3.11	3.12	Avg
As	5.8	1.5	2.5	1.6	6.0	8.0	3.9	4.4	3.8	4.2
Be	1.06	1.41	1.77	2.43	1.85	2.27	1.68	1.42	1.51	1.71
Cd	7.88	3.26	6.74	4.21	10.1	2.22	7.77	6.12	6.49	6.09
Cr	30	57	58	69.8	31	28	42	32	72	47
Pb	38	40	47	74	39	35	45	36	33	43
Hg	0.19	0.30	0.32	0.31	0.34	0.30	0.29	0.27	0.32	0.29
Ni	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Limestone

Sample	1.7	1.8	1.9	2.7	2.8	2.9	3.7	3.8	3.9	Avg.
As	<0.5	<0.5	<0.5	1.3	0.7	<0.5	0.6	1.5	1	1.0
Be	0.17	0.26	0.14	0.08	0.14	0.04	0.34	0.28	0.30	0.19
Cd	0.38	<0.25	0.94	0.81	0.56	<0.25	0.84	0.71	0.62	0.69
Cr	<1.0	<1.0	<1.0	3	5	5	1	<1.0	<1.0	2
Pb	62	26	25	21	70	27	20	15	22	32
Hg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ni	<5.0	<5.0	<5.0	<5.0	<5.0	5.3	<5.0	5.8	<5.0	<5.0

Table B2 continued

Lime Product

Sample	1.4	1.5	1.6	2.4	2.5	2.6	3.4	3.5	3.6	Avg.
As	< 0.5	< 0.5	< 0.5	0.5	0.9	0.9	2.6	2.6	< 0.5	0.8
Be	0.09	0.17	0.14	0.10	0.14	0.04	0.34	0.33	0.30	0.18
Cd	0.36	0.79	0.88	< 0.25	1.15	1.38	1.07	< 0.25	1.14	0.78
Cr	< 1.0	2	< 1.0	2	9	7	< 1.0	< 1.0	1	3
Pb	38	35	41	14	33	32	25	22	29	29.89
Hg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
N	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Alternative Fuel / Coal Mixture Fired in Kiln

Sample	A	B	C	Avg.
As	1.5	1.8	2.8	2.0
Be	1.25	0.98	1.92	1.38
Cd	4.17	15.7	4.44	8.10
Cr	32	28	43	34
Pb	39	47	56	47
Hg	0.30	0.29	0.27	0.29
Ni	< 5.0	< 5.0	< 5.0	< 5.0

MOD1 ANALYSIS FOR ALTERNATIVE FUEL

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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VME North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 920365
Sample Date: 02/04/92
Sampled By : N/A
Received : 02/05/92
Reported : 02/20/92
P.O. Number: N/A

RMC Number : 965
Sample Description: CENTECH FUEL PELLETS

Rept	Parameter	Result	RCRA LIMITS	Date Anl Completed	Analyst	Method
1	ANTIMONY,TOTAL (TCLP)	<0.1 MG/L		02/07/92	BAK	EPA 7060
1	ARSENIC, TOTAL	<0.2 MG/KG		02/05/92	EAF	EPA 7060
1	ARSENIC, TOTAL (TCLP)	<0.1 MG/L	5.0 MG/L	02/07/92	BAK	EPA 7060
1	BARIUM, TOTAL	11 MG/KG		02/11/92	JNO	EPA 7080
1	BARIUM, TOTAL (TCLP)	<0.5 MG/L	100.0 MG/L	02/07/92	BAK	EPA 7080
1	BERYLLIUM, TOTAL	0.07 MG/KG		02/18/92	JNO	EPA 7091
1	BERYLLIUM, TOTAL (TCLP)	<0.0005 MG/L		02/18/92	JNO	EPA 7091
1	BORON (TCLP)	0.25 MG/L		02/11/92	JNO	6010/200.7
1	CADMIUM, TOTAL	<1.0 MG/KG		02/11/92	JNO	EPA 7131
1	CADMIUM, TOTAL (TCLP)	<0.05 MG/L	1.0 MG/L	02/07/92	BAK	EPA 7131
1	CHROMIUM, HEXAVALENT, TOTAL (TCLP)	<0.002 MG/L		02/11/92	EAF	EPA 7197
1	CHROMIUM, TOTAL	2.2 MG/KG		02/11/92	JNO	EPA 7191
1	CHROMIUM, TOTAL (TCLP)	<0.05 MG/L	5.0 MG/L	02/07/92	BAK	EPA 7191
1	COPPER, TOTAL	15 MG/KG		02/11/92	JNO	EPA 7210, 7211
1	COPPER, TOTAL (TCLP)	<0.05 MG/L		02/07/92	BAK	EPA 7210, 7211
1	LEAD, TOTAL	7.2 MG/KG		02/11/92	JNO	EPA 7421
1	LEAD, TOTAL (TCLP)	<0.1 MG/L	5.0 MG/L	02/07/92	BAK	EPA 7421
1	MERCURY, TOTAL	<0.07 MG/KG		02/06/92	LMS	EPA 7470, 7471
1	MERCURY, TOTAL (TCLP)	0.0002 MG/L	0.2 MG/L	02/07/92	LMS	EPA 7470,7471
1	MOLYBDENUM, TOTAL	<10 MG/KG		02/06/92	EAF	EPA 7481
1	MOLYBDENUM,TOTAL (TCLP)	<0.01 MG/L		02/10/92	EAF	EPA 7481
1	NICKEL, TOTAL	<1.0 MG/KG		02/11/92	JNO	EPA 249.2
1	NICKEL, TOTAL (TCLP)	<0.05 MG/L		02/07/92	BAK	EPA 249.2
1	SELENIUM, TOTAL	<0.2 MG/KG		02/07/92	EAF	EPA 7740
1	SELENIUM, TOTAL (TCLP)	<0.1 MG/L	1.0 MG/L	02/07/92	BAK	EPA 7740
1	SILVER, TOTAL	<1.0 MG/KG		02/11/92	JNO	EPA 7750
1	SILVER, TOTAL (TCLP)	<0.05 MG/L	5.0 MG/L	02/07/92	BAK	EPA 7750
1	ZINC, TOTAL	39 MG/KG		02/07/92	LMS	EPA 7950
1	ZINC, TOTAL (TCLP)	0.6 MG/L		02/11/92	JNO	EPA 7950
1	AMMONIA-NITROGEN(WATER LEACHATE)	<0.03 MG/L		02/19/92	ABB	EPA 350.1

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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38 Robinson Street
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CERTIFICATE OF ANALYSIS

WMI North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 920565
Sample Date: 02/04/92
Sampled By : N/A
Received : 02/05/92
Reported : 02/20/92
P.O. Number: N/A

RMC Number : 963
Sample Description: CENTECH FUEL PELLETS

Repl	Parameter	Result	RCRA LIMITS	Date And Completed	Analyst	Method
1	CHEMICAL OXYGEN DEMAND-H20 LEACHATE	1010 MG/L		02/18/92	LAC	EPA 410.4
1	CYANIDE, TOTAL (MACRO DIST.)	0.34 MG/KG		02/13/92	ABB	EPA 335.3
1	CYANIDE, TOTAL (WATER LEACHATE)	<0.005 MG/L		02/20/92	ABB	EPA 9012
1	PHENOLICS (TCLP)	0.18 MG/L		02/06/92	ABB	EPA 420.2
1	HERBICIDES: 2,4,5-TP (TCLP)	<100 UG/L	1.0 MG/L	02/19/92	SDF	EPA 8150
1	HERBICIDES: 2,4-D (TCLP)	<1000 UG/L	10.0 MG/L	02/19/92	SDF	EPA 8150
1	TCLP PESTICIDES (TCLP LEACH)	SEE PEST. ATTACHMENT		02/19/92	JAI	EPA 8080
1	TCLP SEMI VOLATILES (TCLP LEACH)	SEE SEMI-VOL. ATTACHMENT		02/18/92	JWG	EPA 8270
1	TCLP VOLATILES (TCLP LEACH)	SEE VOL. ATTACHMENT		02/18/92	DAF	EPA 8240
1	HEATING VALUE	5994 BTU/LB		02/11/92	*	EPA D3286 PT.25
1	OIL + GREASE (SOLID)	11000 MG/KG		02/07/92	JMA	EPA 9070,9071,413.2(
1	OIL + GREASE(WATER LEACHATE)	1.51 MG/L		02/18/92	JMA	EPA 9070,413.1(3R)
1	CARBON, TOTAL ORGANIC (WATER LEACH)	560 MG/L		02/19/92	SPK	EPA 415.1
1	CORROSIVITY	NOT CORROSIVE		02/06/92	LAC	SW846,SEC7.2.1A
1	IGNITABILITY (SOLID)	NOT IGNITABLE		02/13/92	CM	ASTM D-4982-89A
1	PAINT FILTER TEST	NO FREE LIQUIDS		02/06/92	LAC	EPA 9095
1	PH (SOLID)	8.58 STANDARD	2-12.5 STANDARD	02/06/92	LAC	EPA 9065
1	PH (TCLP - NON-VOLATILE)	6.69 STANDARD		02/06/92	TMZ	EPA 9040,9045
1	PH (TCLP - ZERO HEADSPACE)	5.30 STANDARD		02/15/92	TMZ	EPA 9040,9045
1	PH(WATER LEACHATE)	6.46 STANDARD		02/13/92	WSP	EPA 9040
1	REACTIVITY	NOT REACTIVE		02/13/92	CM	SW846,SEC 7.3
1	REACTIVITY: CYANIDE	<1 MG/KG	250 MG/KG	02/13/92	ABB	SW846,SEC 7.3
1	REACTIVITY: SULFIDE	<50 MG/KG	500 MG/KG	02/20/92	KAJ	SW846,SEC 7.3
1	TCLP SETUP - NON-VOLATILES	COMPLETED		02/06/92	TMZ	EPA 1311
1	TCLP SETUP - VOLATILES	COMPLETED		02/15/92	TMZ	EPA 1311
1	TOTAL DISSOLVED SOLIDS-H20 LEACHATE	874 MG/L		02/18/92	REG	EPA 160.1
1	TOTAL ORGANIC HALOGENS	<50 MG/KG		02/18/92	SPK	EPA 9020/5050
1	TOTAL ORGANIC HALOGENS(WATER LEACH)	75 UG/L		02/18/92	SPK	EPA 9020
1	TOTAL SOLIDS	907000 MG/KG		02/06/92	TMZ	EPA 160.3
1	TOTAL SOLIDS (WATER LEACHATE)	874 MG/L		02/18/92	REG	EPA 209A

Approved By:

Trila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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Pottstown, PA 19464
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WMI North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 920565
Sample Date: 02/04/92
Sampled By : N/A
Received : 02/05/92
Reported : 02/20/92
P.O. Number: N/A

RMC Number : 953
Sample Description: CENTECH FUEL PELLETS

Repl	Parameter	Result	RCRA LIMITS	Date Anl Completed	Analyst	Method
1	TOTAL VOLATILE SOLIDS	826000 MG/KG		02/05/92	TKZ	EPA 160.4
1	TOTAL VOLATILE SOLIDS (WATER LEACH)	384 MG/L		02/18/92	REG	EPA 160.4
1	WATER LEACHATE SET UP	COMPLETED		02/13/92	WSP	ASTM D3987-85

Approved By:

Trila E. Dixon
Laboratory Operations Manager

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Summary of Toxicity Characteristic Leaching Procedure

CLIENT ID: CEMTECH FUEL PELLETS
RMC ID: 983

DATE ANALYZED: 2-18-92
ANALYZED BY: JAI

Pesticides

	ug/l		ug/l
g-BHC (lindane)	<40	chlordane	<3.0
heptachlor	<0.8	toxaphene	<50
heptachlor epoxide	<0.8	methoxychlor	<1000
endrin	<2.0		

<X = Not detected; value indicates minimum quantifiable limit.

Approved By: [signature]

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Tri-County Business Campus
83 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
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RMC Environmental Chemistry Laboratory
Semivolatile Analysis Data

Client I.D. : CEMTECH FUEL PELLETS   Date Analyzed: 02/18/92

RMC I.D. : 963 TCLP   Analyzed By: JMG

Compound	uG/L		QL	Compound	uG/L	QL
Pyridine	U		100	2,4,6-Trichlorophenol	U	100
2-Methylphenol	U		100	2,4,5-Trichlorophenol	U	500
Hexachloroethane	U		100	2,4-Dinitrotoluene	U	100
3- & 4-Methylphenol	16	J	100	Hexachlorobenzene	U	100
Nitrobenzene	U		100	Pentachlorophenol	U	500
Hexachlorobutadiene	U		100			

Surrogate Compounds	Recovery
2-Fluorophenol	104 %
Phenol-d5	105 %
Nitrobenzene-d5	121 %
2-Fluorobiphenyl	117 %
2,4,6-Tribromophenol	114 %
Terphenyl-d14	148 %

QL : Sample Specific Quantitation Limit

Qualifiers

(J) Indicates an estimated value
(B) Indicates compound found in blank
(U) Indicates compound not detected
(D) Indicates surrogates have been diluted out

Approved By: [signature]

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Volatile Organic Analysis Data

CLIENT I.D. : CEMTECH FUEL PELLETS
RMC I.D. : 963 TCLP

Date Analyzed : 02/18/92
Analyzed By : DAF

COMPOUND	UG/L	CRQL	COMPOUND	UG/L	CRQL
Vinyl Chloride	U	100	Trichloroethene	U	50
1,1-Dichloroethene	U	50	Benzene	U	50
Chloroform	U	50	Tetrachloroethene	U	50
1,2-Dichloroethane	U	50	Chlorobenzene	U	50
2-Butanone	140	100	1,2-Dichlorobenzene	U	50
Carbon Tetrachloride	U	50	1,4-Dichlorobenzene	U	50

SURROGATE COMPOUNDS	RECOVERY
1,2-Dichloroethane-d4	104 %
Toluene-d8	95 %
Bromofluorobenzene	98 %

CRQL = Contract Required Quantitation Limit

Qualifiers
(J) Indicates detected below CRQL
(U) Indicates compound not detected
(D) Indicates surrogates have been diluted out
(B) Indicates compound found in blank

Approved By ____________

RMC ENVIRONMENTAL SERVICES

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Semivolatile Analysis Data

Client I.D. : 60756 METHOD BLANK — Date Analyzed: 02/18/92

RMC I.D. : METHOD BLANK — Analyzed By: JVG

Compound	uG/L	QL	Compound	uG/L	QL
Pyridine	U	100	2,4,6-Trichlorophenol	U	100
2-Methylphenol	U	100	2,4,5-Trichlorophenol	U	500
Hexachloroethane	U	100	2,4-Dinitrotoluene	U	100
3- & 4-Methylphenol	U	100	Hexachlorobenzene	U	100
Nitrobenzene	U	100	Pentachlorophenol	U	500
Hexachlorobutadiene	U	100			

Surrogate Compounds	Recovery
2-Fluorophenol	71 %
Phenol-d5	76 %
Nitrobenzene-d5	83 %
2-Fluorobiphenyl	81 %
2,4,6-Tribromophenol	80 %
Terphenyl-d14	115 %

QL : Sample Specific Quantitation Limit

Qualifiers

(J) Indicates an estimated value

(B) Indicates compound found in blank

(U) Indicates compound not detected

(D) Indicates surrogates have been diluted out

Approved By:

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Volatile Organic Analysis Data

CLIENT I.D. : 202063 METHOD BLANK
RMC I.D. : METHOD BLANK

Date Analyzed : 02/18/92
Analyzed By : DAE

COMPOUND	UG/L	CRQL
Vinyl Chloride	U	10
1,1-Dichloroethene	U	5
Chloroform	U	5
1,2-Dichloroethane	U	5
2-Butanone	U	10
Carbon Tetrachloride	U	5

COMPOUND	UG/L	CRQL
Trichloroethene	U	5
Benzene	U	5
Tetrachloroethene	U	5
Chlorobenzene	U	5
1,2-Dichlorobenzene	U	5
1,4-Dichlorobenzene	U	5

SURROGATE COMPOUNDS	RECOVERY
1,2-Dichloroethane-d4	100 %
Toluene-d8	93 %
Bromofluorobenzene	92 %

CRQL = Contract Required Quantitation Limit

Qualifiers
(J) Indicates detected below CRQL
(U) Indicates compound not detected
(D) Indicates surrogates have been diluted out
(B) Indicates compound found in blank

Approved By: [signature]

SAMPLE NARRATIVE

RMC REPORT #920471
RMC #1214

This sample was composited from a coal sample and fuel pellets prior to analysis by RMC Environmental Services.

A composite ratio of 0.21g Pellets per 1g coal was used as per instructions on the chain of custody and sample bottle.

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CERTIFICATE OF ANALYSIS

WMI North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 920471
Sample Date: N/A
Sampled By : GAR
Received : 02/12/92
Reported : 02/21/92
P.O. Number: N/A

RMC Number : 1214
Sample Description: COMP. OF COAL & FUEL PELLETS

Repl	Parameter	Result	RCRA LIMITS	Date Anl Completed	Analyst	Method
1	ANTIMONY,TOTAL (TCLP)	<0.1 MG/L		02/18/92	BAK	EPA 7040
1	ARSENIC, TOTAL	13.5 MG/KG		02/14/92	EAF	EPA 7060
1	ARSENIC, TOTAL (TCLP)	<0.1 MG/L	5.0 MG/L	02/18/92	BAK	EPA 7060
1	BARIUM, TOTAL	51 MG/KG		02/18/92	BAK	EPA 7080
1	BARIUM, TOTAL (TCLP)	<0.5 MG/L	100.0 MG/L	02/18/92	BAK	EPA 7080
1	BERYLLIUM, TOTAL	1.0 MG/KG		02/18/92	JRO	EPA 7091
1	BERYLLIUM, TOTAL (TCLP)	0.0006 MG/L		02/18/92	JRO	EPA 7091
1	BORON (TCLP)	0.5 MG/L		02/18/92	JRO	6010/200.7
1	CADMIUM, TOTAL	<1.0 MG/KG		02/18/92	JRO	EPA 7131
1	CADMIUM, TOTAL (TCLP)	<0.05 MG/L	1.0 MG/L	02/18/92	BAK	EPA 7131
1	CHROMIUM, HEXAVALENT, TOTAL (TCLP)	<0.002 MG/L		02/19/92	EAF	EPA 7197
1	CHROMIUM, TOTAL	7.2 MG/KG		02/18/92	BAK	EPA 7191
1	CHROMIUM, TOTAL (TCLP)	<0.05 MG/L	5.0 MG/L	02/18/92	BAK	EPA 7191
1	COPPER, TOTAL	15.4 MG/KG		02/14/92	EAF	EPA 7210, 7211
1	COPPER, TOTAL (TCLP)	<0.05 MG/L		02/18/92	BAK	EPA 7210, 7211
1	LEAD, TOTAL	19 MG/KG		02/18/92	BAK	EPA 7421
1	LEAD, TOTAL (TCLP)	<0.1 MG/L	5.0 MG/L	02/18/92	BAK	EPA 7421
1	MERCURY, TOTAL	0.17 MG/KG		02/18/92	LMS	EPA 7470, 7471
1	MERCURY, TOTAL (TCLP)	<0.0002 MG/L	0.2 MG/L	02/18/92	LMS	EPA 7470,7471
1	MOLYBDENUM, TOTAL	<10 MG/KG		02/19/92	LMS	EPA 7481
1	MOLYBDENUM,TOTAL (TCLP)	<0.5 MG/L		02/19/92	LMS	EPA 7481
1	NICKEL, TOTAL	12 MG/KG		02/18/92	JRO	EPA 249.2
1	NICKEL, TOTAL (TCLP)	0.08 MG/L		02/18/92	BAK	EPA 249.2
1	SELENIUM, TOTAL	2.3 MG/KG		02/19/92	EAF	EPA 7740
1	SELENIUM, TOTAL (TCLP)	<0.1 MG/L	1.0 MG/L	02/18/92	BAK	EPA 7740
1	SILVER, TOTAL	<1.0 MG/KG		02/18/92	JRO	EPA 7760
1	SILVER, TOTAL (TCLP)	<0.05 MG/L	5.0 MG/L	02/18/92	BAK	EPA 7760
1	ZINC, TOTAL	23 MG/KG		02/18/92	BAK	EPA 7950
1	ZINC, TOTAL (TCLP)	0.71 MG/L		02/18/92	BAK	EPA 7950
1	AMMONIA-NITROGEN(WATER LEACHATE)	<0.03 MG/L		02/19/92	ABB	EPA 350.1

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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CERTIFICATE OF ANALYSIS

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WMI North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 92047?
Sample Date: N/A
Sampled By : GAR
Received : 02/12/92
Reported : 02/21/92
P.O. Number: N/A

RMC Number : 1214
Sample Description: COMP. OF COAL & FUEL PELLETS

Repl	Parameter	Result	RCRA LIMITS	Date Anl Completed	Analyst	Method
1	CHEMICAL OXYGEN DEMAND-H2O LEACHATE	165 MG/L		02/18/92	LAC	EPA 410.4
1	CYANIDE, TOTAL (MACRO DIST.)	<0.025 MG/KG		02/13/92	ABB	EPA 335.3
1	CYANIDE, TOTAL (WATER LEACHATE)	<0.005 MG/L		02/20/92	ABB	EPA 9012
1	PHENOLICS (TCLP)	<0.05 MG/L		02/18/92	ABB	EPA 420.2
1	HERBICIDE: 2,4,5-TP (TCLP)	<100 UG/L	1.0 MG/L	02/19/92	SDF	EPA 8150
1	HERBICIDE: 2,4-D (TCLP)	<1000 UG/L	10.0 MG/L	02/19/92	SDF	EPA 8150
1	TCLP PESTICIDES (TCLP LEACH)	SEE PEST. ATTACHMENT		02/19/92	JAI	EPA 8080
1	TCLP SEMI VOLATILES (TCLP LEACH)	SEE SEMI-VOL. ATTACHMENT		02/18/92	JVG	EPA 8270
1	TCLP VOLATILES (TCLP LEACH)	SEE VOL. ATTACHMENT		02/18/92	DAF	EPA 8260
1	HEATING VALUE	6360 BTU/LB		02/18/92	*	EPA D3286 PT.25
1	OIL + GREASE (SOLID)	6410 MG/KG		02/18/92	JMA	EPA 9070,9071,413.2
1	OIL + GREASE(WATER LEACHATE)	<1 MG/L		02/18/92	JMA	EPA 9170,413.1(IR)
1	CARBON, TOTAL ORGANIC (WATER LEACH)	57 MG/L		02/19/92	SPK	EPA 415.1
1	CORROSIVITY	NOT CORROSIVE		02/13/92	LAC	SW846,SEC7.2.1A
1	IGNITABILITY (SOLID)	NOT IGNITABLE		02/13/92	CM	ASTM D-4982-89A
1	PAINT FILTER TEST	NO FREE LIQUIDS		02/13/92	LAC	EPA 9095
1	PH (SOLID)	5.09 STANDARD	2-12.5 STANDARD	02/13/92	LAC	EPA 9045
1	PH (TCLP - NON-VOLATILE)	4.85 STANDARD		02/14/92	JCD	EPA 9040,9045
1	PH (TCLP - ZERO HEADSPACE)	5.10 STANDARD		02/15/92	TMZ	EPA 9040,9045
1	PH(WATER LEACHATE)	5.68 STANDARD		02/13/92	WSP	EPA 9040
1	REACTIVITY	NOT REACTIVE		02/13/92	CM	SW846,SEC 7.3
1	REACTIVITY: CYANIDE	<1 MG/KG	250 MG/KG	02/13/92	ABB	SW846,SEC 7.3
1	REACTIVITY: SULFIDE	<50 MG/KG	500 MG/KG	02/20/92	KAJ	SW846,SEC 7.3
1	TCLP SETUP - NON-VOLATILES	COMPLETED		02/14/92	JCD	EPA 1311
1	TCLP SETUP - VOLATILES	COMPLETED		02/15/92	TMZ	EPA 1311
1	TOTAL DISSOLVED SOLIDS-H20 LEACHATE	532 MG/L		02/18/92	REG	EPA 160.1
1	TOTAL ORGANIC HALOGENS	<50 MG/KG		02/18/92	SPK	EPA 9020/3050
1	TOTAL ORGANIC HALOGENS(WATER LEACH)	44 UG/L		02/19/92	SPK	EPA 9020
1	TOTAL SOLIDS	939000 MG/KG		02/18/92	REG	EPA 160.3
1	TOTAL SOLIDS (WATER LEACHATE)	532 MG/L		02/18/92	REG	EPA 209A

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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CERTIFICATE OF ANALYSIS

WMI North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 920471
Sample Date: N/A
Sampled By : GAR
Received : 02/12/92
Reported : 02/21/92
P.O. Number: N/A

RMC Number : 1214
Sample Description: COMP. OF COAL & FUEL PELLETS

Repl.	Parameter	Result	RCRA LIMITS	Date Anl Completed	Analyst	Method
1	TOTAL VOLATILE SOLIDS	674000 MG/KG		02/18/92	REG	EPA 160.4
1	TOTAL VOLATILE SOLIDS (WATER LEACH)	130 MG/L		02/18/92	REG	EPA 160.4
1	WATER LEACHATE SET UP	COMPLETED		02/13/92	WSP	ASTM D3987-85

Approved By:

Twila E. Dixon

Twila E. Dixon
Laboratory Operations Manager

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CERTIFICATE OF ANALYSIS

Summary of Toxicity Characteristic Leaching Procedure

CLIENT ID: COMP. OF COAL AND FUEL PELLETS
RMC ID: 1214

DATE ANALYZED: 2-19-92
ANALYZED BY: JAJ

Pesticides

	ug/l		ug/l
g-BHC (lindane)	<40	chlordane	<3.0
heptachlor	< 0.8	toxaphene	<50
heptachlor epoxide	< 0.8	methoxychlor	< 1000
endrin	<2.0		

<X = Not detected; value indicates minimum quantifiable limit.

Approved By:

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Semivolatile Analysis Data

Client I.D. : COMPOSITE OF COAL & FUEL PELLETS   Date Analyzed: 02/18/92

RMC I.D. : 1214 TCLP   Analyzed By: JVG

Compound	uG/L		QL	Compound	uG/L	QL
Pyridine	U		100	2,4,6-Trichlorophenol	U	100
2-Methylphenol	U		100	2,4,5-Trichlorophenol	U	500
Hexachloroethane	U		100	2,4-Dinitrotoluene	U	100
3- & 4-Methylphenol	4	J	100	Hexachlorobenzene	U	100
Nitrobenzene	U		100	Pentachlorophenol	U	500
Hexachlorobutadiene	U		100			

Surrogate Compounds	Recovery	
2-Fluorophenol	93	%
Phenol-d5	89	%
Nitrobenzene-d5	90	%
2-Fluorobiphenyl	81	%
2,4,6-Tribromophenol	110	%
Terphenyl-d14	138	%

QL : Sample Specific Quantitation Limit

Qualifiers

(J) Indicates an estimated value   (U) Indicates compound not detected

(B) Indicates compound found in blank   (D) Indicates surrogates have been diluted out

Approved By: [signature]

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Semivolatile Analysis Data

Client I.D. : COAL FOR COMBINING INTO MIX. Date Analyzed: 02/18/92

RMC I.D. : 1214 TCLP Analyzed By: JVG

Compound	uG/L		QL	Compound	uG/L	QL
Pyridine	U		100	2,4,6-Trichlorophenol	U	100
2-Methylphenol	U		100	2,4,5-Trichlorophenol	U	500
Hexachloroethane	U		100	2,4-Dinitrotoluene	U	100
3- & 4-Methylphenol	4	J	100	Hexachlorobenzene	U	100
Nitrobenzene	U		100	Pentachlorophenol	U	500
Hexachlorobutadiene	U		100			

Surrogate Compounds	Recovery
2-Fluorophenol	83 %
Phenol-d5	89 %
Nitrobenzene-d5	90 %
2-Fluorobiphenyl	91 %
2,4,6-Tribromophenol	110 %
Terphenyl-d14	138 %

QL : Sample Specific Quantitation Limit

Qualifiers
(J) Indicates an estimated value
(U) Indicates compound not detected
(B) Indicates compound found in blank
(D) Indicates surrogates have been diluted out

Approved By: [signature]

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Volatile Organic Analysis Data

CLIENT I.D. : COMP. OF COAL & FUEL PELLETS
RMC I.D. : 1214 TCLP

Date Analyzed : 02/18/92
Analyzed By : DAF

COMPOUND	UG/L	CRQL
Vinyl Chloride	U	100
1,1-Dichloroethene	U	50
Chloroform	U	50
1,2-Dichloroethane	U	50
2-Butanone	U	100
Carbon Tetrachloride	U	50

COMPOUND	UG/L	CRQL
Trichloroethene	U	50
Benzene	U	50
Tetrachloroethene	U	50
Chlorobenzene	U	50
1,2-Dichlorobenzene	U	50
1,4-Dichlorobenzene	U	50

SURROGATE COMPOUNDS	RECOVERY
1,2-Dichloroethane-d4	102 %
Toluene-d8	92 %
Bromofluorobenzene	92 %

CRQL = Contract Required Quantitation Limit

Qualifiers
(J) Indicates detected below CRQL
(U) Indicates compound not detected
(D) Indicates surrogates have been diluted out
(B) Indicates compound found in blank

Approved By ______________

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Semivolatile Analysis Data

Client I.D. : E0751 METHOD BLANK

Date Analyzed: 02/18/92

RMC I.D. : METHOD BLANK

Analyzed By: JVG

Compound	uG/L	QL	Compound	uG/L	QL
Pyridine	U	100	2,4,6-Trichlorophenol	U	100
2-Methylphenol	U	100	2,4,5-Trichlorophenol	U	500
Hexachloroethane	U	100	2,4-Dinitrotoluene	U	100
3- & 4-Methylphenol	U	100	Hexachlorobenzene	U	100
Nitrobenzene	U	100	Pentachlorophenol	U	500
Hexachlorobutadiene	U	100			

Surrogate Compounds	Recovery
2-Fluorophenol	47 %
Phenol-d5	38 %
Nitrobenzene-d5	87 %
2-Fluorobiphenyl	62 %
2,4,6-Tribromophenol	79 %
Terphenyl-d14	123 %

QL : Sample Specific Quantitation Limit

Qualifiers

(J) Indicates an estimated value

(B) Indicates compound found in blank

(U) Indicates compound not detected

(D) Indicates surrogates have been diluted out

Approved By: [signature]

RMC ENVIRONMENTAL SERVICES

CERTIFICATE OF ANALYSIS

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WMI North America
Three Greenwood Square
Bensalem, PA 19020

Report No. : 920555
Sample Date: N/A
Sampled By : GAR
Received : 02/12/92
Reported : 03/02/92
P.O. Number: N/A

RMC Number : 1607
Sample Description: COMPOSITE OF COAL AND FUEL PELLETS

Rep#	Parameter	Result	Date Anl Completed	Ana-lyst	Method
1	HEATING VALUE	11559 BTU/LB	03/02/92	*	EPA D3286 PT.26

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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CERTIFICATE OF ANALYSIS

RMC Environmental Chemistry Laboratory
Volatile Organic Analysis Data

CLIENT I.D. : 202053 METRCO BLANK
RMC I.D. : METRCO BLANK

Date Analyzed : 02/18/92
Analyzed By : DAF

COMPOUND	UG/L	CRQL	COMPOUND	UG/L	CRQL
Vinyl Chloride	U	10	Trichloroethene	U	5
1,1-Dichloroethene	U	5	Benzene	U	5
Chloroform	U	5	Tetrachloroethene	U	5
1,2-Dichloroethane	U	5	Chlorobenzene	U	5
2-Butanone	U	10	1,2-Dichlorobenzene	U	5
Carbon Tetrachloride	U	5	1,4-Dichlorobenzene	U	5

SURROGATE COMPOUNDS	RECOVERY
1,2-Dichloroethane-d4	100 %
Toluene-d8	93 %
Bromofluorobenzene	92 %

CRQL = Contract Required Quantitation Limit

Qualifiers
(J) Indicates detected below CRQL
(U) Indicates compound not detected
(D) Indicates surrogates have been diluted out
(B) Indicates compound found in blank

Approved By Ronald E. [illegible]

CHAIN OF CUSTODY RECORD

RMC USE ONLY

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4852

RMC ENVIRONMENTAL SERVICES

Client: Warner Co. (WMNA)
Sampler (initials): GAR
Job No.: 4031
Client Contact: GAR / MAW
Phone: 948-4700

Refrigerator #				
No./Type of Containers	1P			
Volume of Containers	100 Oz			
Preservative				
General Analysis Group Requested	Mod 1			

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected
(963)	Additive pellets	WS	
1214	Coal for combining into mixture (add 0.21 g pellets per gram coal).	SO	

MATRIX CODES: S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids; GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids; BI — Biological; O — Oil; A — Air; F — Fish; X — Other; G — Grab; C — Composite

BOTTLE CODES: G — Glass; P — Plastic

Special Instructions: Coal ... 1g coal + .21g pellets → ratio
KG
2-12-92

Sample Containers Prepared By:	Relinquished at Laboratory By:	Date	Time	Received By	For (Company)
Total No. Containers:					

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	[illegible]	[illegible]	2/12/92	300					

RMC Use Only

Samples Were:
1 Shipped or Hand Delivered
NOTES:

2 Ambient or Chilled
NOTES:

3 Received Broken/Leaking (Improperly Sealed) Y N
NOTES:

4 Properly Preserved Y N
NOTES: N/A MAD 2-12-92

5 Received Within Holding Times Y N
NOTES:

COC Tape Was:

1 Present on Outer Package Y N

2 Unbroken on Outer Package Y N

3 Present on Sample Y N

4 Unbroken on Sample Y N

NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

RMC reserves the right to charge $50.00 for unreturned preservative kits.

Original: Laboratory Yellow: Client

Sheet ____ of ____

RMC USE ONLY

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4852

RMC ENVIRONMENTAL SERVICES

Client: RMC

Sampler (Initials): ______

P.O. / Job No.: 9223007

Client Contact: Kelli Yocum

Phone: 327-4850

Refrigerator #	—								
No./Type of Containers	1/P								
Volume of Containers	250ml								
Preservative	—								
General Analysis / Group Requested	HV (NH2	Omit plant)							

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected	HV								
	1014	SO		Y								

MATRIX CODES:
S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids
GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids
BI — Biological; O — Oil; A — Air; F — Fish; X — Other
G — Grab; C — Composite

BOTTLE CODES:
G — Glass
P — Plastic

Special Instructions: Please report ASAP
no surcharge —

Sample Containers Prepared By: RDW	Relinquished at Laboratory By: ______	Date	Time	Received By	For (Company)
Total No. Containers: 1					

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	K. Wehrmann	UPS	2/1/92	1:30					

RMC Use Only

Samples Were:
1 Shipped or Hand-Delivered
NOTES:

2 Ambient or Chilled
NOTES:

3 Received Broken/Leaking (Improperly Sealed)
Y N
NOTES:

4 Properly Preserved
Y N/A N
NOTES:

5 Received Within Holding Times
Y N
NOTES:

COC Tape Was:

1 Present on Outer Package Y N

2 Unbroken on Outer Package Y N

3 Present on Sample Y N

4 Unbroken on Sample Y N

NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

RMC reserves the right to charge $50.00 for unreturned preservative kits. Original: Laboratory Yellow: Client

Sheet ____ of ____

PARTICULATE ANALYSIS

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2610

Report No. : 921066
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2755
Sample Description: TEST 1 FILTER

Repl.	Parameter	Result	Date And Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	5.5 MG	04/23/92	DMK	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

RMC ENVIRONMENTAL SERVICES

CERTIFICATE OF ANALYSIS

Tri-County Business Campus
38 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921065
Sample Date: N/A ,
Sampled By : TMH
Received : 05/30/92
Reported : 06/25/92
P.O. Number: N/A

RMC Number : 2736
Sample Description: TEST 1 FRONT 1/2 ACETONE RINSE

Repl.	Parameter	Result	Date Anl. Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	18.9 MG	06/21/92	DMK	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4882 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2610

Report No. : 929066
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/27/92
P.O. Number: N/A

RMC Number : 2737
Sample Description: TEST 1 IMPINGER SOL'N

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	TOTAL DISSOLVED SOLIDS (AIR)	35.2 MG	04/21/92	DMK	EPA 160.1
1	TOTAL SUSPENDED SOLIDS (AIR)	0.5 MG	04/21/92	DMK	EPA 160.2

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215-327-4850
215-327-4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921066
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2738
Sample Description: TEST 1 BACK 1/2 ACETONE RINSE

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	7.3 MG	04/21/92	DMC	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4952 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 6031-02-2410

Report No. : 921056
Sample Date: N/A
Sampled By : TNH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2739
Sample Description: TEST 2 FILTER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	4.2 MG	04/20/92	DMK	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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88 Robinson Street
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4051-02-2410

Report No. : 921056
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2760
Sample Description: TEST 2 FRONT 1/2 ACETONE RINSE

Rep't	Parameter	Result	Date Anl Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	15.3 MG	04/21/92	DMK	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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88 Robinson Street
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921065
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/27/92
P.O. Number: N/A

RMC Number : 2741
Sample Description: TEST 2 IMPINGER SOL'N

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	TOTAL DISSOLVED SOLIDS (AIR)	49.6 MG	04/21/92	DMC	EPA 160.1
1	TOTAL SUSPENDED SOLIDS (AIR)	0.1 MG	04/21/92	DMC	EPA 160.2

Approved By:

Tricia E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

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88 Robinson Street
Pottstown PA 19464
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2610

Report No. : 921066
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2742
Sample Description: TEST 2 BACK 1/2 ACETONE RINSE

Repl.	Parameter	Result	Date Anl Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	21.5 MG	04/21/92	DMK	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 FAX

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4051-02-2410

Report No. : 921056
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2743
Sample Description: BLANK FILTER

Rept	Parameter	Result	Date Anl. Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	0.8 MG	04/20/92	DMK	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921056
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2764
Sample Description: BLANK FROM 1/2 ACETONE RINSE

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	PADER PARTICULATE ANALYSIS	4.3 MG	04/21/92	CMK	PADER

Approved By:

Twila E. Olson
Laboratory Operations Manager

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4C31-02-2410

Report No. : 921066
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/27/92
P.O. Number: N/A

RMC Number : 2745
Sample Description: BLANK IMPINGER SOL'N

Repl.	Parameter	Result	Date Anl. Completed	Analyst	Method
1	TOTAL DISSOLVED SOLIDS (AIR)	2.7 MG	04/21/92	DMK	EPA 160.1
1	TOTAL SUSPENDED SOLIDS (AIR)	<0.1 MG	04/21/92	DMK	EPA 160.2

Approved By:

Twila E. Dixon
Laboratory Operations Manager

RMC USE ONLY

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4852

RMC ENVIRONMENTAL SERVICES

Client: Warren Lime

Sampler (Initials): T.M.H.

Job No.: 4031 Task 02

Client Contact: T. Harvey

Phone:

Refrigerator #											
No./Type of Containers	3/G	1/Poly									
Volume of Containers											
Preservative											
General Analysis Group Requested	Back Half										

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected	Back Half									
2735	Test 1 Filter	X		✓									
2736	Test 1 Front ½ Acetone Rinse	WW		✓									
2737	Test 1 Impinger Soln	WW		✓									
2738	Test 1 Back ½ Acetone Rinse	WW		✓									
2739	Test 2 Filter	X		✓									
2740	Test 2 Front ½ Acetone Rinse	WW		✓									
2741	Test 2 Impinger Soln	WW		✓									
2742	Test 2 Back ½ Acetone Rinse	WW		✓									
2743	Blank Filter	X		✓									
2744	Blank Front ½ Acetone Rinse	WW		✓									
2745	Blank Impinger Soln.	WW		✓									
~~2746~~	~~Blank Back ½ Acetone Rinse~~	~~WW~~		~~✓~~									
	Cancel #2746 as per phone conv. w/Tim Harvey												

MATRIX CODES:
S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids; GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids; BI — Biological; O — Oil; A — Air; F — Fish; X — Other; G — Grab; C — Composite

BOTTLE CODES: G — Glass; P — Plastic

Special Instructions: Report/Invoice to T. Harvey

Sample Containers Prepared By:	Relinquished at Laboratory By:	Date	Time	Received By	For (Company)
Total No. Containers:					

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	Timothy Harvey	[illegible]	3/11/02	1245					

RMC Use Only

Samples Were:
1 Shipped or Hand Delivered
NOTES:
2 Ambient or Chilled
NOTES:
3 Received Broken/Leaking (Improperly Sealed) Y N
NOTES:
4 Properly Preserved Y N
NOTES: N/A [illegible] 3/13/01
5 Received Within Holding Times Y N
NOTES:

COC Tape Was:
1 Present on Outer Package Y N
2 Unbroken on Outer Package Y N
3 Present on Sample Y N
4 Unbroken on Sample Y N
NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

SO_2/H_2SO_4 ANALYSIS

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 6051-02-2410

Report No. : 921067
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/13/92
P.O. Number: N/A

RMC Number : 2748
Sample Description: TEST 1 ISOPROPYL + FILTER

Repl	Parameter	Result	Date Anl. Completed	Analyst	Method
1	AIR - SULFITE	<0.5 MG/100 ML	04/08/92	KAJ	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921067
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/13/92
P.O. Number: N/A

RMC Number : 2749
Sample Description: TEST 1 IMPINGER 2 + 3

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	AIR-SULFUR DIOXIDE	264 MG/100 ML	04/02/92	KAJ	RADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
98 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921067
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/13/92
P.O. Number: N/A

RMC Number : 2750
Sample Description: TEST 1 IMPINGER 4

Repl	Parameter	Result	Date Anl. Completed	Ana-lyst	Method
1	AIR-SULFUR DIOXIDE	<0.5 MG/100 ML	04/03/92	KAJ	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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Tri-County Business Campus
38 Robinson Street
Pottstown, PA 19464
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4051-02-2410

Report No. : 921067
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/13/92
P.O. Number: N/A

RMC Number : 2752
Sample Description: TEST 2 ISOPROPYL + FILTER

Repl	Parameter	Result	Date Anl Completed	Ana-lyst	Method
1	AIR- SULFITE	<0.5 MG/100 ML	04/02/92	KAJ	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

RMG
ENVIRONMENTAL
SERVICES

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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215 • 327 • 4852 FAX

CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-8410

Report No. : 921067
Sample Date: N/A
Sampled By : TWH
Received : 03/30/92
Reported : 04/13/92
P.O. Number: N/A

RMC Number : 2755
Sample Description: TEST 2 IMPINGER 2 + 3

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	AIR-SULFUR DIOXIDE	277 MG/100 ML	04/02/92	KAJ	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 6031-02-2410

Report No. : 921067
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2754
Sample Description: TEST 2 IMPINGER 4

Repl	Parameter	Result	Date Anl Completed	Ana-lyst	Method
1	AIR-SULFUR DIOXIDE	<0.3 MG/100 ML	04/02/92	KAJ	PADER

Approved By:

Linda E. Dixon
Laboratory Operations Manager

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 - 327 - 4850
215 - 327 - 4852 FAX

CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921057
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

REPORT DESCRIPTION : 4031-02-2410

RMC Number : 2756
Sample Description: BLANK ISOPROPYL + FILTER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	AIR - SULFITE	<0.5 MG/100 ML	04/02/92	KAJ	PADER

Approved By:

Twila E. Dixon
Laboratory Operations Manager

RMC ENVIRONMENTAL SERVICES

CERTIFICATE OF ANALYSIS

Tri-County Business Campus
89 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02-2410

Report No. : 921067
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2757
Sample Description: BLANK IMPINGER 2 + 3 + 4

Rep#	Parameter	Result	Date Anl. Completed	Analyst	Method
1	AIR-SULFUR DIOXIDE	<0.5 MG/100 ML	04/02/92	KAJ	PADER

Approved By:

Tanya E. Dixon
Laboratory Operations Manager

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4852

RMC ENVIRONMENTAL SERVICES

Client: Weaver Lime(?)
Sampler (Initials): TMH
Job No.: 4031 task 02
Client Contact: T. Harvey
Phone:

Refrigerator #						
No./Type of Containers	1/P	1/P	1/P	1/Bag		
Volume of Containers	250	250	500	1 liter		
Preservative	–					
General Analysis / Group Requested	H_2SO_4	SO_2				

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected	H_2SO_4	SO_2					
2747	~~SO₂ / SO₂~~ Test 1 Filter	X		✓						
2748	Test 1 Isopropyl / ~~Imp~~ + Filter	WW		✓						
2749	Test 1 impinger 2 + 3				✓					
2750	Test 1 impinger 4				✓					
2751	Test 2 ~~SO₂ / SO₂~~ – Filter	X		✓						
2752	Test 2 isopropyl / + Filter	WW		✓						
2753	Test 2 impinger 2 + 3				✓					
2754	Test 2 impinger 4				✓					
2755	~~Blank SO₂/SO₂ Filter~~	X		✓						
2756	Blank isopropyl / + Filter	WW		✓						
2757	Blank impinger 2 + 3 + 4				✓					
	~~Blank impinger 4~~				✓					

MATRIX CODES: S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids; GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids; BI — Biological; O — Oil; A — Air; F — Fish; X — Other; G — Grab; C — Composite

BOTTLE CODES: G — Glass; P — Plastic

Special Instructions: Report / Invoice to T. Harvey
Cancel filters per Tim Harvey
JMW 3/26/93

Sample Containers Prepared By:	Relinquished at Laboratory By:	Date	Time	Received By	For (Company)
Total No. Containers:					

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	Timothy Harvey	J. Smith(?)	3/26/93	1315					

RMC Use Only

Samples Were:
1 Shipped or Hand Delivered
NOTES:
2 Ambient or Chilled
NOTES:
3 Received Broken/Leaking (Improperly Sealed) Y N
NOTES:
4 Properly Preserved Y N/A N
NOTES: JMW 3/26/93
5 Received Within Holding Times Y N
NOTES:

COC Tape Was:
1 Present on Outer Package Y N
2 Unbroken on Outer Package Y N
3 Present on Sample Y N
4 Unbroken on Sample Y N
NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

TOTAL HYDROCARBON ANALYSIS

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921007
Sample Date: 03/25/92
Sampled By : TNH
Received : 03/25/92
Reported : 04/02/92
P.O. Number: N/A

REPORT DESCRIPTION : 4031
WARNER LINE

RMC Number : 2567
Sample Description: AQUEOUS THC 2-WARNER

Repl	Parameter	Result	Date Anl. Completed	Analyst	Method
1	TOTAL HYDROCARBONS IN WATER (BY GC)	<2.0 PPM AS METHANE	03/26/92	SDF	ASTM D 3328

Warner THC's

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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Tri-County Business Campus
88 Robinson Street
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031
WARNER LINE

Report No. : 921007
Sample Date: 03/25/92
Sampled By : TMH
Received : 03/25/92
Reported : 04/02/92
P.O. Number: N/A

RMC Number : 2569
Sample Description: GASEOUS THC 2-WARNER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	TOTAL HYDROCARBONS IN AIR (BY GC)	50 PPM AS METHANE	03/26/92	SCF	ASTM D 3325B

Approved By:

Twila E. Dixon
Laboratory Operations Manager

RMC
ENVIRONMENTAL
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4051
WARNER LINE

Report No. : 921007
Sample Date: 03/25/92
Sampled By : TMH
Received : 03/25/92
Reported : 04/02/92
P.O. Number: N/A

RMC Number : 2565
Sample Description: AQUEOUS THC 1-WARNER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	TOTAL HYDROCARBONS IN WATER (BY GC)	<2.0 PPM AS METHANE	03/26/92	SDF	ASTM D 3328

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031
WARNER LINE

Report No. : 921007
Sample Date: 05/25/92
Sampled By : TMH
Received : 05/25/92
Reported : 06/02/92
P.O. Number: N/A

RMC Number : 2568
Sample Description: GASEOUS THC 1-WARNER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	TOTAL HYDROCARBONS IN AIR (BY GC)	28 PPM AS METHANE	05/26/92	SDF	ASTM D 5525B

Approved By:

Twila E. Dixon
Laboratory Operations Manager

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
63 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921007
Sample Date: N/A
Sampled By : N/A
Received : 03/25/92
Reported : 04/02/92
P.O. Number: N/A

REPORT DESCRIPTION : 4031
WARNER LINE

RMC Number : 2570
Sample Description: TRIP BLANK

Repl.	Parameter	Result	Date An. Completed	Ana- lyst	Method
1	TOTAL HYDROCARBONS IN WATER (BY GC)	<2.0 PPM AS METHANE	03/26/92	SCF	ASTM D 3328

Approved By:

Twila E. Dixon
Laboratory Operations Manager

RMC USE ONLY

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4852

RMC ENVIRONMENTAL SERVICES

Client RMC - Tim Harvey

Sampler (initials) TWH

Job No. 4031

Client Contact T. Harvey

Phone 948-4700

Refrigerator #									
No./Type of Containers	1/G	1/G	2/G						
Volume of Containers	60 ml	40 ml	40 ml						
Preservative									
General Analysis / Group Requested	total hydrocarbons as Methane, by G.C.								

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected									
2566	Aqueous THC 1 - Warner	Stack	3-25-92	1								
2567	" " THC 2 - Warner	S		1								
2568	Gaseous THC 1 - Warner	S		1								
2569	Gaseous THC 2 - Warner	S		1								
2570	Trip Blank -	Water			2							

MATRIX CODES: S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Water Waste(?); DS — Drum Solids; GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids; BI — Biological; O — Oil; A — Air; T — Tissue; X — Other; G — Grab; C — Composite

BOTTLE CODES: G — Glass; P — Plastic

Special Instructions:

Sample Containers:
Prepared By: ______
Total No. Containers: ______

Relinquished at Laboratory By: ______

Date	Time	Received By	For (Company)

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	Tim Harvey	[illegible]	3/26/92	1520					

RMC Use Only

Samples Were:
1 Shipped or ~~Hand~~ Delivered
NOTES:
2 Ambient or Chilled
NOTES:
3 Received Broken/ Leaking (Improperly Sealed)
Y N
NOTES:
4 Properly Preserved
Y N/A N
NOTES: WD 3-26-92
5 Received Within Holding Times
Y N
NOTES:

COC Tape Was:
1 Present on Outer Package Y N
2 Unbroken on Outer Package Y N
3 Present on Sample Y N
4 Unbroken on Sample Y N
NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

RMC reserves the right to charge $50.00 for unreturned preservative kits. Original: Laboratory Yellow: Client Sheet ____ of ____

CHLORIDE ANALYSIS

RMC
ENVIRONMENTAL
SERVICES

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 924065
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

REPORT DESCRIPTION : 4051-02 (2410)

RMC Number : 2705
Sample Description: HCL/CL2 TEST 1 H2SO4

Rep.	Parameter	Result	Date Anl. Completed	Ana-lyst	Method
1	CHLORIDE, ION CHROMATOGRAPHY	630 MG/L	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

RMC ENVIRONMENTAL SERVICES

CERTIFICATE OF ANALYSIS

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02 (2610)

Report No. : 921063
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2706
Sample Description: HCL/CL2 TEST 1 NAOH

Rep.	Parameter	Result	Date And Completed	Analyst	Method
1	CHLORIDE, ION CHROMATOGRAPHY	12 MG/L	04/09/92	*	

Approved By:

Tanya E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4C31-02 (2410)

Report No. : 921065
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2707
Sample Description: HCL/CL2 TEST 2 H2SO4

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	CHLORIDE, ION CHROMATOGRAPHY	500 MG/L	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4C31-02 (2510)

Report No. : 921068
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2708
Sample Description: HCL/CL2 TEST 2 MACH

Repl	Parameter	Result	Date Anl. Completed	Analyst	Method
1	CHLORIDE, ION CHROMATOGRAPHY	<5 MG/L	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

RMG ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4C33-C2 (2410)

Report No. : 921063
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2709
Sample Description: *CL/CL2 BLANK 82806

Rept	Parameter	Result	Date Anl Completed	Analyst	Method
1	CHLORIDE, ION CHROMATOGRAPHY	6 MG/L	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

RMC ENVIRONMENTAL SERVICES

CERTIFICATE OF ANALYSIS

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3650 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 6031-02 (2410)

Report No. : 921065
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/15/92
P.O. Number: N/A

RMC Number : 2710
Sample Description: HCL/CL2 BLANK NAOH

Repl	Parameter	Result	Date Anl. Completed	Ana-lyst	Method
1	CHLORIDE, ION CHROMATOGRAPHY	<5 MG/L	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

RMC USE ONLY

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4882

RMC ENVIRONMENTAL SERVICES

Client: Warner Lmbt
Sampler (Initials): TMH
Job No.: 4031 Task 02
Client Contact: T. Harvey
Phone:

Refrigerator #	
No./Type of Containers	1P
Volume of Containers	250ml
Preservative	
General Analysis Group Requested	Chlorides by I.C.

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected	Chlorides by I.C.
2705	HCl/Cl₂ Test 1 H₂SO₄	WW		✓
2706	" " Test 1 NaOH			✓
2707	HCl/Cl₂ Test 2 H₂SO₄			✓
2708	" Test 2 NaOH			✓
2709	HCl/Cl₂ Blank H₂SO₄			✓
2710	" Blank NaOH	WW		✓

MATRIX CODES: S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids; GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids; BI — Biological; O — Oil; A — Air; F — Fish; X — Other; G — Grab; C — Composite

BOTTLE CODES: G — Glass; P — Plastic

Special Instructions: Rpt/Inv. to T. Harvey

Sample Containers Prepared By:	Relinquished at Laboratory By:	Date	Time	Received By	For (Company)
Total No. Containers:					

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	Trud. Harvey	N. Smith	12/16/98	12/5					

RMC Use Only

Samples Were:
1 Shipped or Hand-Delivered
NOTES:

2 Ambient or Chilled
NOTES:

3 Received Broken/Leaking (Improperly Sealed)
Y N
NOTES:

4 Properly Preserved
Y N
NOTES: N/A
[illegible] 12/16/98

5 Received Within Holding Times
Y N
NOTES:

COC Tape Was:

1 Present on Outer Package Y N

2 Unbroken on Outer Package Y N

3 Present on Sample Y N

4 Unbroken on Sample Y N

NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

RMC reserves the right to charge $50.00 for unreturned preservative kits. Original: Laboratory Yellow: Client Sheet ____ of ____

HEAVY METALS ANALYSIS

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
98 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921064
Sample Date: N/A
Sampled By : TKH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

REPORT DESCRIPTION : 4051-02 (2410)

RMC Number : 2711
Sample Description: TEST 1 FILTER

Repl	Parameter	Result	Date Anl Completed	Ana-lyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4051-02 (2410)

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 3712
Sample Description: TEST 1 ACETONE/NITRIC RINSE

Rept.	Parameter	Result	Date Anl Completed	Ana-lyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Tanja E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4081-02 (2410)

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2715
Sample Description: TEST 1 H202/HN03

Rept.	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

* This analysis was subcontracted

Approved By:

Twila E. Dixon
Laboratory Operations Manager

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ENVIRONMENTAL SERVICES
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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 6031-02 (2410)

Report No. : 921054
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2714
Sample Description: TEST 1 KMNO4 SOLN

Repl	Parameter	Result	Date Anl. Completed	Ana-lyst	Method
1	METALS, AIR	0.87 UG	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

PA DER LAB ID: 46-253 • NJ DEP LAB ID: 77434 • VA DGS LAB ID: 00298 • CT DHS LAB ID: PH-0667 • MD DHS LAB ID: 150 • WV DH LAB ID: 40 • DE HSS: CERTIFIED • MI DPH: CERTIFIED

CERTIFICATE OF ANALYSIS

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Tri-County Business Campus
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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

REPORT DESCRIPTION : 4031-02 (2410)

RMC Number : 2715
Sample Description: TEST 2 FILTER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4051-02 (2410)

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2715
Sample Description: TEST 2 ACETONE/NITRIC RINSE

Rep#	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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CERTIFICATE OF ANALYSIS

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02 (2410)

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2717
Sample Description: TEST 2 H2O2/HNO3

Repl.	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

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Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921064
Sample Date: N/A
Sampled By : THH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

REPORT DESCRIPTION : 4061-02 (2410)

RMC Number : 2718
Sample Description: TEST 2 KMNO4 SOL'N

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	1.3 UG	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

RMC ENVIRONMENTAL SERVICES

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Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02 (2410)

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2719
Sample Description: BLANK FILTER

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
98 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/25/92
P.O. Number: N/A

REPORT DESCRIPTION : 6031-02 (2410)

RMC Number : 3720
Sample Description: BLANK - ACETONE NITRIC RINSE

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

RMC
ENVIRONMENTAL SERVICES

CERTIFICATE OF ANALYSIS

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38 Robinson Street
Pottstown, PA 19464
215 • 327 • 4850
215 • 327 • 4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

REPORT DESCRIPTION : 4031-02 (2610)

Report No. : 921056
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

RMC Number : 2721
Sample Description: BLANK - H2O2/HNO3

Repl	Parameter	Result	Date Anl Completed	Analyst	Method
1	METALS, AIR	SEE ATTACHMENT	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

CERTIFICATE OF ANALYSIS

RMC ENVIRONMENTAL SERVICES
Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
215-327-4850
215-327-4852 Fax

Tim Harvey - RMC
3450 Schuylkill Road
Spring City, PA 19475

Report No. : 921064
Sample Date: N/A
Sampled By : TMH
Received : 03/30/92
Reported : 04/23/92
P.O. Number: N/A

REPORT DESCRIPTION : 4051-02 (2410)

RMC Number : 2722
Sample Description: BLANK - KP-04 SOL'N

Rep#	Parameter	Result	Date An. Completed	Analyst	Method
1	METALS, ACR	<0.5 UG	04/09/92	*	

Approved By:

Twila E. Dixon
Laboratory Operations Manager

* This analysis was subcontracted

Galson Laboratories LABORATORY ANALYSIS REPORT

Client : RMC Environmental Services
Site : NS
Date Sampled : NS
Date Received : 31-MAR-92

Account No. : 11315
Login No. : 7716

MULTIPLE METALS		211 212 213	215 216 217	219 220 221
	Lab ID:	7716-001	7716-002	7716-003
ELEMENT	Sample ID:	1B-A-MM-ABCD	2A-A-MM-ABCD	3B-A-MM-ABCD
ARSENIC	TOTAL MG	<0.001	<0.001	0.002
BERYLLIUM		<0.001	<0.001	<0.001
CADMIUM		0.005	0.004	0.001
CHROMIUM		0.013	0.007	0.005
LEAD		0.092	0.041	0.001
MERCURY		0.0019	0.0012	<0.0006
NICKEL		0.015	0.024	<0.008

Analytical Method: EPA Methods Manual for Compliance with BIF Regulations.

Collection Media: Combined filter, acetone/HNO3 rinse, HNO3/H2O2 impinger, and probe rinse.

Submitted by: RMC ES, Inc
Approved by: [signature]
Date: 4/9/92
QC by:
Faxed: 4/10/92 Phoned:

< -Less Than	mg -Milligrams	corr -Corrected
> -Greater Than	ug -Micrograms	g -Grams
NA -Not Applicable	ND -Not Detected	bl -Blank
NS -Not Specified		diff-Difference

Galson Laboratories

LABORATORY ANALYSIS REPORT

Client : RMC Environmental Services
Site : NS
Date Sampled : NS
Date Received : 31-MAR-92

Account No. : 11315
Login No. : 7716

MERCURY

Sample ID	Lab ID	TOTAL UG
2714	7716-004	0.87
2718	7716-005	1.3
2722	7716-006	<0.5

Analytical Method: EPA Methods Manual for Compliance with BIF Regulations.

Collection Media: KMnO4 Impinger

Submitted by: JO
Approved by: Mary Madhavan
Date: 4/9/92
QC by:
Faxed: 4/10/92 Phoned:

< -Less Than
> -Greater Than
NA -Not Applicable
NS -Not Specified

mg -Milligrams
ug -Micrograms
ND -Not Detected

corr -Corrected
g -Grams
bl -Blank
diff-Difference

RMC USE ONLY

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
FAX (215) 327-4852

RMC ENVIRONMENTAL SERVICES

Client: Weiner Lime

Sampler (initials): TMH

Job No.: 4031 Task 02

Client Contact: T. Harvey

Phone: ______

	(1)	(2)	(3)						
Refrigerator #									
No./Type of Containers	1P	1P	1P						
Volume of Containers	4x1	250	500						
Preservative									
General Analysis Group Requested	Arsenic	Beryllium	Cadmium	Total Chromium	Lead	Nickel	Mercury		

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected	Arsenic	Beryllium	Cadmium	Total Chromium	Lead	Nickel	Mercury		
2711	Heavy Metals Test 1 Filter	X		✓	✓	✓	✓	✓	✓	✓		
2712	Test 1 Acetone/Nitric Rinse	WW		✓	✓	✓	✓	✓	✓	✓		
2713	Test 1 H_2O_2/HNO_3	WW		✓	✓	✓	✓	✓	✓	✓		
2714	Test 1 $KMnO_4$ soln	WW								✓		
2715	Heavy Metals Test 2 Filter	X		✓	✓	✓	✓	✓	✓	✓		
2716	Test 2 Acetone/Nitric Rinse	WW		✓	✓	✓	✓	✓	✓	✓		
2717	Test 2 H_2O_2/HNO_3	WW		✓	✓	✓	✓	✓	✓	✓		
2718	Test 2 $KMnO_4$ soln	WW								✓		
2719	Heavy Metals Blank Filter	X		✓	✓	✓	✓	✓	✓	✓		
2720	~~Blank~~ - Acetone/Nitric Rinse	WW		✓	✓	✓	✓	✓	✓	✓		
2721	BLANK - H_2O_2/HNO_3	WW		✓	✓	✓	✓	✓	✓	✓		
2722	BLANK - $KMnO_4$ soln	WW								✓		

MATRIX CODES: S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids; GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids; BI — Biological; O — Oil; A — Air; F — Fish; X — Other; G — Grab; C — Composite

BOTTLE CODES: G — Glass; P — Plastic

Special Instructions: Rpt / Inv. to T. Harvey

Sample Containers Prepared By: ______ Total No. Containers: ______	Relinquished at Laboratory By: ______	Date	Time	Received By	For (Company)

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	Timothy Harvey	D. Smith	3-30-96	1215					

RMC Use Only

Samples Were:
1 Shipped or Hand-Delivered
NOTES:

2 Ambient or Chilled
NOTES:

3 Received Broken/Leaking (Improperly Sealed) Y N
NOTES:

4 Properly Preserved Y N
NOTES: N/A

5 Received Within Holding Times Y N
NOTES:

COC Tape Was:

1 Present on Outer Package Y N

2 Unbroken on Outer Package Y N

3 Present on Sample Y N

4 Unbroken on Sample Y N

NOTES:

403/3096

DIOXIN/FURAN ANALYSIS

STACK TEST RESULTS - DIOXIN & FURAN

SOURCE: Warner Company Lime Kiln #2 TEST DATE: 28 March, 1992

LABORATORY DATA	Run #1	Run #2
Contaminant Mass, ng		
2378-TCDD	0.00	0.00
12378-PeCDD	0.02	0.00
123478-HxCDD	0.01	0.00
123678-HxCDD	0.03	0.40
123789-HxCDD	0.04	0.00
1234678-HpCDD	0.23	0.16
OCDD	0.90	0.27
2378-TCDF	0.14	0.14
12378-PeCDF	0.04	0.04
23478-PeCDF	0.04	0.04
123478-HxCDF	0.15	0.14
123678-HxCDF	0.04	0.05
234678-HxCDF	0.05	0.05
123789-HxCDF	0.00	0.00
1234678-HpCDF	0.19	0.14
1234789-HpCDF	0.04	0.00
OCDF	0.12	0.14
TOTAL TCDD	0.38	0.32
TOTAL PeCDD	0.47	0.25
TOTAL HxCDD	0.49	0.39
TOTAL HpCDD	0.54	0.43
TOTAL TCDF	0.52	0.41
TOTAL PeCDF	0.29	0.25
TOTAL HxCDF	0.38	0.35
TOTAL HpCDF	0.33	0.18

RMC USE ONLY

CHAIN OF CUSTODY RECORD

Tri-County Business Campus
88 Robinson Street
Pottstown, PA 19464
(215) 327-4850
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RMC ENVIRONMENTAL SERVICES

Client Warner Lim
Sampler (Initials) TMH
Job No. 4031 Task 02
Client Contact T. Harvey
Phone

Refrigerator #											
No./Type of Containers	3		(4) 3	N/A							
Volume of Containers	1 Liter		6/2	...with							
Preservative											
General Analysis Group Requested	Diox/Furan EPA-0023										

RMC Only Lab ID	Sample Identification	Matrix Code	Date/Time Collected	Diox/Furan EPA-0023								
2723	Diox/Furan Test 1 XAD	X		✓								
2724	Test 1 Acetone/Methylene Chlor.	WW		✓								
2725	Test 1 Toluene	WW		✓								
2726	Test 1 Filter	X		✓								
2727	Diox/Furan Test 2 XAD	X		✓								
2728	Test 2 Acetone/Methylene Chloride	WW		✓								
2729	Test 2 Toluene	WW		✓								
2730	Test 2 Filter	X		✓								
2731	Diox/Furan Blank XAD	X		✓								
2732	Blank - Acetone/Methylene Chloride	WW		✓								
2733	Blank - Toluene	WW		✓								
2734	Blank - Filter	X		✓								

MATRIX CODES:
S — Soil; SE — Sediment; SO — Solid; SL — Sludge; WS — Solid Waste; DS — Drum Solids
GW — Groundwater; SW — Surface Water; WW — Waste Water; PW — Potable Water; DL — Drum Liquids
BI — Biological; O — Oil; A — Air; F — Fish; X — Other
G — Grab; C — Composite

BOTTLE CODES
G — Glass
P — Plastic

Special Instructions: RPT / Invoice to T. Harvey

Sample Containers Prepared By: Total No. Containers:	Relinquished at Laboratory By:	Date	Time	Received By	For (Company) -

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	Timothy Harvey	[illegible]	3-30-92	1315					

RMC Use Only

Samples Were:
1 Shipped or Hand Delivered
NOTES:

2 Ambient or Chilled
NOTES:

3 Received Broken/ Leaking (Improperly Sealed)
Y N
NOTES:

4 Properly Preserved
Y N
NOTES: N/A MD 3-30-92

5 Received Within Holding Times
Y N
NOTES:

COC Tape Was:

1 Present on Outer Package Y N

2 Unbroken on Outer Package Y N

3 Present on Sample Y N

4 Unbroken on Sample Y N

NOTES:

Discrepancies Between Sample Labels and COC Record? Y N
NOTES:

TRIANGLE LABORATORIES OF RTP, INC.
PCDD/PCDF 2378X ANALYSIS (aa)

04/10/92

FILE NAME....: SS21618
CONCAL.......: SS21612
ANALYST......: SP
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.......: RMC
SAMPLE ID....: 2723,2724,2726
ANALYSIS DATE: 04/04/92
SAMPLE MATRIX: MM5
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: *
PROJECT NUMBER: 20522A
DATE RECEIVED.: 03/31/92
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.008				____
12378-PeCDD	0.02				1.46	30:47	____
123478-HxCDD	0.01				1.16	33:51	____
123678-HxCDD	0.03				1.17	33:56	____
123789-HxCDD	0.04				1.11	34:16	____
1234678-HpCDD	0.29				0.93	37:15	B
OCDD	1.2				0.82	41:01	B
2378-TCDF	0.14				0.79	25:58	____
12378-PeCDF	0.04				1.56	29:47	____
23478-PeCDF	0.05				1.54	30:27	____
123478-HxCDF	0.15				1.10	33:10	____
123678-HxCDF	0.04				1.06	33:16	____
234678-HxCDF	0.05				1.07	33:45	____
123789-HxCDF	ND		0.01				____
1234678-HpCDF	0.19				0.94	36:13	____
1234789-HpCDF	0.04				1.07	37:47	____
OCDF	EMPC			0.16			____
TOTAL TCDD	0.38	4		0.47	0.78		____
TOTAL PeCDD	0.47	6			1.55		____
TOTAL HxCDD	0.49	6			1.18		____
TOTAL HpCDD	0.54	2			1.09		____
TOTAL TCDF	0.52	11		0.54	0.73		____
TOTAL PeCDF	0.29	8		0.37	1.51		____
TOTAL HxCDF	0.38	7		0.39	1.16		____
TOTAL HpCDF	0.33	4			1.05		____

* TLI SAMPLE ID.:55-55-1,2,4

Reviewed By: | TM 4/20/92 |

X237_RPT 4.00, LARS 4.20

TRIANGLE LABORATORIES OF RTP, INC.
PCDD/PCDF 2378X ANALYSIS (aa) QA/QC SUMMARY

FILE NAME....: S921618
CONCAL.......: S921612
ANALYST......: SP
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.......: RMC
SAMPLE ID....: 2723,2724,2725
ANALYSIS DATE: 04/04/92
SAMPLE MATRIX: MM5
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: *
PROJECT NUMBER: 20522A
DATE RECEIVED.: 03/31/92
DATE COLLECTED: / /
CLIENT PROJECT: n/a

SURROGATE RECOVERY SUMMARY (TYPE AA)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	5.3	132		25:38	....
13C12-PeCDF 234	4.7	117	1.59	30:27	....
13C12-HxCDF 478	4.9	122	0.52	33:09	....
13C12-HxCDD 478	4.6	115	1.20	33:51	....
13C12-HpCDF 789	5.3	134	0.46	37:47	....

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE AA)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	4.2	105	0.51	34:32	....
13C12-HxCDF 234	4.3	109	0.52	33:45	....

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.2	81.1	0.75	25:56	....
13C12-2378-TCDD	2.9	73.2	0.82	25:38	....
13C12-PeCDF 123	3.4	85.7	1.57	29:47	....
13C12-PeCDD 123	2.5	63.7	1.48	30:46	....
13C12-HxCDF 678	4.0	99.6	0.50	33:15	....
13C12-HxCDD 678	3.7	93.6	1.21	33:56	....
13C12-HpCDF 678	4.1	102	0.44	36:12	....
13C12-HpCDD 678	3.8	95.9	1.01	37:15	....
13C12-OCDD	6.1	76.4	0.84	41:00	....

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.80	26:27	....
13C12-HxCDD 789	1.22	34:15	....

Reviewed By: TW 4/10/92

X237_RPT 4.00, LARS 4.20

	Initial	Date
E-File/Header Changes	[illegible]	[illegible]
Manual Integrations		
Transcription		
Phase Corrections		

[illegible]

Page No. 1
04/08/92

Listing of 9921s188.dbf

Matched GC Peaks / Ratio / Ret. Time

m/z	Cal?	Ratio	RT	Area	Match Rat	Match RT	Rel_RT	Who/Why
304		0.51	22:53	116.42	[illegible]	F	0.882	
		0.70	23:24	138.54	T	F	0.902	
		0.75	23:38	182.53	T	F	0.91[illegible]	
		0.78	24:00	630.73	T	F	0.925	
		0.66	24:19	570.41	T	F	0.938	
		0.79	24:41	482.60	T	F	0.952	
		0.76	24:58	471.59	T	F	0.963	
re-integrate		~~[illegible]~~	25:22	~~909.25~~ 986	[illegible]	F	0.978	
		0.69	25:33	553.62	[illegible]	F	0.985	
		0.65	25:46	198.76	[illegible]	F	0.994	
		0.79	25:58	1572.73	T	T	1.001	
		0.84	26:22	244.18	T	F	1.017	
		0.91	26:34	144.63	F	F	1.024	
		1.28	26:49	20.61	F	F	1.034	
		2.09	27:31	30.99	F	F	1.061	S/N
		1.05	27:39	46.25	F	F	1.066	
	DC	0.84	28:56	19.65	T	F	1.116	WH
	DC	0.33	29:53	208.91	F	F	1.152	WH
	DC	1.80	31:36	148.93	F	F	1.219	WH
304		*** Total ***		5691.43	# of Peaks:		19	
316		0.75	24:56	230.63	T	F	0.961	
		0.72	25:33	474.85	T	F	0.985	
		0.76	25:56	48187.98	T	T	1.000	
		1.17	26:21	441.27	F	F	1.015	
	DC	1.11	27:37	99.91	F	F	1.065	WH
	DC	0.75	29:47	970.46	T	F	1.148	WH
	DC	0.74	30:28	986.85	[illegible]	F	1.175	WH
316		*** Total ***		51391.95	# of Peaks:		7	
320		0.75	24:10	2139.25	T	F	0.907	
		0.85	24:33	381.85	[illegible]	F	0.922	
		0.54	24:50	120.66	F	F	0.932	
		0.64	25:29	295.20	F	F	0.957	
		0.55	25:46	137.08	F	F	0.967	
plot, noise		0.71	26:08	75.75	T	F	0.981	
		0.92	26:27	250.53	T	F	0.993	
		0.98	26:30	198.50	F	F	0.995	
		0.39	26:49 D	29.18	F	F	1.007	
	DC	0.80	29:02	23.87	T	F	1.090	WH
	DC	0.48	29:47	208.57	F	F	1.118	WH
	DC	0.31	29:50	53.26	F	F	1.120	WH
	DC	0.63	30:05	31.64	F	F	1.130	WH

Page No. 1
04/08/92

Listing of S9215_8F.dbf

Matched GC Peaks / Ratio / Ret. Time

M_Z	Unit	Ratio	RT	Area	Match Rat	Match RT	REL_RT	Who/ Why
320	DC	0.48	30:27	725.80	F	F	1.143	WH
	DC	1.95	30:40	21.60	F	F	1.151	WH
	DC	1.24	31:09	26.97	F	F	1.170	WH
	DC	0.36	31:22	36.11	F	F	1.178	WH
320		*** Total ***		4725.79	# of Peaks:		17	
328		0.00	25:18	267.70	T	T	0.950	
		0.00	26:38	38385.66	T	T	1.000	
		0.00	27:00	541.01	T	F	1.014	
		0.00	27:12	27.14	T	F	1.021	
	DC	0.00	28:57	150.27	T	F	1.087	WH
	DC	0.00	29:52	3569.85	T	F	1.121	WH
	DC	0.00	30:09	78.86	T	F	1.132	WH
	DC	0.00	30:33	313.68	T	F	1.147	WH
328		*** Total ***		42935.17	# of Peaks:		8	
332		0.56	25:29	73.53	F	F	0.957	
		0.80	26:27	34794.24	T	T	0.993	
		0.82	26:38	32530.08	T	T	1.000	
	DC	1.15	30:47	414.10	F	F	1.156	WH
332		*** Total ***		67811.95	# of Peaks:		4	
340	DC	0.91	27:08	40.85	F	F	0.911	WL
	DC	0.37	27:26	46.07	F	F	0.921	WL
	DC	0.46	27:37	25.35	F	F	0.927	WL
		1.57	27:51	216.03	T	F	0.935	
		1.14	28:49	152.14	F	F	0.968	
		1.41	28:56	740.15	T	F	0.971	
		2.86	29:05	127.82	F	F	0.977	
		1.83	29:15	33.52	F	F	0.982	
		1.57	29:24	125.90	T	F	0.987	
		2.04	29:30	276.95	F	F	0.990	
		1.11	29:42	171.74	F	F	0.997	
		1.56	29:47	392.02	T	T	1.000	
		1.44	29:56	142.53	T	F	1.005	
		1.63	30:04	317.91	T	F	1.010	
		1.54	30:27	399.84	T	T	1.022	
		1.39	30:36	273.24	T	F	1.027	
		1.65	30:55	24.94	T	F	1.038	
		1.48	31:08	17.30	T	F	1.045	
340		*** Total ***		3525.30	# of Peaks:		18	
352		1.70	28:55	165.87	T	F	0.971	
		1.87	29:24	124.50	F	F	0.987	
		1.57	29:47	33227.39	T	T	1.000	
		2.46	30:03	1001.88	F	F	1.009	
		1.59	30:27	36509.83	T	T	1.022	
		1.93	31:24	360.58	F	F	1.054	
352		*** Total ***		71390.05	# of Peaks:		6	
356		1.63	29:02	667.49	T	F	0.944	
		0.80	29:23	21.69	F	F	0.958	
		1.51	29:44	559.18	T	F	0.965	

Listing of S921s188.dbf

Matched 30 Peaks / Ratio / Ret. Time

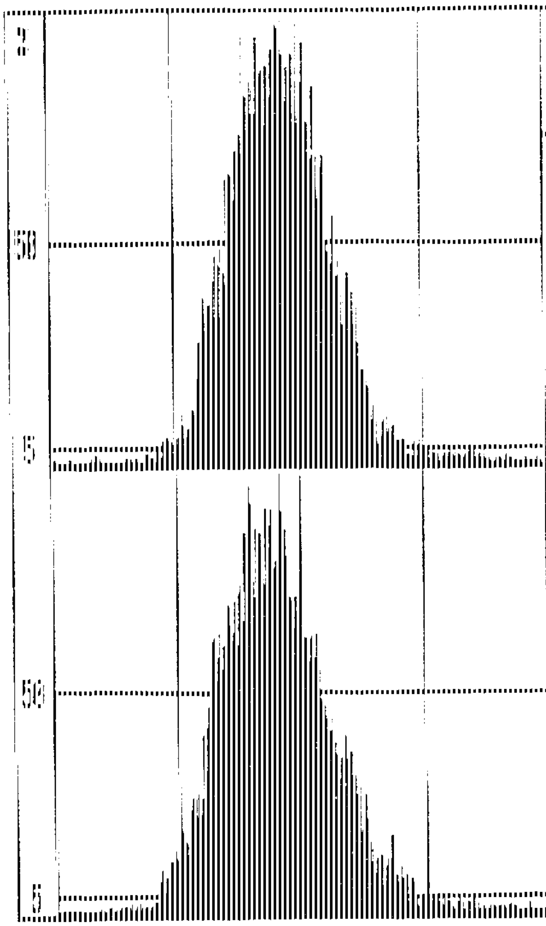
M_Z	Omit	Ratio	RT	Area	Match Ret	Match Ql	Rel_RT	[illegible]
356		1.41	29:52	106.93	T	F	0.971	
		1.71	30:04	384.21	T	F	0.977	
	D	0.42	30:18	42.41	F	F	0.985	
		1.53	30:29	109.51	T	F	0.991	
	D	0.53	30:38	51.93	I	F	0.996	
		1.48	30:47	62.06	T	T	1.001	
356		*** Total ***		2004.40	# of Peaks		7	
368	split	~~[illegible]~~ 1.48	30:46	~~[illegible]~~ 13786	T	T	1.001	
		1.51	31:15	171.44	T	T	1.015	
368		*** Total ***		14277.30	# of Peaks		2	
374		1.21	32:13	248.15	T	F	0.969	
		1.14	32:21	561.69	T	F	0.973	
	D	0.85	32:38	47.39	F	F	0.981	
		1.31	32:47	77.61	T	F	0.986	
		1.10	33:10	1067.61	T	T	0.997	
		~~[illegible]~~	33:15	~~560.20~~ 497	~~F~~ T	T	1.001	
		1.34	33:32	101.15	T	F	1.009	
		1.07	33:45	388.72	T	T	1.015	
	D	0.66	33:53	15.55	F	F	1.019	
		1.00	34:37	120.28	F	~~[illegible]~~ F	~~1.044~~	1.999
	DC	1.02	35:04	12.88	F	F	1.055	WH
374		*** Total ***		3297.23	# of Peaks:		11	
384		0.52	33:09	33044.60	T	T	0.997	
		0.50	33:15	34058.16	T	T	1.000	
		0.95	33:30	740.50	F	F	1.008	
		0.52	33:45	32018.55	T	T	1.015	
		0.51	34:32	23564.91	T	T	1.039	
384		*** Total ***		123426.72	# of Peaks:		5	
390		1.21	32:41	203.44	T	F	0.963	
		1.20	33:07	1381.30	T	F	0.976	
		1.18	33:20	566.20	T	F	0.982	
	D	1.75	33:30	74.41	F	F	0.987	
	split	~~0.92~~	~~33:38~~	~~[illegible]~~	~~F~~ T	~~F~~ T	~~0.991~~	.997
		~~[illegible]~~ 1.07	33:56	~~295.56~~	~~F~~ T	T	1.000	
		1.11	34:16	139.58	T	T	1.010	
390		*** Total ***		2725.49	# of Peaks:		7	
402		1.20	33:51	19433.52	T	T	0.998	
		1.21	33:56	23710.39	T	T	1.000	
		1.22	34:15	22899.94	T	T	1.009	
		1.97	34:36	151.89	F	F	1.020	
		2.99	34:42	100.41	F	F	1.023	
402		*** Total ***		66296.15	# of Peaks:		5	
408		0.94	36:12	1377.57	T	T	1.000	
		1.13	36:28	111.91	T	F	1.007	
		0.99	36:38	285.67	T	F	1.012	
		1.37	37:47	165.93	T	T	1.044	
408		*** Total ***		1942.08	# of Peaks:		4	

Listing of S921S188.dbf

Matched SC Peaks / Ratio / Ret. Time

M_Z	Cnfl	Ratio	RT	Area	Match Rat	Match RT	REL_RT	Who/Why
418		0.44	36:17	19371.11	T	T	1.000	
		0.40	36:43	55.97	T	F	1.015	
		0.52	36:59	44.97	F	F	1.022	
		0.46	37:47	17344.03	T	T	1.044	
		0.39	38:19	147.11	T	F	1.058	
418		*** Total ***		36955.79	# of Peaks:		5	
424		1.20	36:29	354.51	T	F	0.979	
		1.98	37:15	953.41	T	T	1.000	
	0	1.09	41:03	270.15	T	T	1.102	
424		*** Total ***		2058.07	# of Peaks:		3	
436		0.70	36:29	35.14	F	F	0.979	
		1.01	37:15	14421.22	T	T	1.000	
		0.88	37:47	175.18	T	F	1.014	
		0.99	37:59	55.15	T	F	1.020	
		0.80	38:07	46.34	F	F	1.023	
	CC	0.87	38:15	26.25	F	F	1.027	WH
	CC	1.17	41:02	1538.34	T	F	1.102	WH
436		*** Total ***		16301.62	# of Peaks:		7	
442 ND		1.12	41:14	388.79	F	T	1.005	
442		*** Total ***		388.79	# of Peaks:		1	
458		0.82	41:01	2470.53	T	T	1.000	
		0.98	41:30	15.74	T	F	1.012	
458		*** Total ***		2490.27	# of Peaks:		2	
470		0.84	41:00	12911.21	T	T	1.000	
		0.67	41:43	75.33	F	F	1.017	
		0.97	41:50	59.07	T	F	1.020	
		1.27	41:56	52.84	F	F	1.023	
		0.87	42:04	52.05	T	F	1.026	
470		*** Total ***		13170.50	# of Peaks:		5	

*** End of Report ***



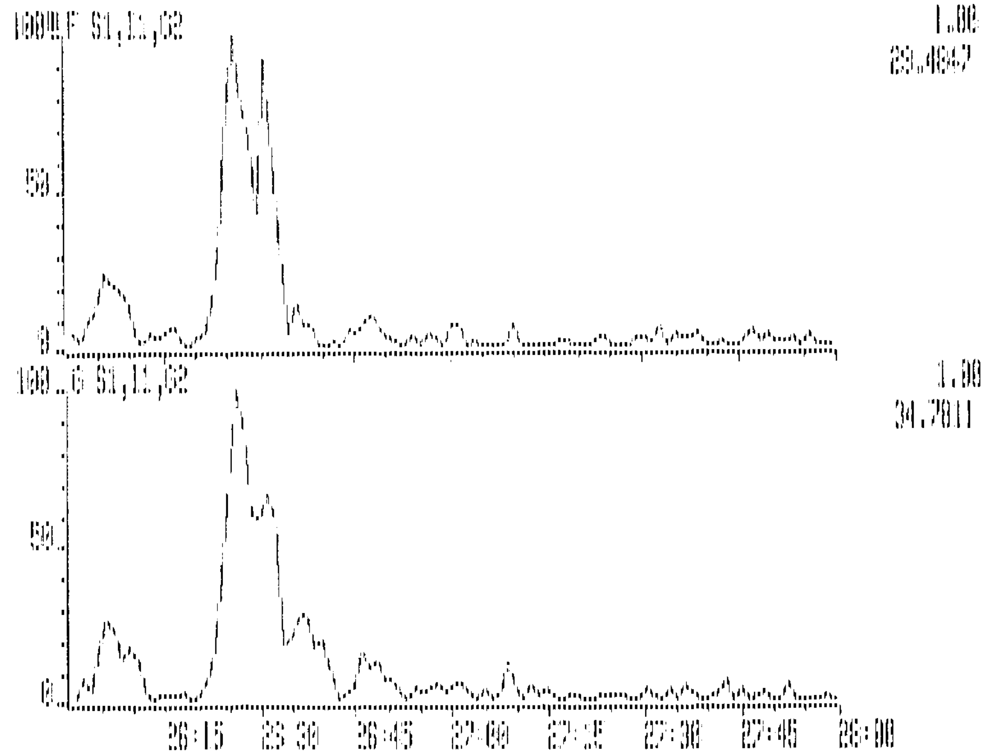
Ref. mass 292.9825 Peak top
Height 1.72 volts Span 200 ppm

System file name NOB5US
Data file name A:SS21613
Resolution 10000
Group number 2
Ionization mode EI+
Switching VOLTAGE
Ref. masses 292.9825, 416.9760

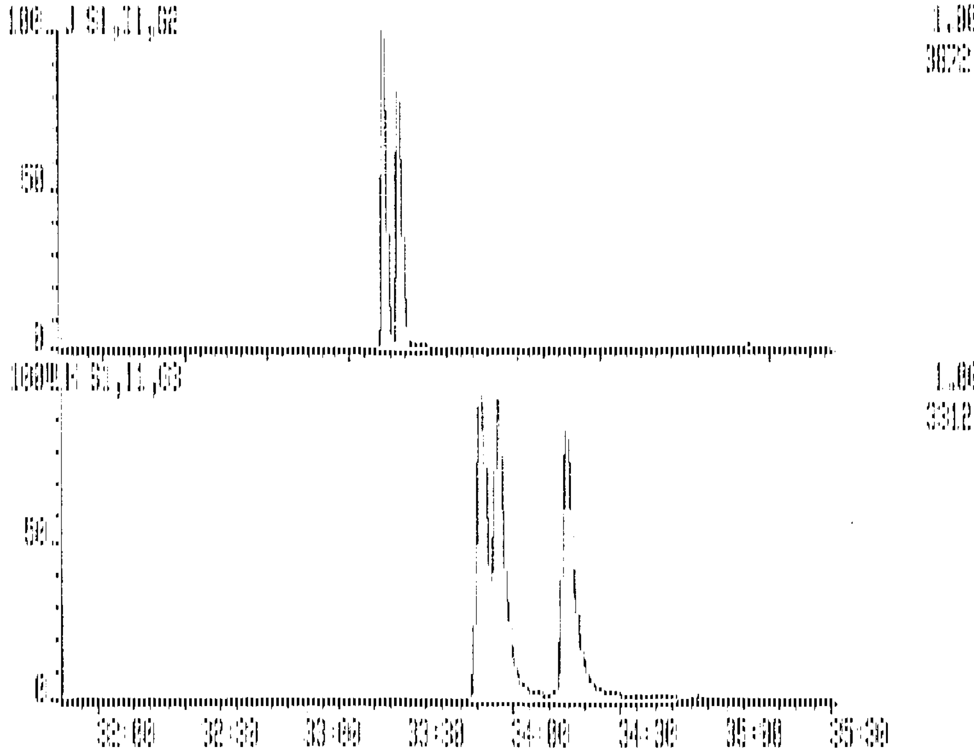
A	293	J	332	S	368
B	304	K	334	T	370
C	306	L	338	U	376
D	316	M	340	V	410
E	318	N	342		
F	320	O	352		
G	322	P	354		
H	328	Q	356		
I	331	R	358		

Channel 1 330.9792 Peak top
Height 1.33 volts Span 200 ppm

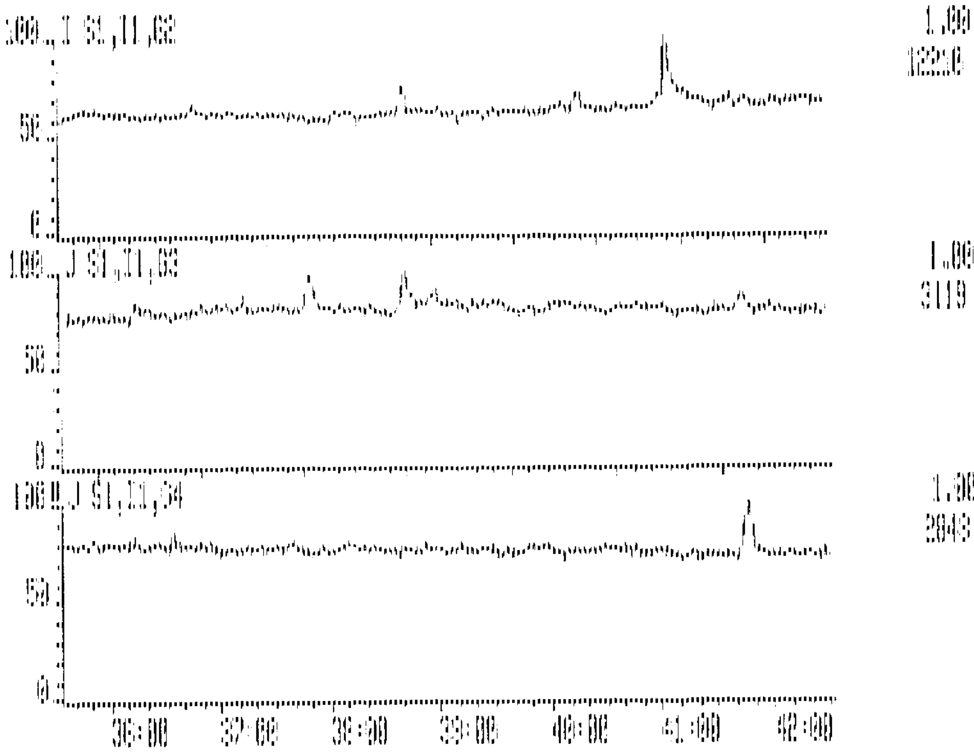
SS2161B 4-APR-92 12:44 70S (EI+) Sys:HDB5US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2723,2724,2726 TL:14205229



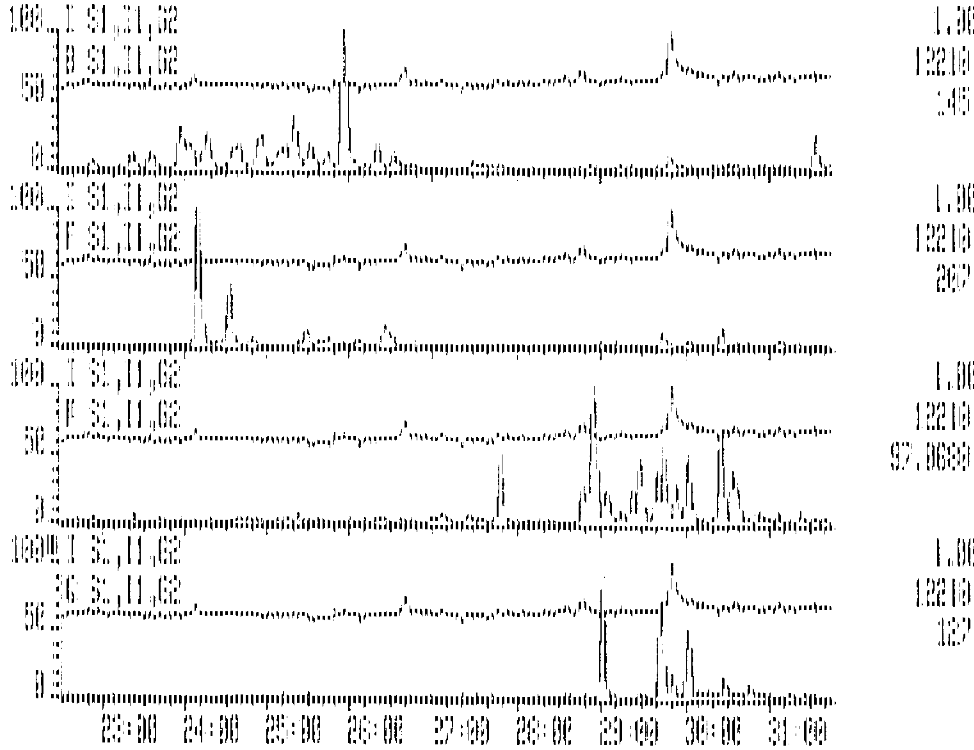
S921610   4-APR-92 12:44 706   (EI+)   Sys:DB5US
GR 3 F: 391.0127 G: 392.9750 H: 401.6550 I: 403.8529 J: 430.9729
Text:2723,2724,2726 7.11205220



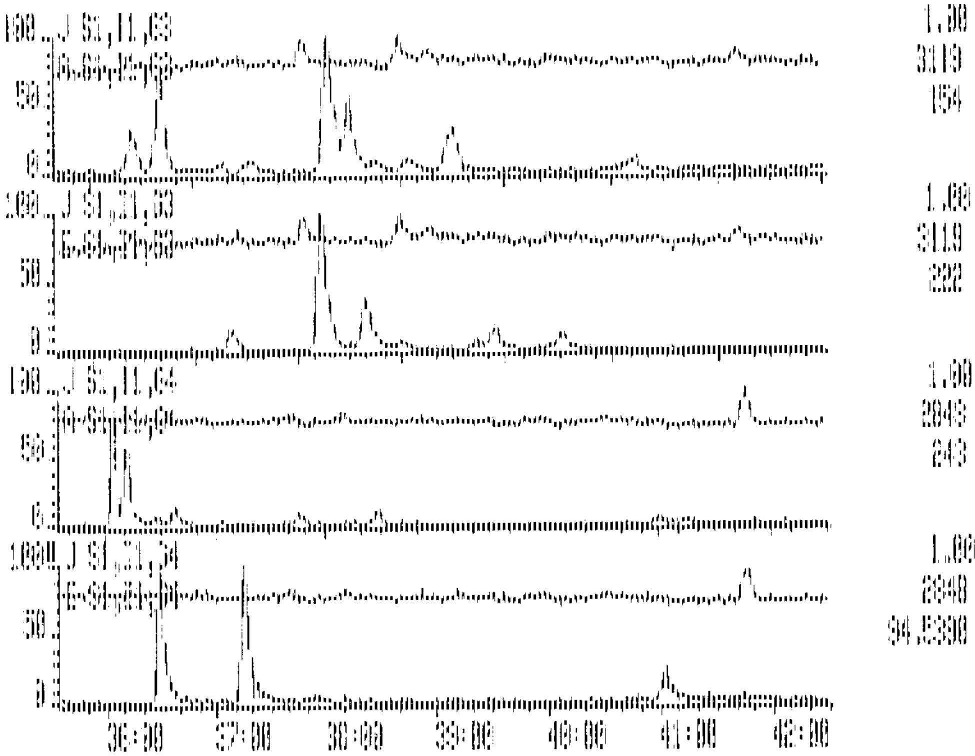
S921658 4-APR-92 12:44 795 (EI+) Sys NO85US
GR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8340 J: 442.9728
Text:2723,2724,2788 T1105220



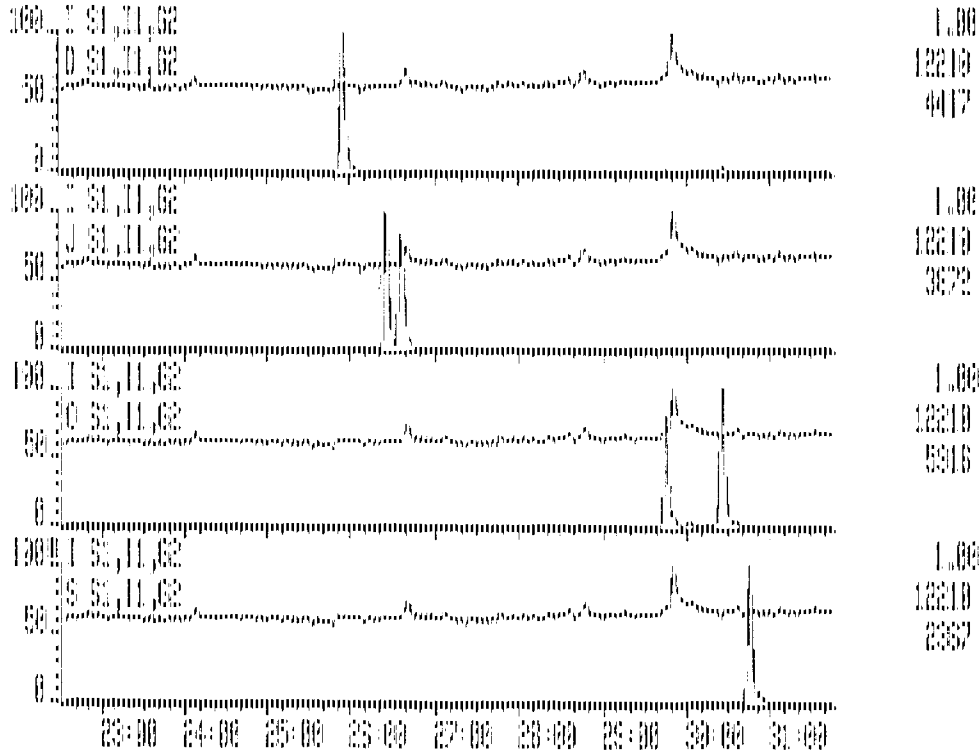
SS21618 4-APR-92 12:44 79S (EI+) Sys:ND85US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text: 2723,2724,2726 TLI1205229



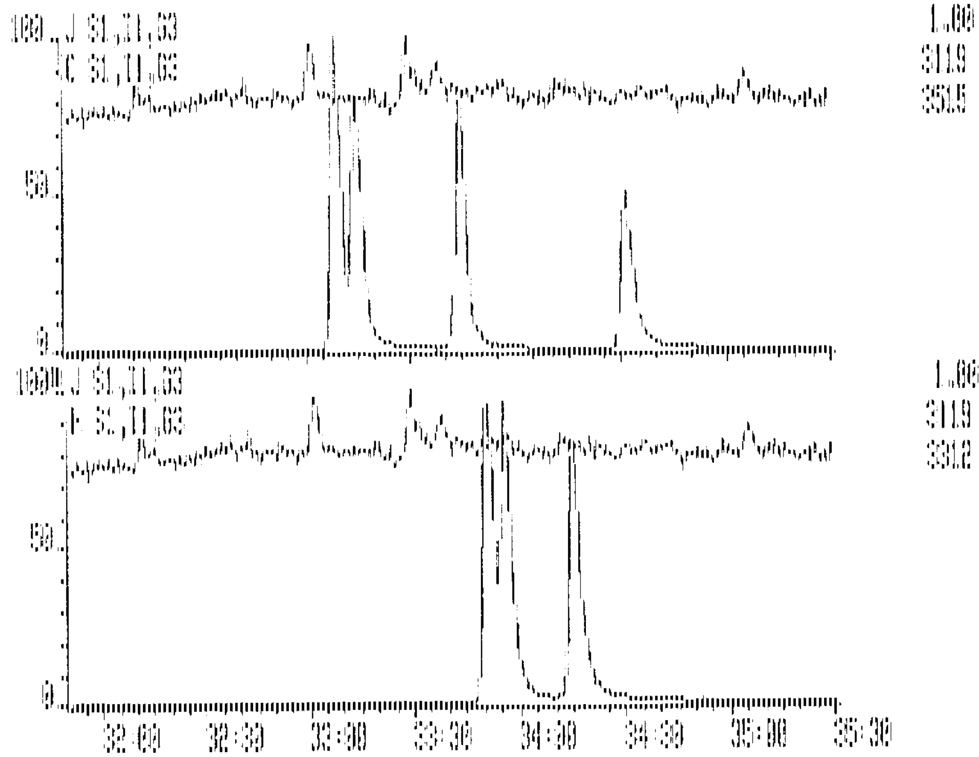
S921618 4-APR-92 12:44 70S (EI+) Sys:NDB5US
GR 4 F: 425.7737 G: 430.9729 H: 435.9169 I: 437.8140 J: 442.9728
Text:2723,2724,2725 TL1120522F



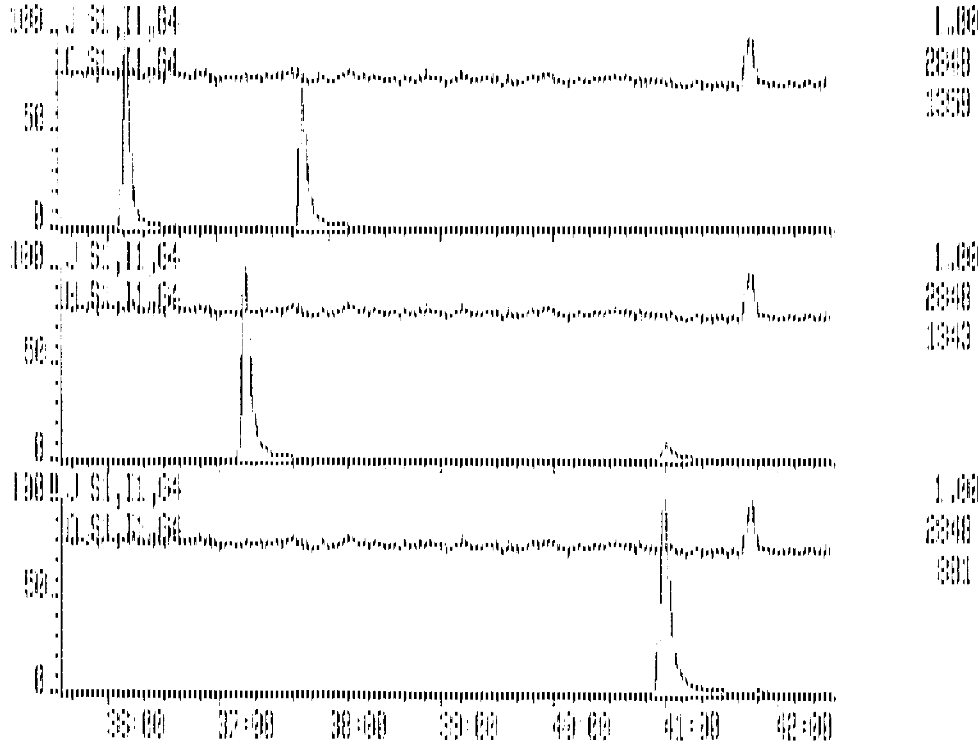
SS21618 6-APR-92 12:44 70S (EI+) Sys:NOBSUS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2723,2724,2726 TL1I205220A



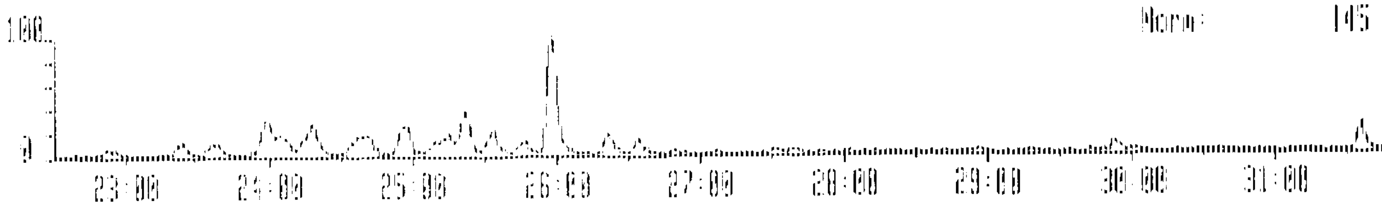
S921538   4-APR-92 12:44 20S   (EI+)   Sys:MDB5US
GR 3 F: 391.0327 G: 392.9760 H: 401.8558 I: 403.8529 J: 430.9729
Text: 2723,2724,2726 TLT4205220



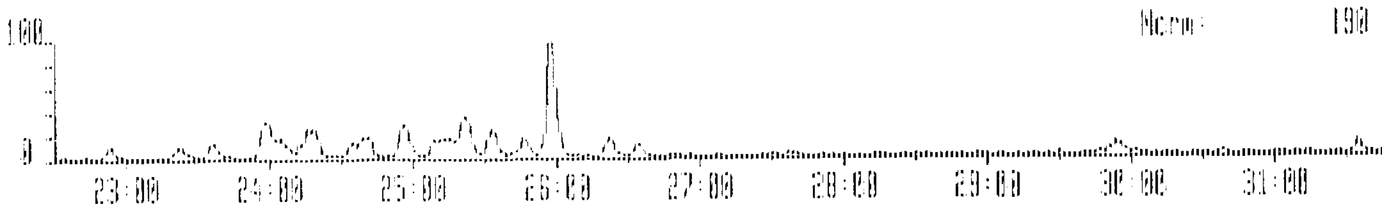
SS21613 4-APR-92 12:44:20S (EI-) Sys:NOB5U6
GF 4 F 425.7737 G: 436.9729 H: 435.8169 I: 437.8140 J 442.9728
Text:2723,2724,2725 T.10205229



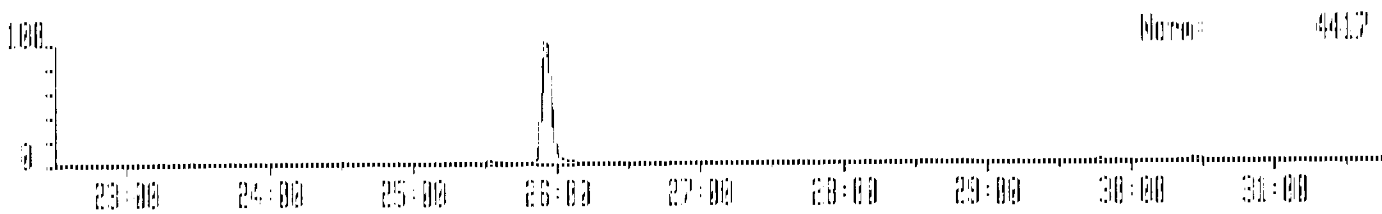
SS921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2723,2724,2726 TL1420522A



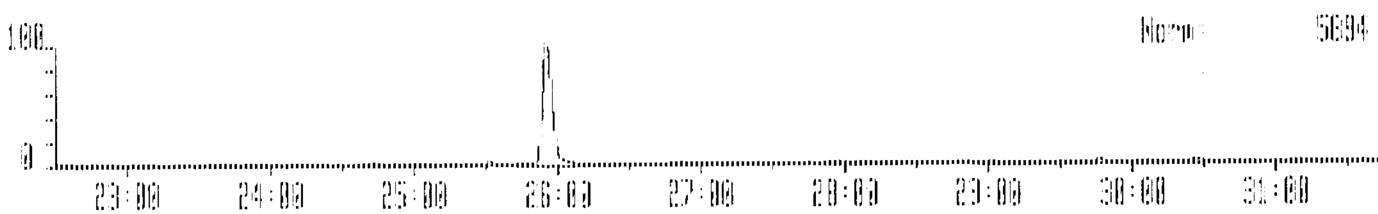
SS921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2723,2724,2726 TL1420522A



SS921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2723,2724,2726 TL1420522A

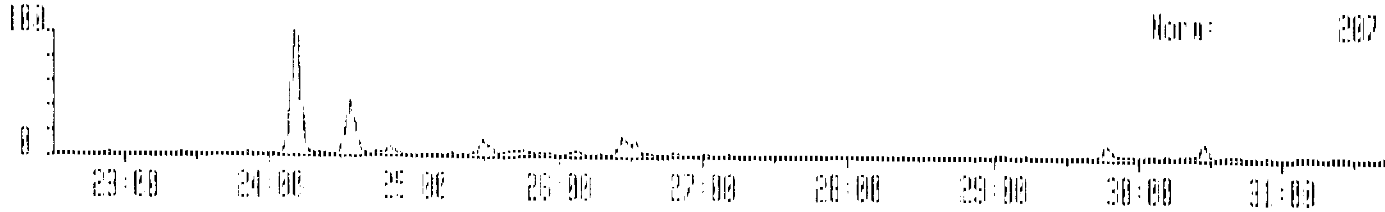


SS921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2723,2724,2726 TL1420522A

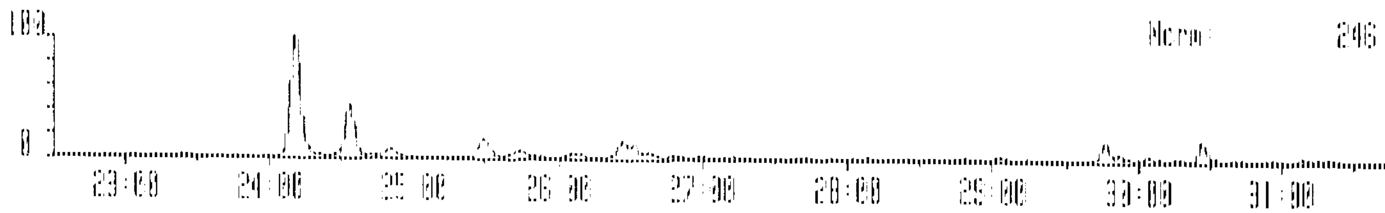


SS921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2723,2724,2726 TL1420522A

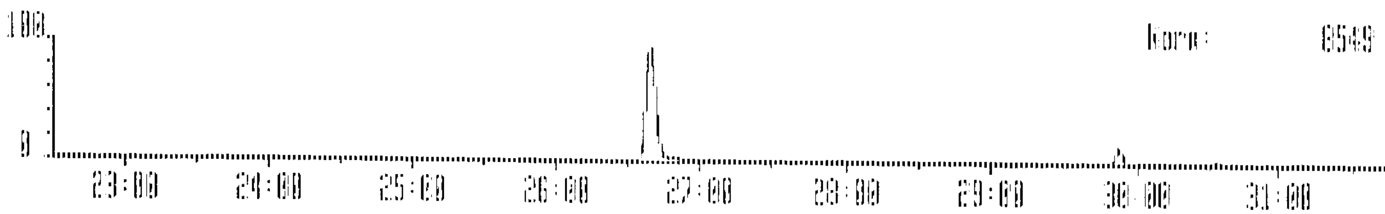
S921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 319.8965
Text:2723,2724,2726 TLI820522A



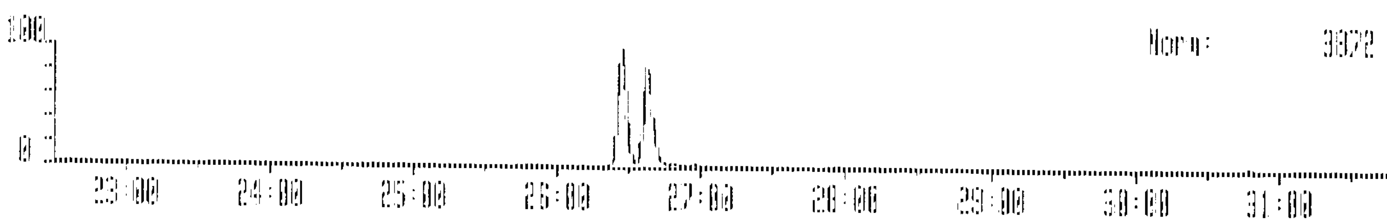
S921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 321.8936
Text:2723,2724,2726 TLI820522A



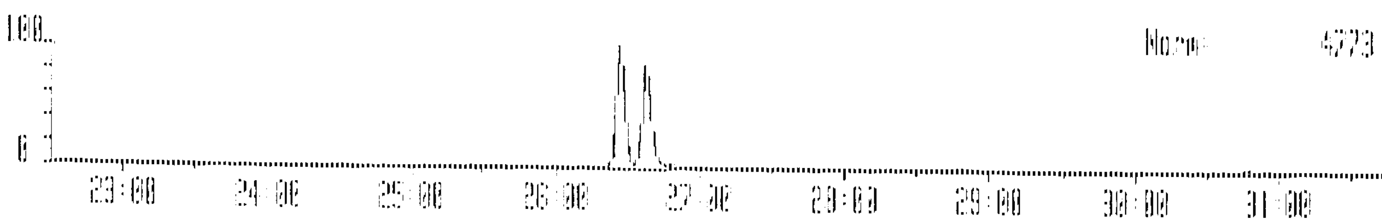
S921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 327.8847
Text:2723,2724,2726 TLI820522A



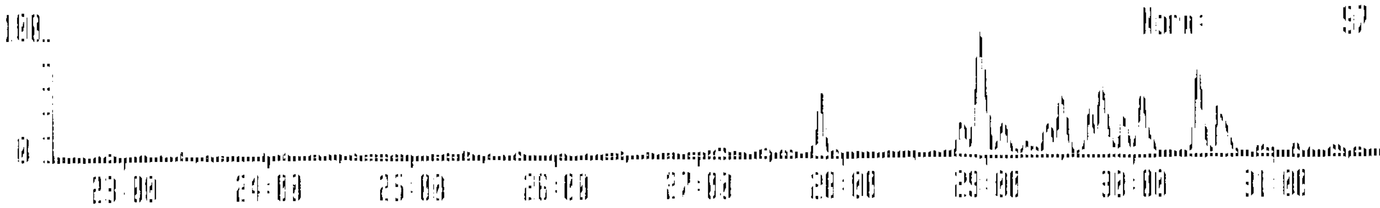
S921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 331.9368
Text:2723,2724,2726 TLI820522A



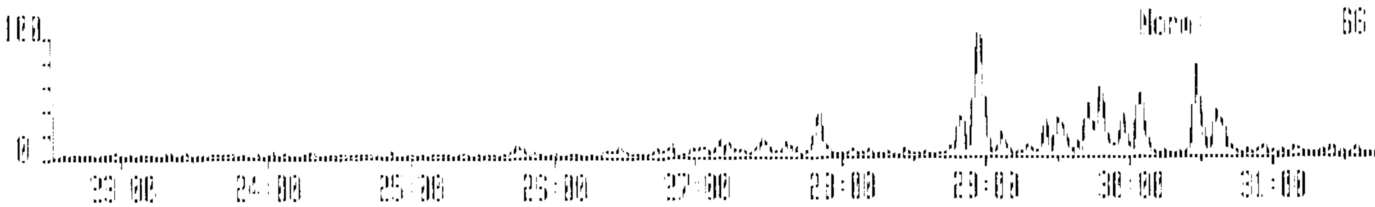
S921618 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 2 Mass 333.9338
Text:2723,2724,2726 TLI820522A



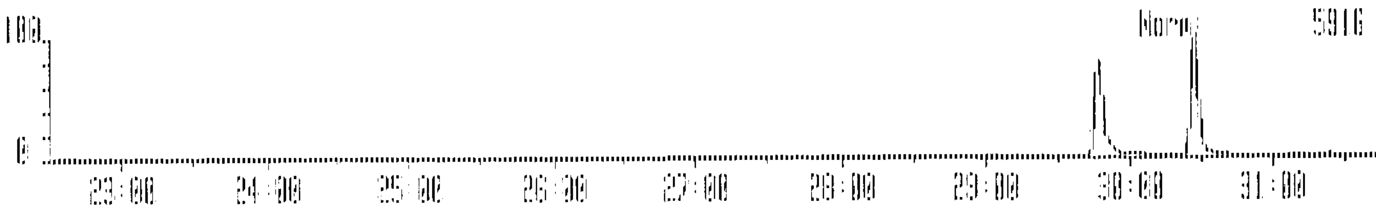
S921610 4-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 339.8597
Text:2723,2724,2726 TL1H20522A



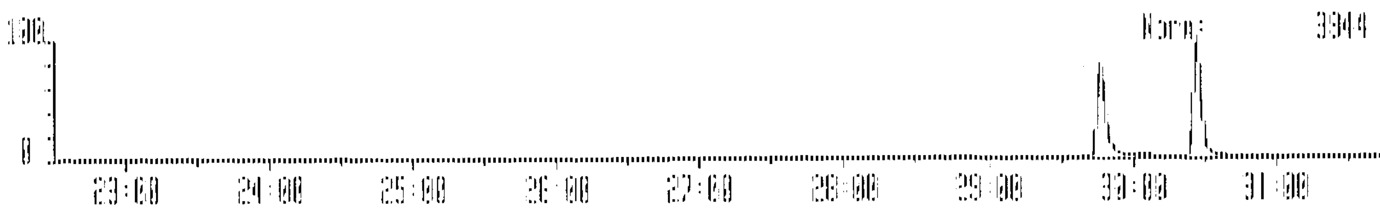
S921610 4-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 341.8567
Text:2723,2724,2726 TL1H20522A



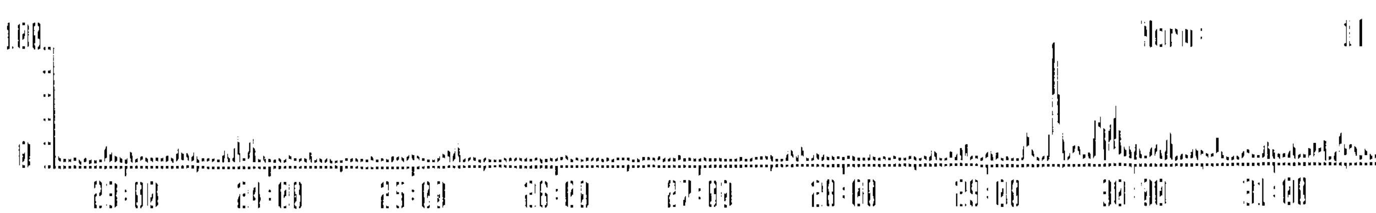
S921610 4-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 351.9000
Text:2723,2724,2726 TL1H20522A



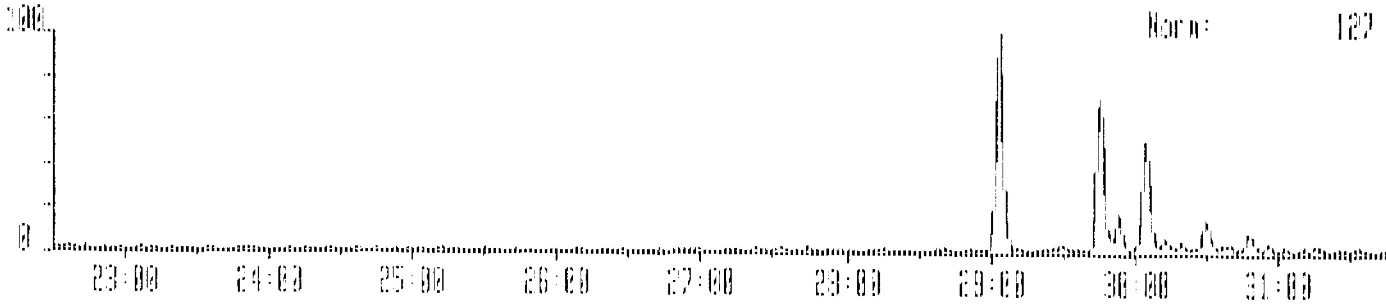
S921610 4-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 353.8570
Text:2723,2724,2726 TL1H20522A



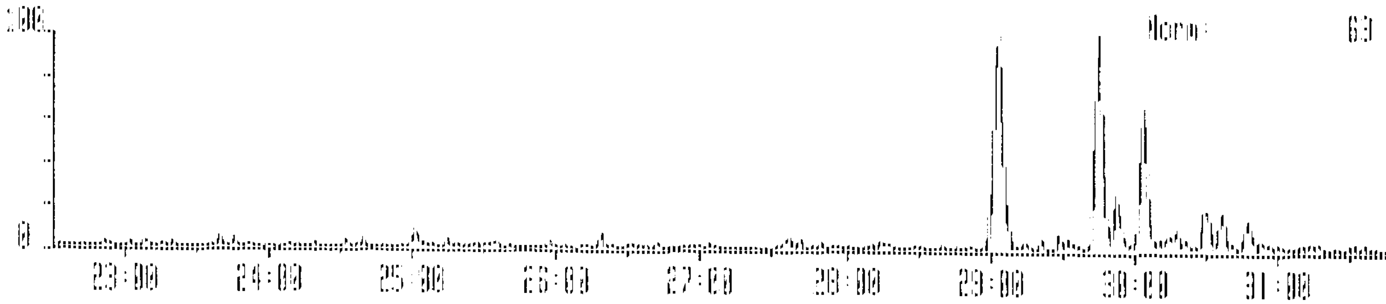
S921610 4-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 409.7974
Text:2723,2724,2726 TL1H20522A



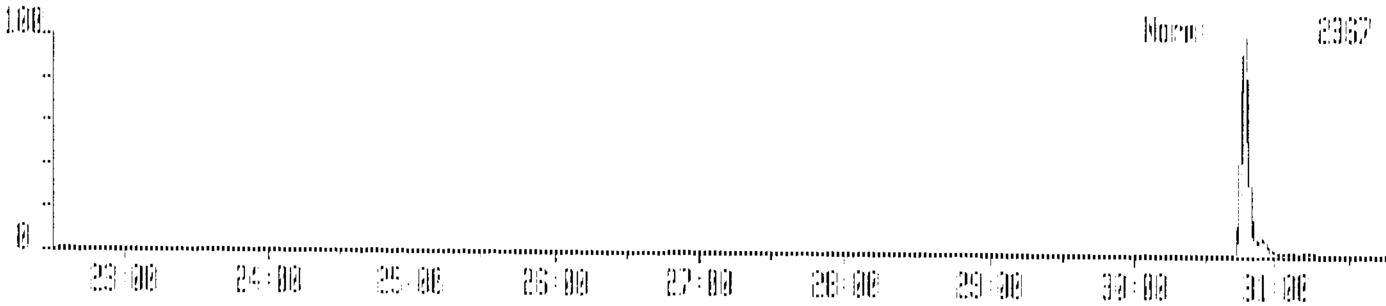
S921610 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 355.8546
Text:2723,2724,2726 TLI820522A



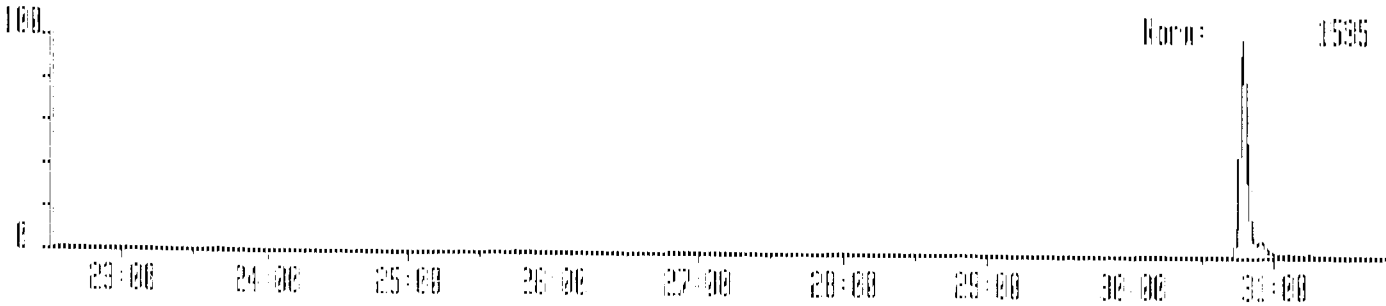
S921610 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 357.8516
Text:2723,2724,2726 TLI820522A



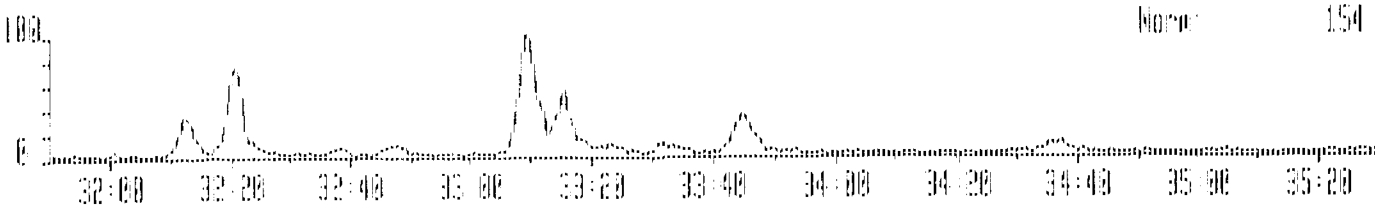
S921610 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 367.8949
Text:2723,2724,2726 TLI820522A



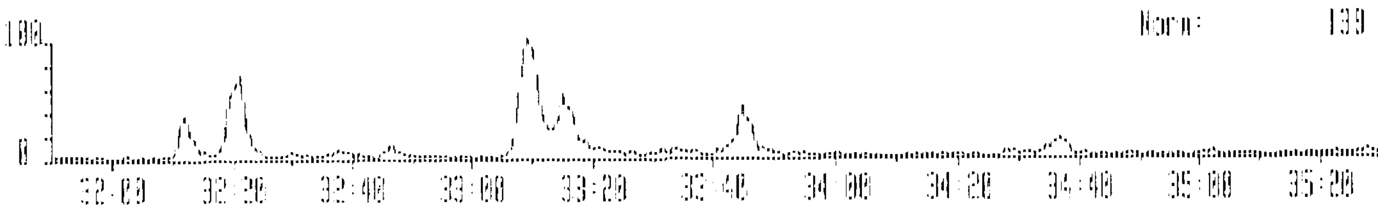
S921610 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 369.8919
Text:2723,2724,2726 TLI820522A



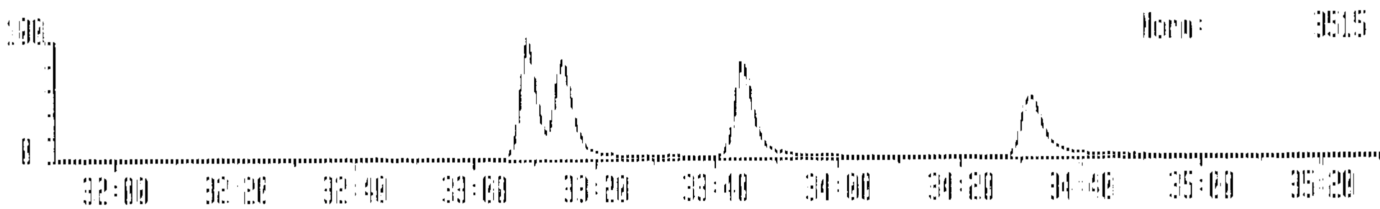
S921618 4-APR-92 Sir Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 373.8208
Text:2723,2724,2726 TL1#20522A



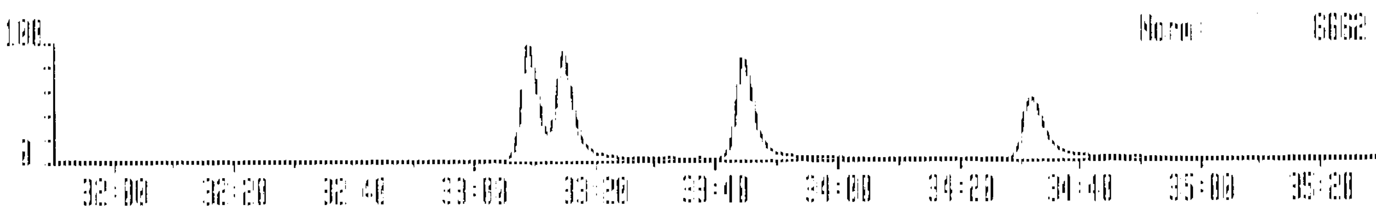
S921618 4-APR-92 Sir:Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 375.8178
Text:2723,2724,2726 TL1#20522A



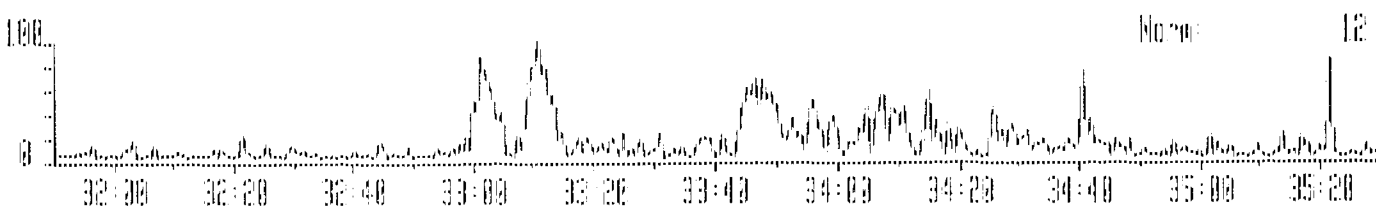
S921618 4-APR-92 Sir:Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 383.6639
Text:2723,2724,2726 TL1#20522A



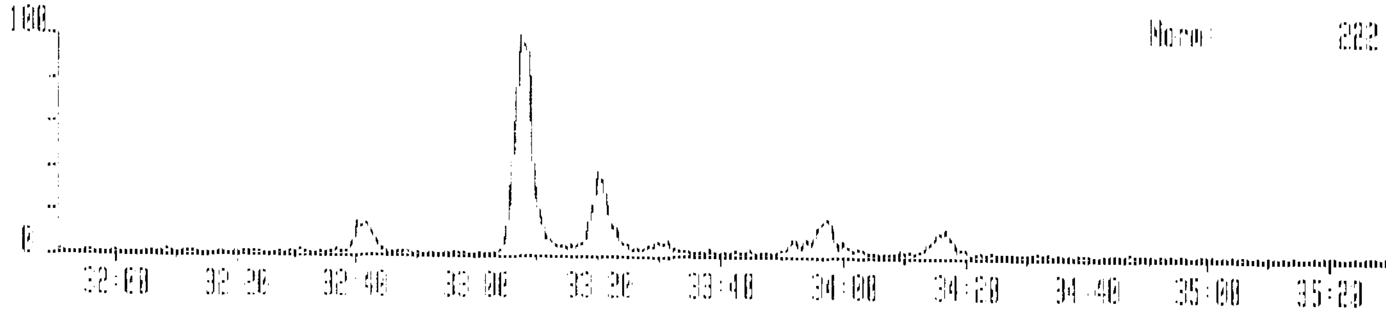
S921618 4-APR-92 Sir:Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 385.8610
Text:2723,2724,2726 TL1#20522A



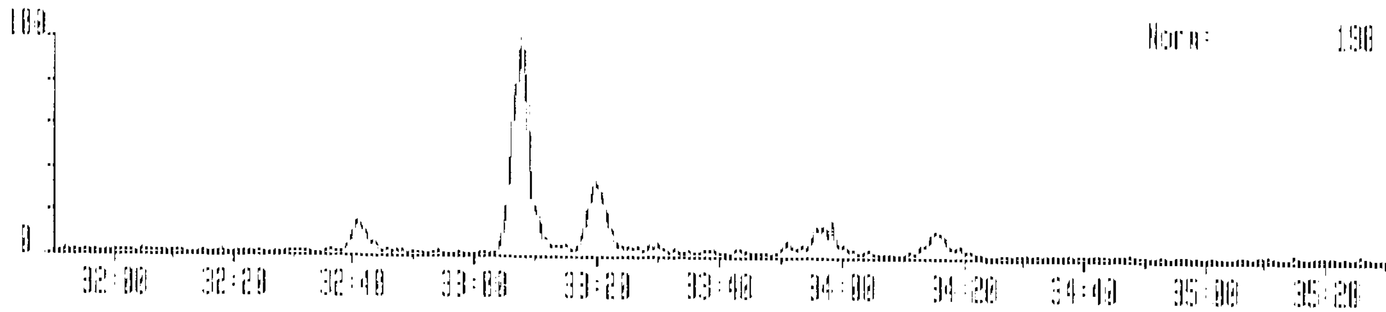
S921618 4-APR-92 Sir:Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 445.7555
Text:2723,2724,2726 TL1#20522A



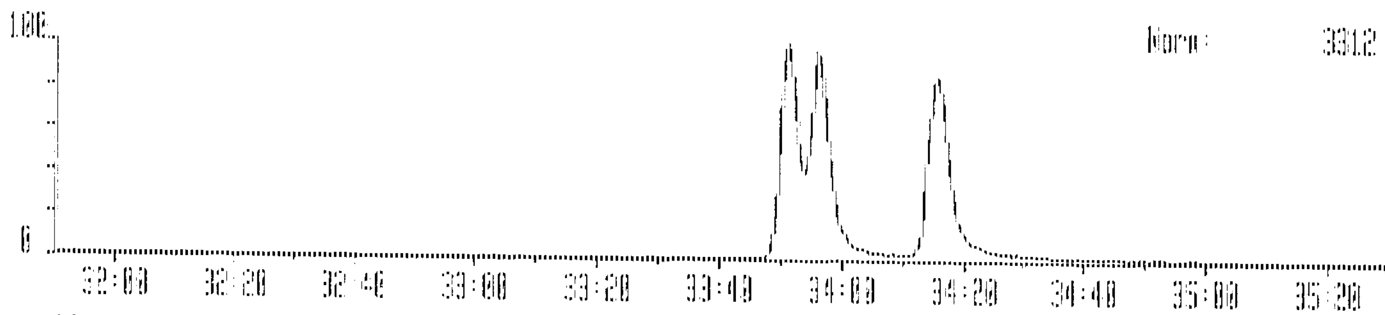
S921616 4-APR-92 Sir Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 3 Mass 389.8156
Text: 2723,2724,2726 TLI020522A



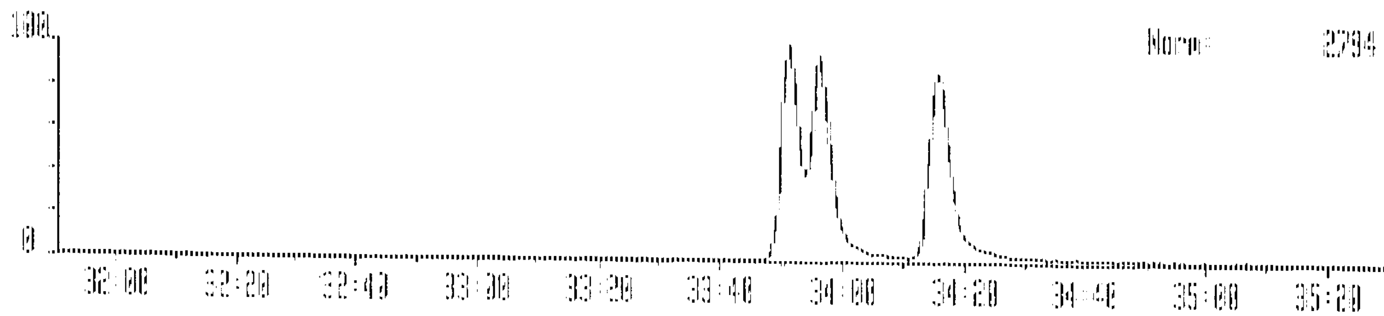
S921619 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 3 Mass 391.8127
Text:2723,2724,2726 TLI020522A



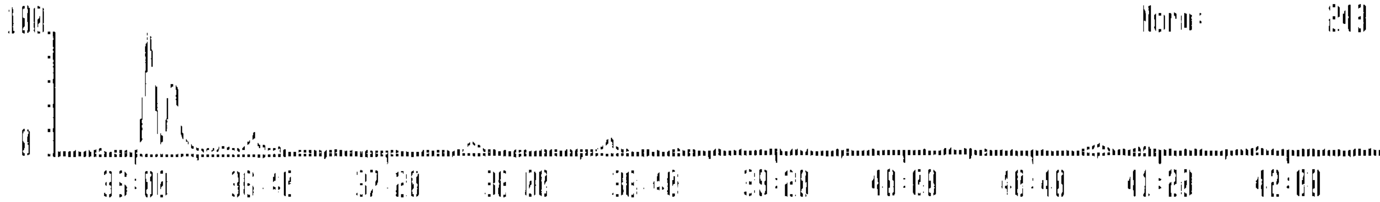
S921618 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 3 Mass 401.8559
Text:2723,2724,2726 TLI020522A



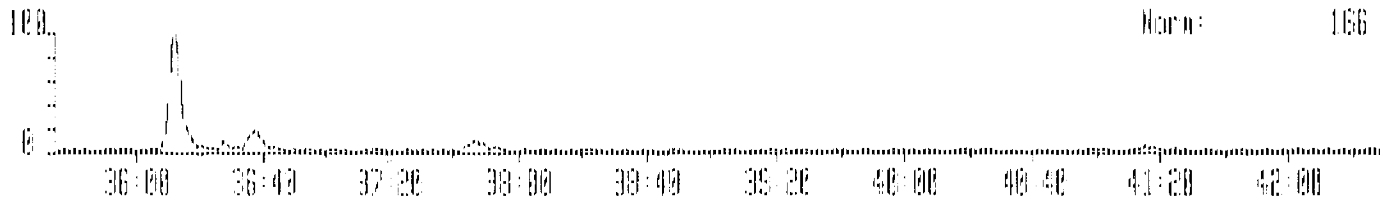
S921619 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 3 Mass 403.8529
Text:2723,2724,2726 TLI020522A



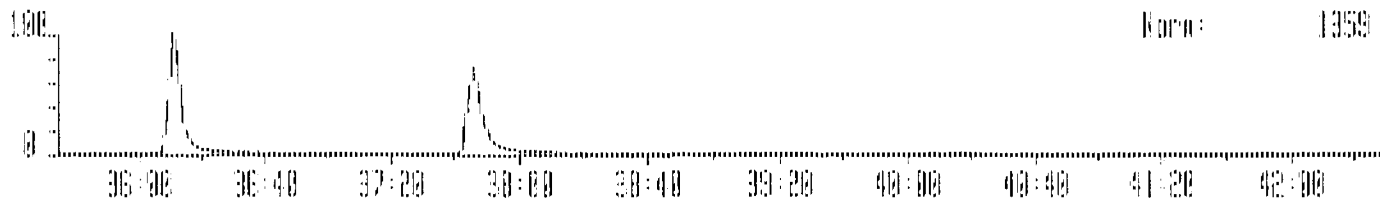
S921610 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 407.7818
Text 2723,2724,2726 TL1420522A



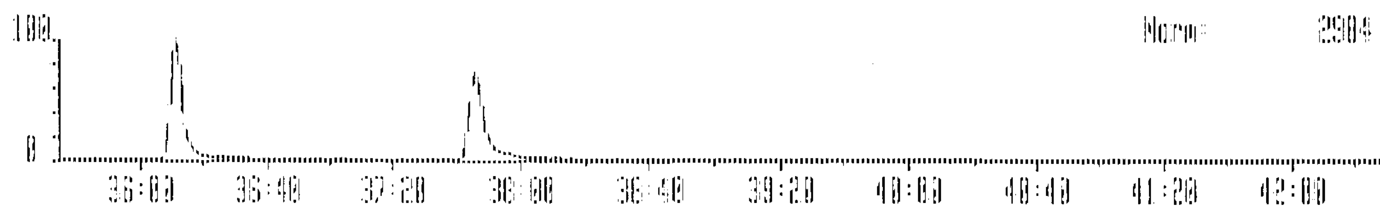
S921610 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 409.7789
Text:2723,2724,2726 TL1620522A



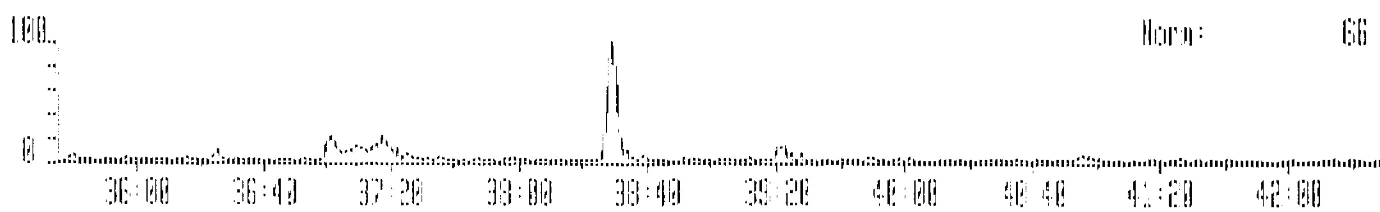
S921610 4-APR-92 Sir Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 417.8253
Text:2723,2724,2726 TL1820522A



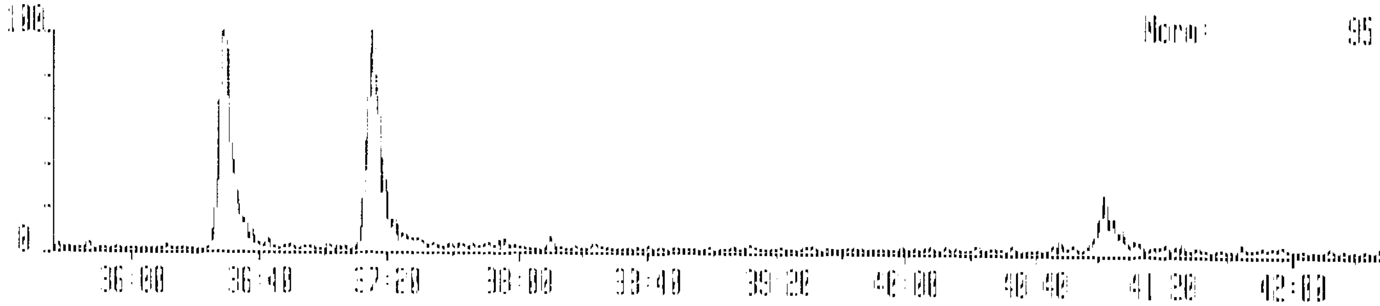
S921610 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 419.8220
Text:2723,2724,2726 TL1420522A



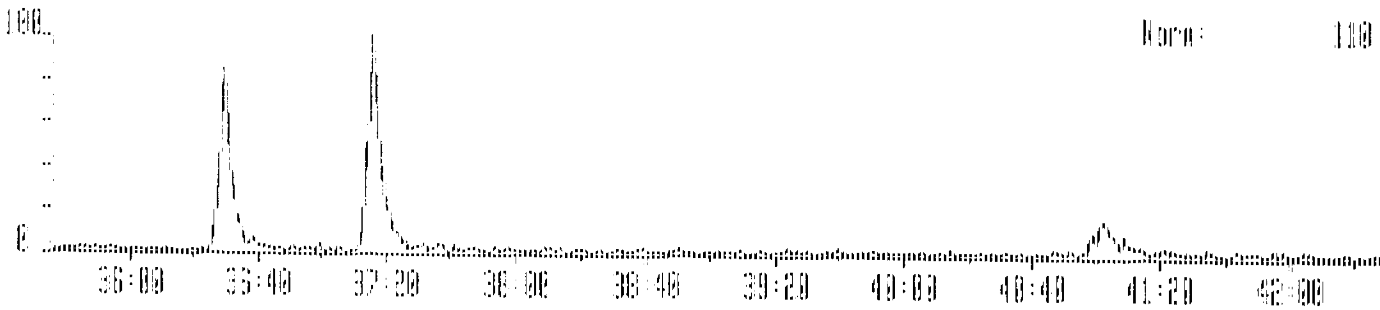
S921610 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 479.7165
Text:2723,2724,2726 TL1020522A



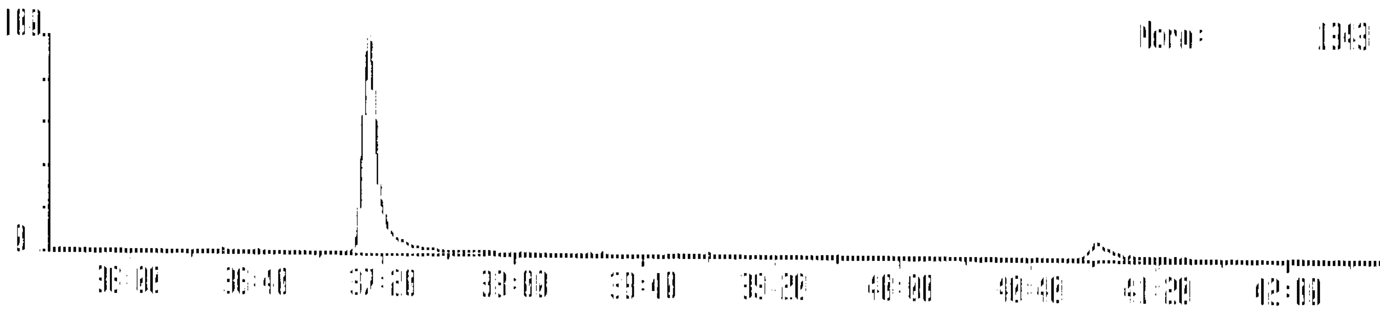
S921618 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 423.7766
Text:2723,2724,2726 TL1420522A



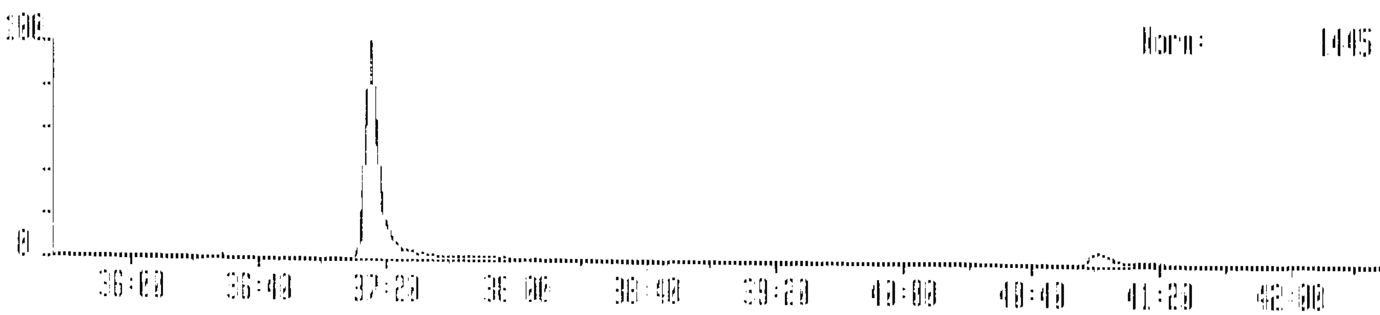
S921618 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 425.7737
Text:2723,2724,2726 TL1420522A



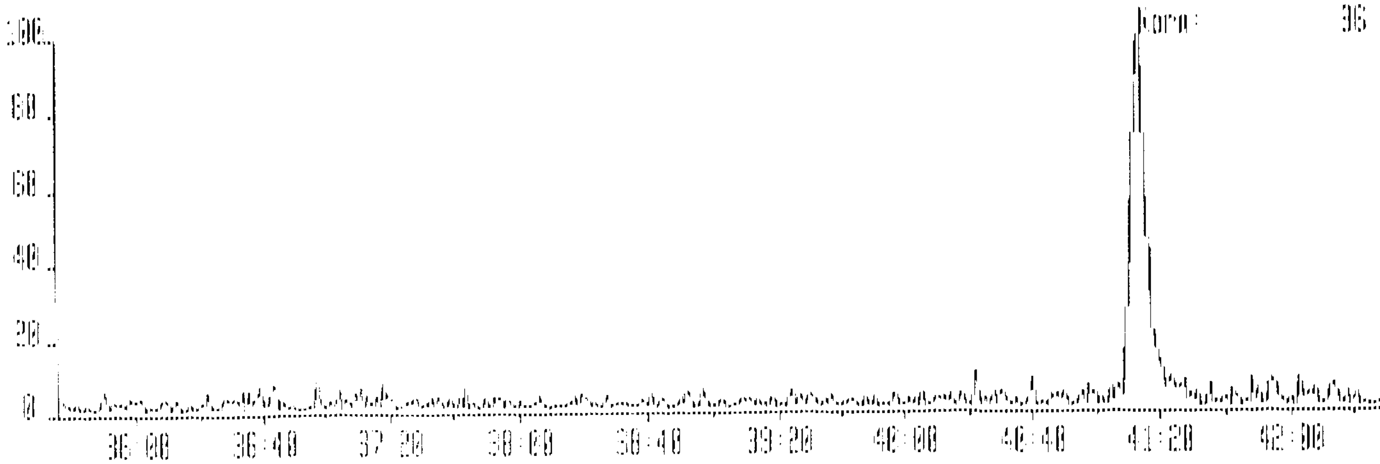
S921618 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 435.8169
Text:2723,2724,2726 TL1420522A



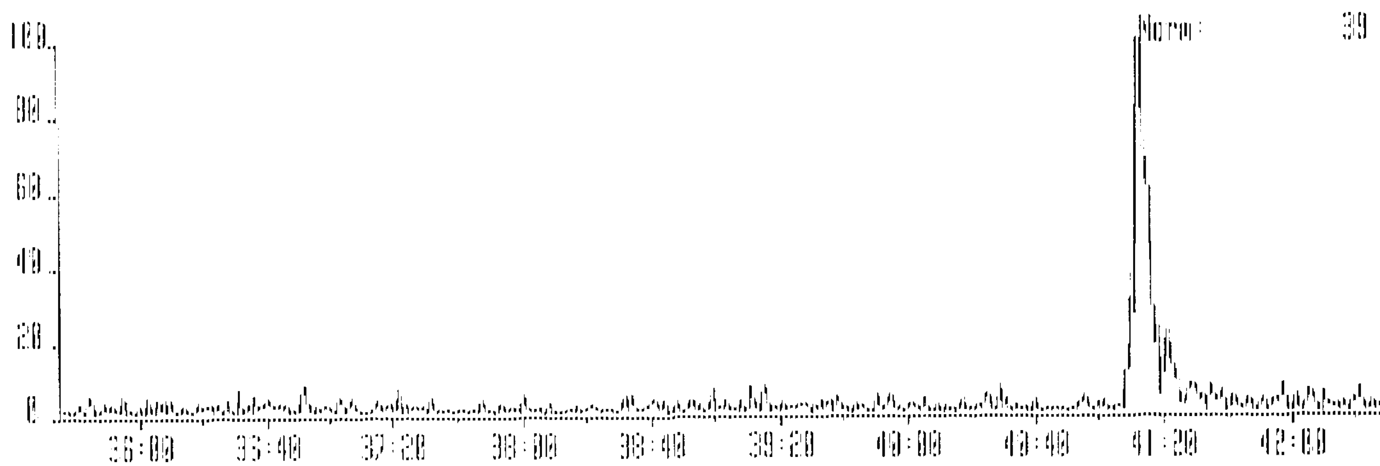
S921618 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 437.8140
Text:2723,2724,2726 TL1420522A



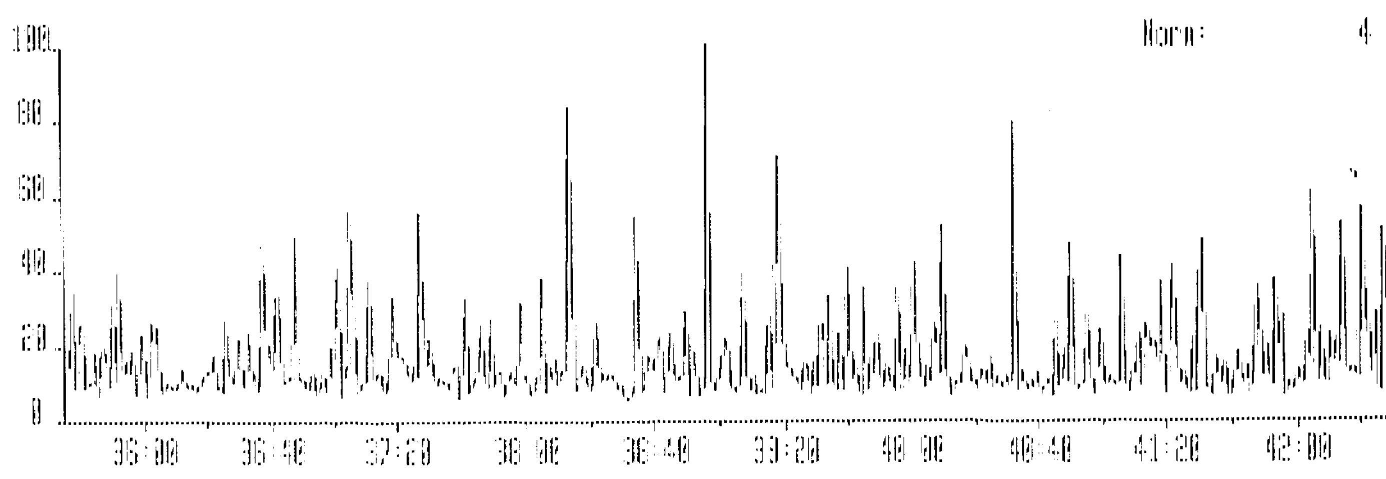
S921618 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2723,2724,2726 TL1020522A



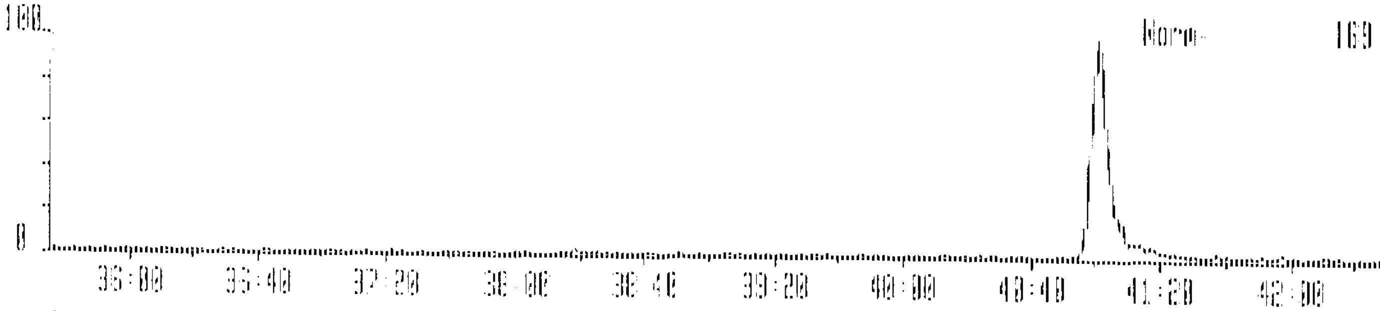
S921618 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2723,2724,2726 TL1020522F



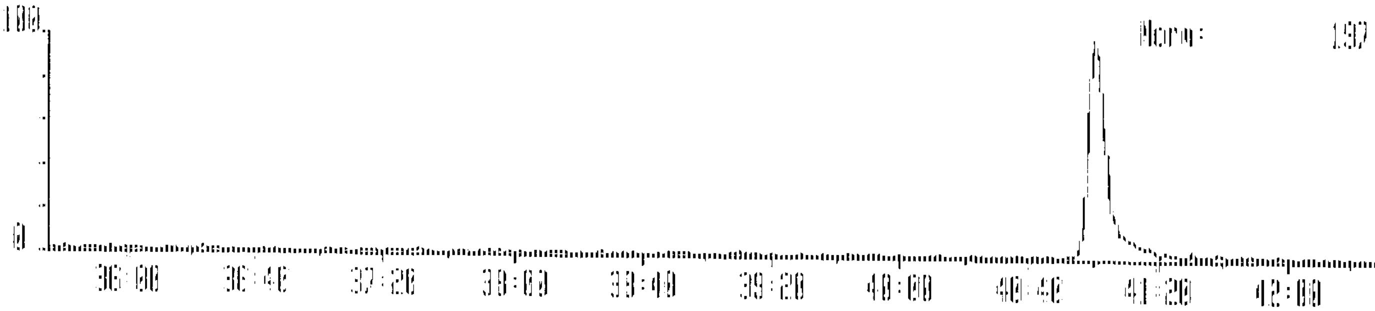
S921639 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2723,2724,2726 TL1020522A



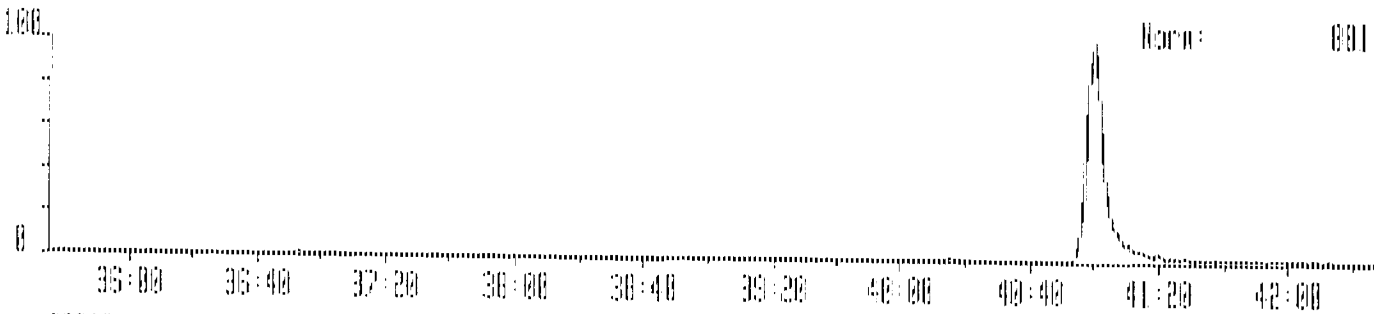
S921618 4-APR-92 Sir Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 457.7377
Text:2723,2724,2726 TLI420522A



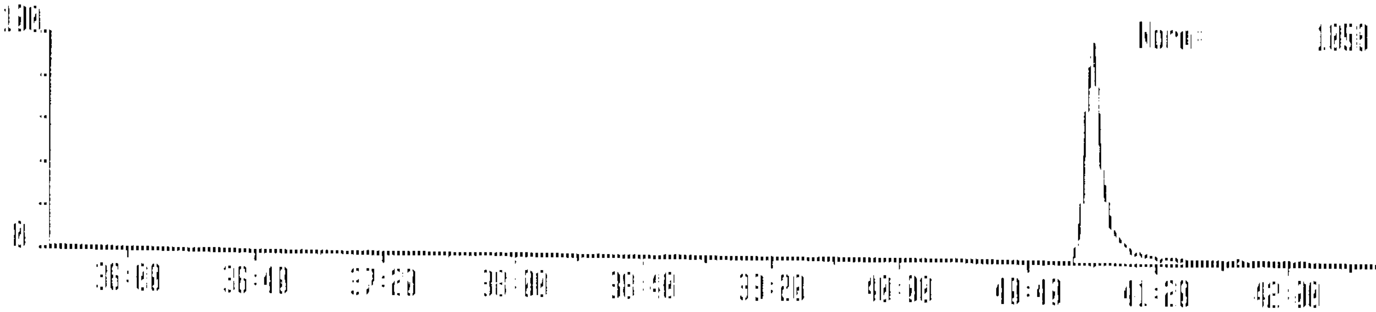
S921618 4-APR-92 Sir Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 459.7348
Text:2723,2724,2726 TLI420522A



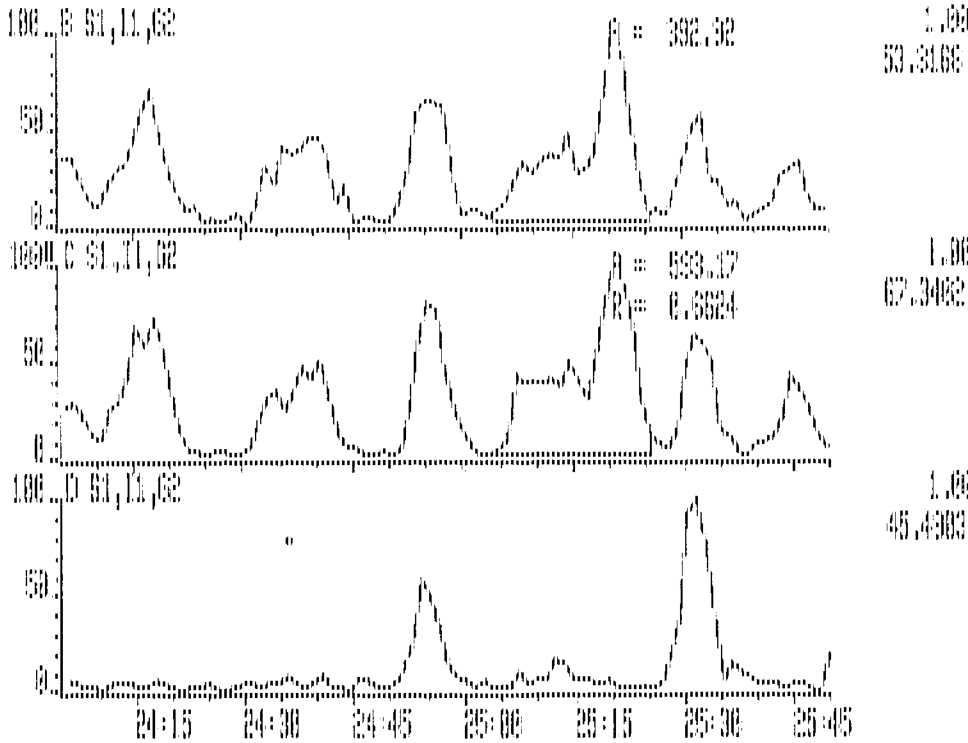
S921618 4-APR-92 Sir Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 469.7779
Text:2723,2724,2726 TLI420522A



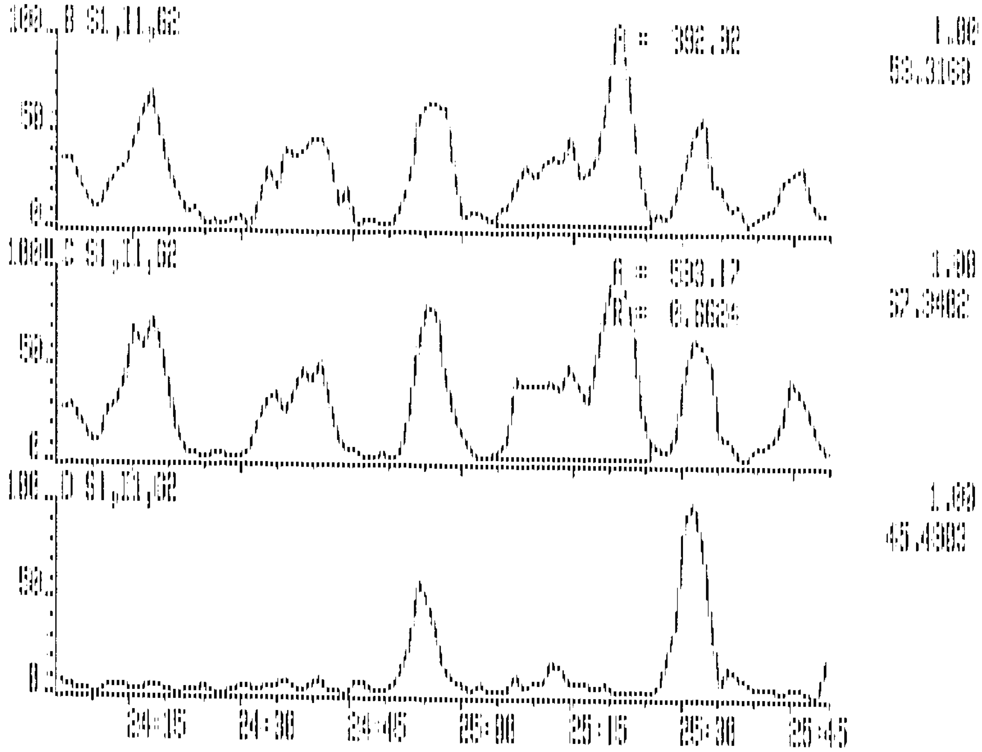
S921618 4-APR-92 Sir Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 471.7750
Text:2723,2724,2726 TLI420522A



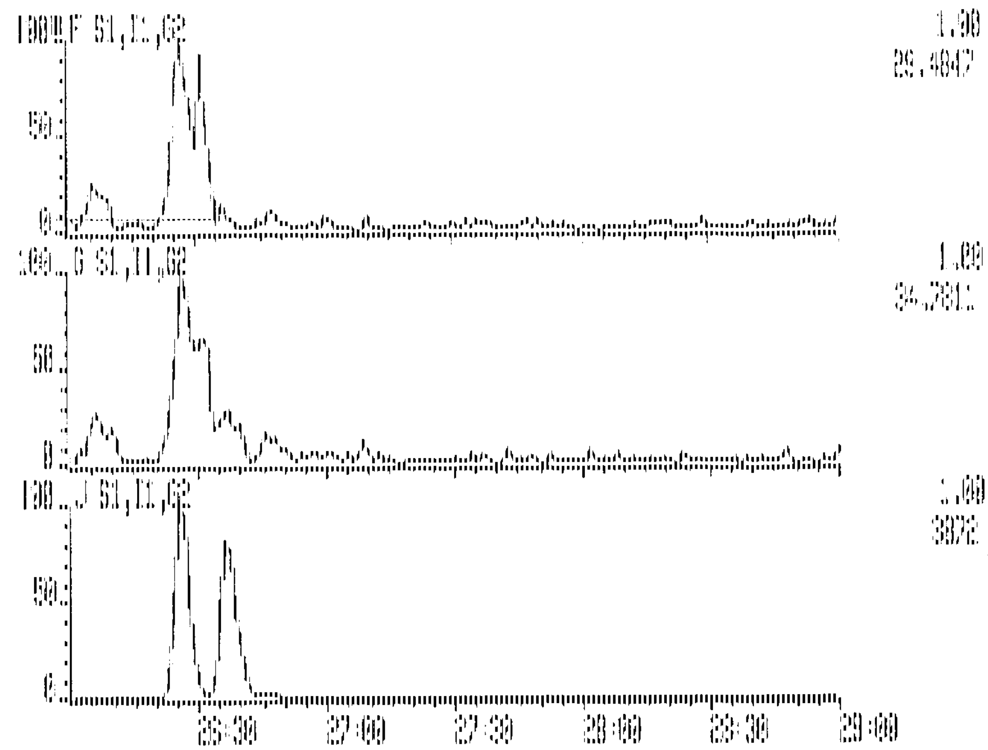
S921618 4-APR-92 12:44 70S (EI+) Sys:NC65US
GR 2 A: 292.9825 B: 303.9016 C: 305.8987 D: 315.9419 E: 317.9389
Text:2723,2724,2726 TL110205228



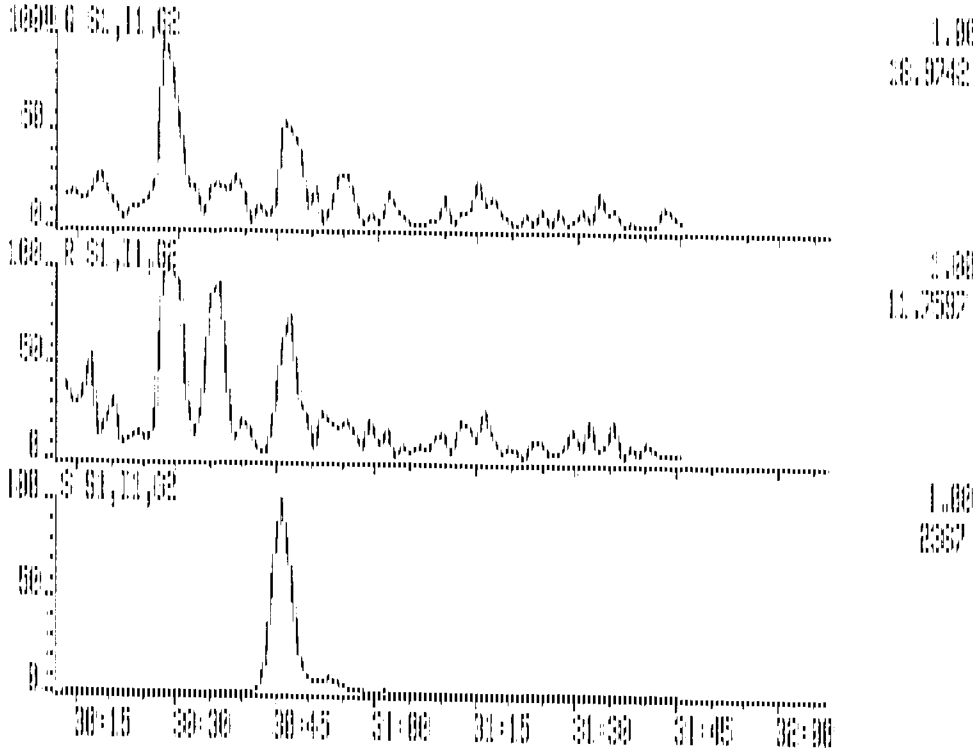
S921618 4-APR-92 12:44 70S (EI+) Sys:MDE5US
GR 2 A: 292.9825 B: 303.9016 C: 305.8987 D: 315.9419 E: 317.9389
Text:2723,2724,2726 TL:14205229



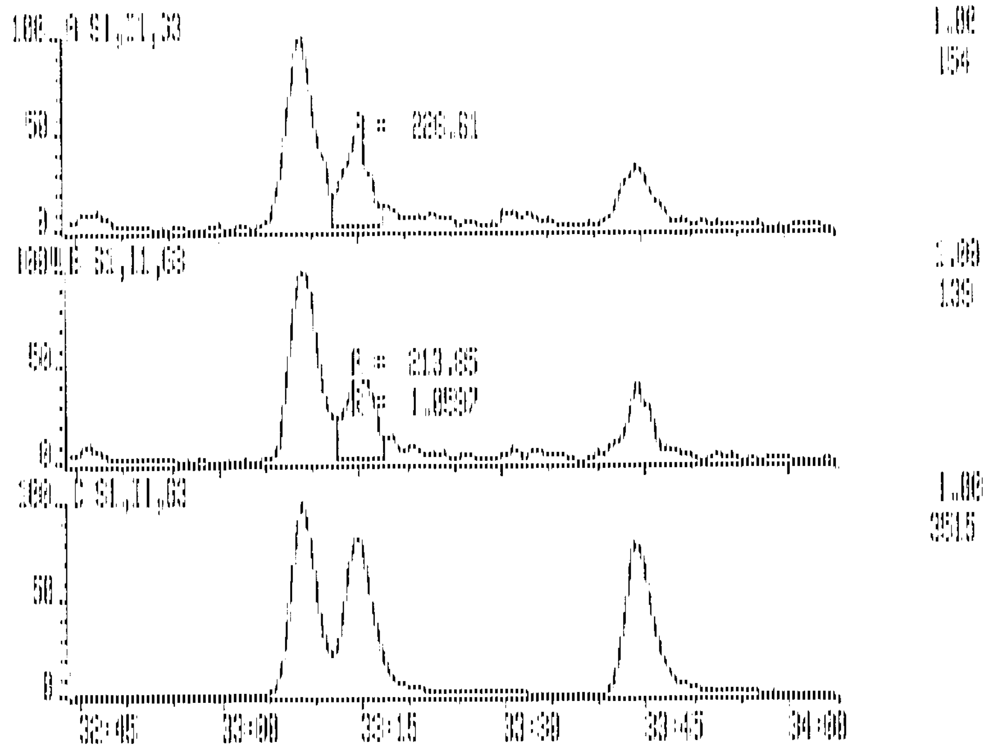
S921618 4-APR-92 12:44.70S (EI+) Sys:NDB5US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2723,2724,2726 TL3H205220



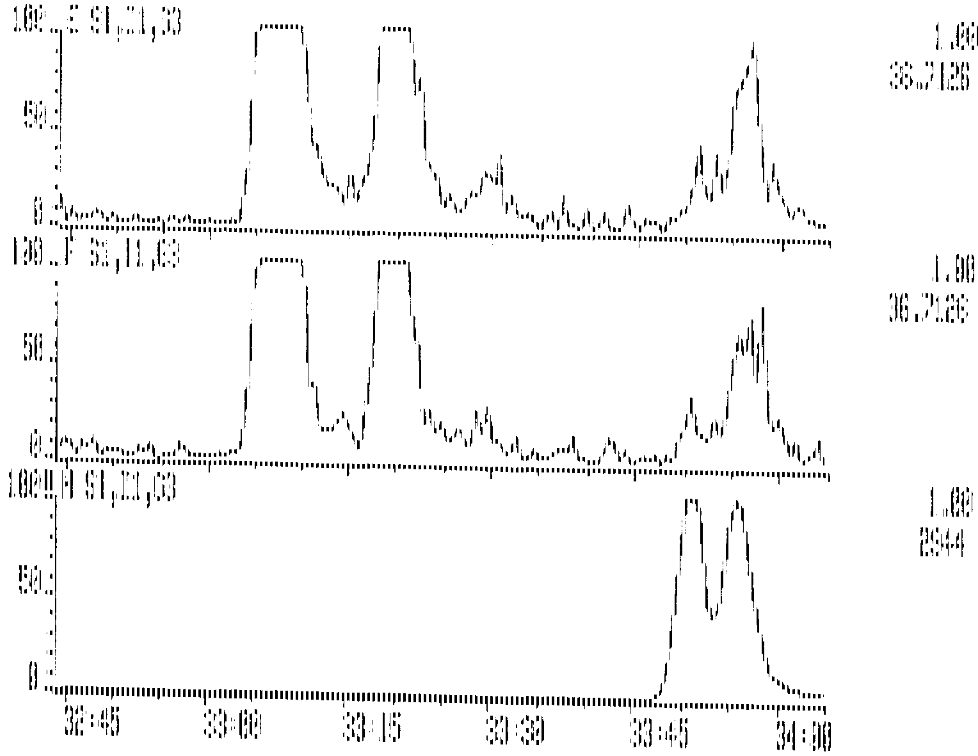
5921518   4-APR-92   12:44 205   (EI+)   Sys:NDB5US
GR 2 O: 351.9000 P: 353.8970 Q: 355.8546 R: 357.8515 S: 357.8949
Text:2723,2724,2726 TLJ4205229



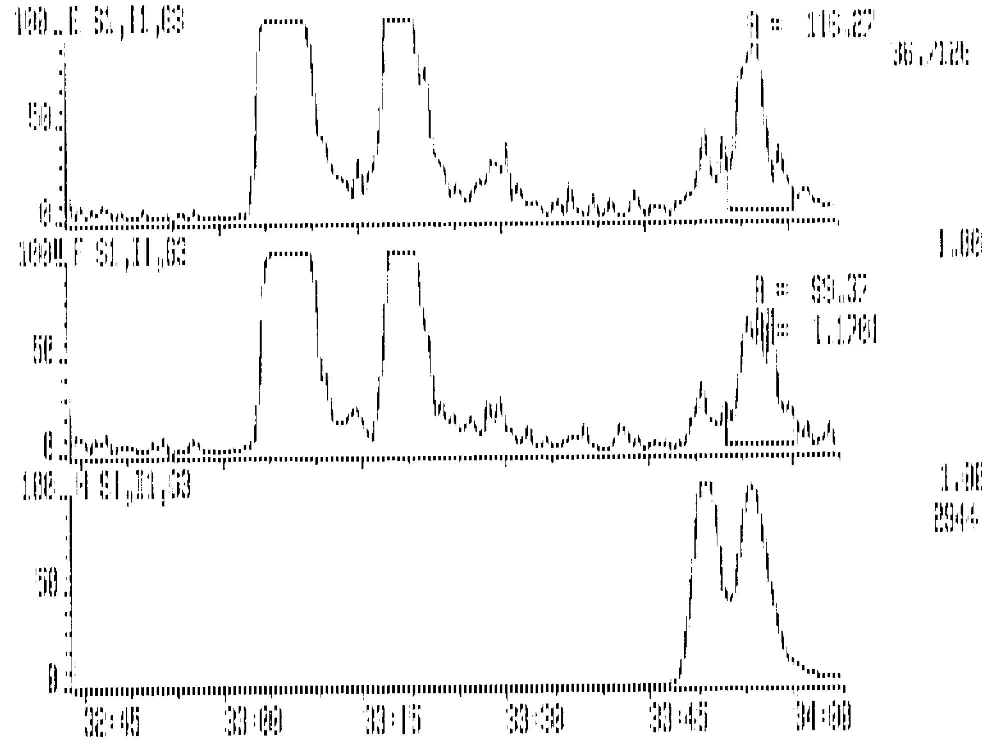
S921618   4-APR-92 12:44.70S   (EI+)   Sys:NDB5US
GR 3 A: 373.8208 B: 375.8178 C: 383.8639 D: 385.8610 E: 389.8156
Text:2723,2724,2726 TL:14205229



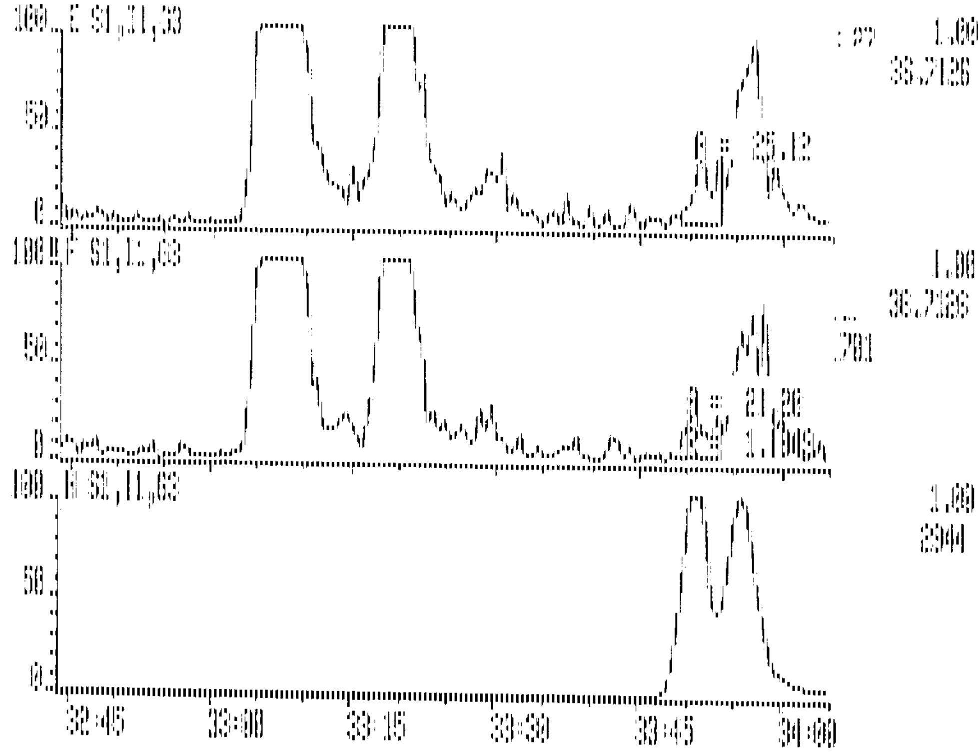
S921618 4-APR-92 12:44 70S (EI+) Sys:NOBSUS
GR 3 D: 385.8512 E: 389.8156 F: 391.8127 G: 392.9760 H: 401.8556
Text:2723,2724,2736 TL1I820522A



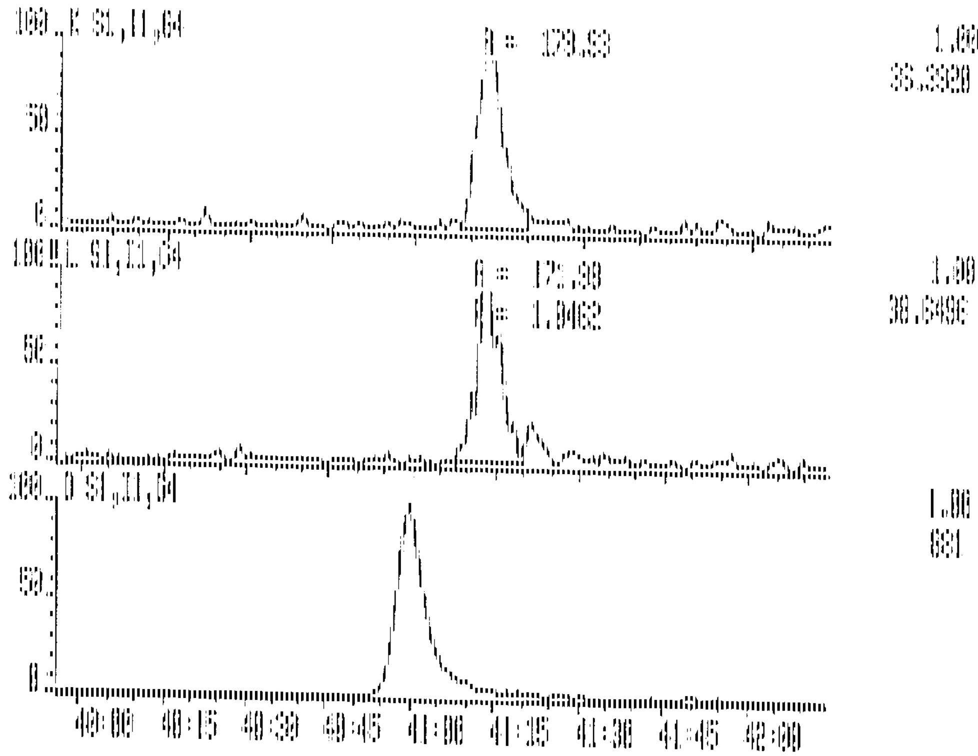
5921618   4-APR-92 12:44 706   (EI+)   Sys:NDB5JS
GR 3 D: 385.8610 E: 389.8156 F: 391.8127 G: 392.9760 H: 401.8558
Text:2723,2724,2726 TL11205220



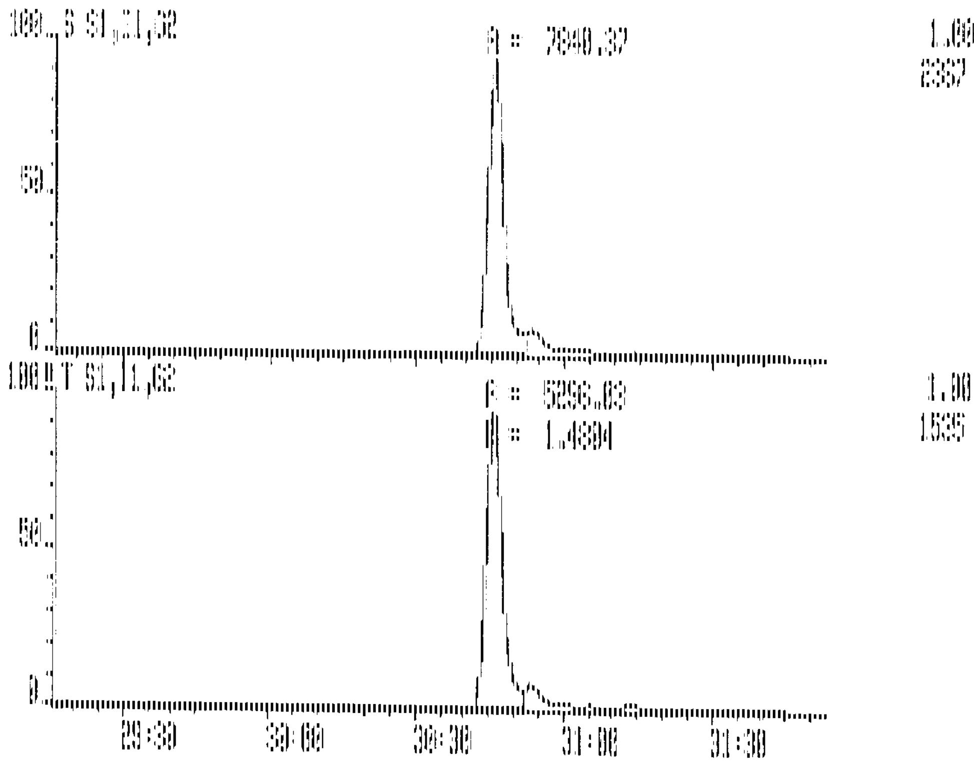
S921618   4-APR-92 12:44 70S   (EI+)   Sys:HD85US
Gr. 3 D: 385.8510 E: 389.8156 F: 391.8127 G: 392.9760 H: 401.8558
Text:2723,2724,2725 TL1102522R



S921518   4-APR-92 12:44 +705   (EI+)   Sys:HDB5US
SR 4 I: 437.8149 J: 442.9728 K: 441.7428 L: 443.7399 M: 457.7377
Text:2723,2724,2726 TL1020522A



S921618 4-APR-92 12:44 70S (EI+) Sys:HD85LS
GR 2 Q: 355.8546 R: 357.8516 S: 367.8949 T: 369.8919 U: 375.8364
Text:2723,2724,2726 TL1H205220



#1

TRIANGLE LABORATORIES OF RTP, INC.
PCDD/PCDF 2378X ANALYSIS (b)

FILE NAME.....: S921582
CONCAL........: S921573
ANALYST.......: SA
SAMPLE SIZE...: 1.00
ICAL DATE.....: 12/12/91
SPIKE FILE....: SPX2374X
GC COLUMN.....: DB-5

CLIENT........: RMC ENV.
SAMPLE ID.....: 2725
ANALYSIS DATE: 04/03/92
SAMPLE MATRIX: TOL.RINSE
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 55-55-3
PROJECT NUMBER: 20522B
DATE RECEIVED.: 03/31/92
DATE COLLECTED: / /
CLIENT PROJECT: n/a

NAME	AMT(pg)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		4.4				
12378-PeCDD	ND		7.7				
123478-HxCDD	ND		10.1				
123678-HxCDD	ND		6.3				
123789-HxCDD	ND		8.5				
1234678-HpCDD	72.7				0.98	37:14	B
OCDD	EMPC			296			B
2378-TCDF	ND		3.4				
12378-PeCDF	ND		3.6				
23478-PeCDF	ND		3.7				
123478-HxCDF	ND		5.8				
123678-HxCDF	ND		4.1				
234678-HxCDF	5.6				1.22	33:43	B
123789-HxCDF	ND		6.5				
1234678-HpCDF	ND		5.7				
1234789-HpCDF	ND		9.8				
OCDF	ND		18.0				
TOTAL TCDD	ND		4.4				
TOTAL PeCDD	EMPC			16.1			
TOTAL HxCDD	9.5	1			1.05		
TOTAL HpCDD	121	2			1.06		
TOTAL TCDF	ND		3.4				
TOTAL PeCDF	ND		3.6				
TOTAL HxCDF	5.3	1			1.22		
TOTAL HpCDF	ND		7.2				

Reviewed By: [signature] 4/14/92

TRIANGLE LABORATORIES OF RTP, INC.
PCDD/PCDF 2378X ANALYSIS (b) QA/QC SUMMARY

FILE NAME.....: S921582
CONCAL........: S921578
ANALYST.......: SA
SAMPLE SIZE...: 1.00
ICAL DATE.....: 12/12/91
SPIKE FILE....: SPX2374X
GC COLUMN.....: DB-5

CLIENT........: RMC ENV.
SAMPLE ID.....: 2725
ANALYSIS DATE: 04/03/92
SAMPLE MATRIX: TOL.RINSE
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: 55-55-3
PROJECT NUMBER: 20522B
DATE RECEIVED.: 03/31/92
DATE COLLECTED: / /
CLIENT PROJECT: n/a

SURROGATE RECOVERY SUMMARY (TYPE B)

NAME	AMT (pg)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	373	93.3		26:37	------
13C12-PeCDF 234	3470	86.6	1.54	30:24	------
13C12-HxCDF 478	3620	90.5	0.53	33:07	------
13C12-HxCDD 478	3760	93.9	1.21	33:49	------
13C12-HpCDF 789	4180	105	0.44	37:45	------

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE B)

NAME	AMT (pg)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3840	96.1	0.49	34:30	------
13C12-HxCDF 234	4290	107	0.52	33:43	------

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (pg)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3380	84.4	0.75	25:54	------
13C12-2378-TCDD	3140	78.6	0.76	26:36	------
13C12-PeCDF 123	4230	106	1.60	29:44	------
13C12-PeCDD 123	3300	82.6	1.53	30:45	------
13C12-HxCDF 678	4010	100	0.49	33:13	------
13C12-HxCDD 678	3800	95.0	1.19	33:54	------
13C12-HpCDF 678	4100	102	0.44	36:10	------
13C12-HpCDD 678	3860	96.6	1.03	37:13	------
13C12-OCDD	5980	74.8	0.87	40:57	------

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.77	26:25	------
13C12-HxCDD 789	1.21	34:13	------

Reviewed By: [illegible] 4/14/92

X237_RPT 4.00, LARS 4.20

N= 8
(30+) ~~GG~~

	Initial	Date
S-File/Header Changes	GG	4/13/92
Manual Integrations	|	|
Transcription	|	|
Phase Corrections	GG	4/14/92

Page No. 1
04/14/92

Listing of S921582B.dsf

Matched GC Peaks / Ratio / Ret. Time

M_Z	Omit	Ratio	RT	Area	Match Rat	Match RT	REL_RT	Who/ Why
316		0.88	24:54	95.04	T	F	0.951	
		0.84	25:30	225.24	T	F	0.985	
		0.75	25:54	24744.17	T	T	1.000	
		0.67	26:20	225.27	T	F	1.017	
	DC	0.79	29:46	995.53	T	F	1.149	WH
	DC	0.78	30:26	711.81	T	F	1.175	WH
316		*** Total ***		26998.06	# of Peaks:		5	
320	DC	0.61	29:46	100.06	F	F	1.119	WH
	DC	0.56	30:26	85.05	F	F	1.144	WH
320		*** Total ***		185.11	# of Peaks:		2	
328		0.00	25:17	30.84	T	F	0.951	
		0.00	26:37	1835.41	T	T	1.001	
328		*** Total ***		1866.25	# of Peaks:		2	
332		0.77	26:25	17163.66	T	T	0.993	
		0.76	26:35	17237.04	T	T	1.000	
		0.68	26:54	270.73	T	F	1.011	
	DC	0.79	30:45	445.27	T	F	1.156	WH
332		*** Total ***		35116.70	# of Peaks:		4	
352		1.53	29:21	68.16	T	F	0.987	
		1.50	29:44	20259.86	T	T	1.000	
		1.76	30:00	438.05	T	F	1.009	
		1.54	30:24	15633.59	T	T	1.022	
		1.37	31:22	161.78	T	F	1.055	
352		*** Total ***		36561.44	# of Peaks:		5	
356		0.52	29:45	41.91	F	F	0.968	
356		*** Total ***		41.91	# of Peaks:		1	
368	Spl	1.53	30:45	~~5819.32~~ 8402.74	T	T	1.000	
		1.11	31:13	75.85	F	F	1.015	
368		*** Total ***		5895.17	# of Peaks:		2	
374	~~DC~~ Cu	~~1.55~~ 1.22	33:45	~~18.70~~ 19.40	~~T~~ F	T	1.015	SN
374		*** Total ***		18.70	# of Peaks:		1	
384		0.53	33:07	11460.84	T	T	0.997	
		0.49	33:13	15000.91	T	T	1.000	
		0.52	33:43	14757.14	T	T	1.015	
		0.49	34:30	10051.76	T	T	1.039	

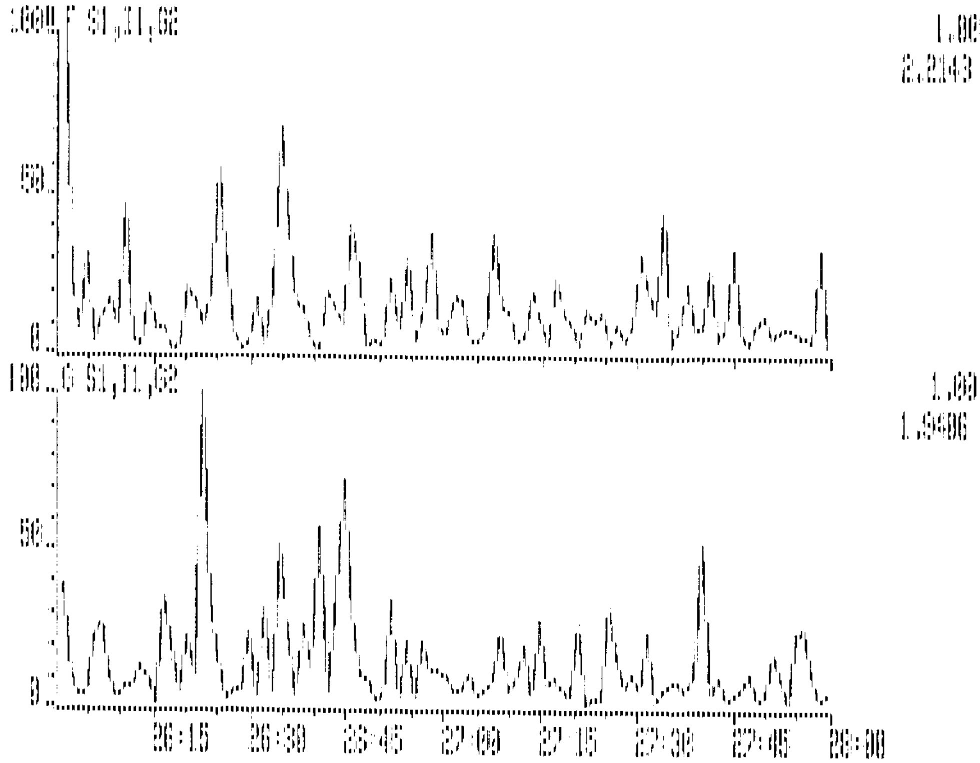
Listing of S921582B.dbf

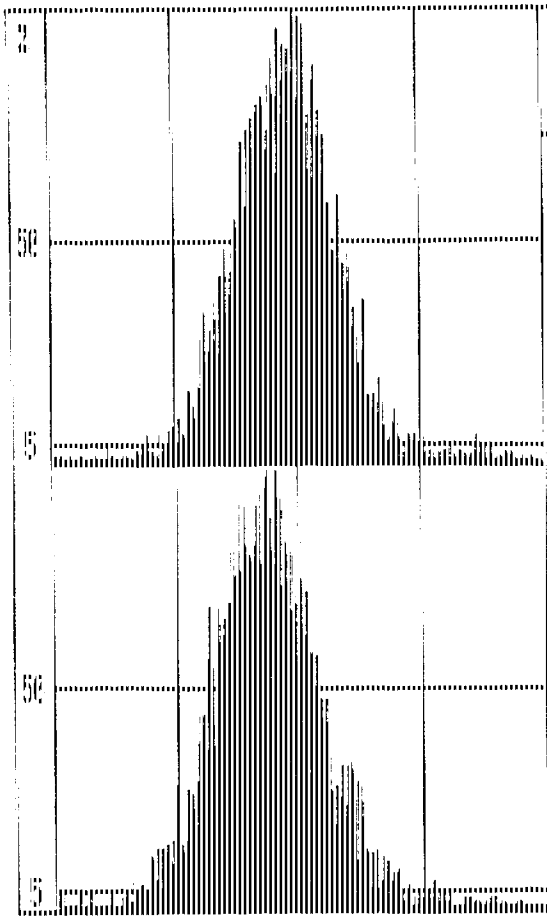
Matched GC Peaks / Ratio / Ret. Time

M_Z	Orig	Ratio	RT.	Area	Match Rat	Match RT	REL_RT	Who/ Why
384		*** Total ***		52270.55	# of Peaks:		4	
390		1.05	33:17	23.72	T	F	0.982	
390		*** Total ***		23.72	# of Peaks:		1	
402		1.21	33:49	7891.39	T	T	0.998	
		1.19	33:54	11222.45	T	T	1.000	
		1.21	34:12	10684.18	T	T	1.009	
402		*** Total ***		29798.02	# of Peaks:		3	
418		0.44	36:10	9070.72	T	T	1.000	
		0.44	37:45	6204.95	T	T	1.044	
		0.51	38:22	25.79	T	F	1.061	
		0.93	38:31	20.80	F	F	1.065	
418		*** Total ***		15323.26	# of Peaks:		4	
424		1.18	36:27	77.34	T	F	0.979	
		0.98	37:14	115.40	T	T	1.000	
	2D	1.69	41:00	24.59	F	F	1.102	BW, MM
424		*** Total ***		217.33	# of Peaks:		3	
436		1.03	37:13	6779.58	T	T	1.000	
		0.62	37:49	47.33	F	F	1.016	
	DC	1.01	40:58	822.19	T	F	1.101	W-
436		*** Total ***		7649.10	# of Peaks:		3	
458	20	0.74	40:58	280.03	F	T	1.000	
458		*** Total ***		280.03	# of Peaks:		1	
470		0.87	40:57	5897.46	T	T	1.000	
470		*** Total ***		5897.46	# of Peaks:		1	

*** End of Report ***

S921582 3-APR-92 02:23 205 (EI+) Sys:HDESUS
GR 2 F 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2725 TEST 01 TL1# 205228





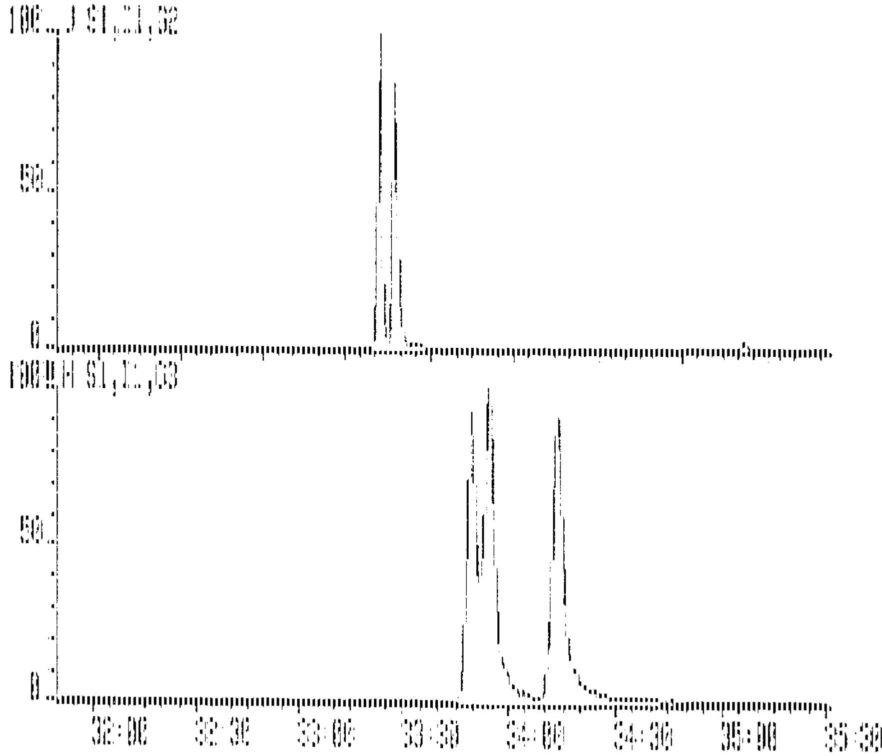
Ref. mass 292.9825 Peak top
Height .39 volts Span 200 ppm

System file name VOE5JS
Data file name A:S921582
Resolution 10000
Group number 2
Ionization mode EI+
Switching VOLTAGE
Ref. masses 292.9825, 416.9760

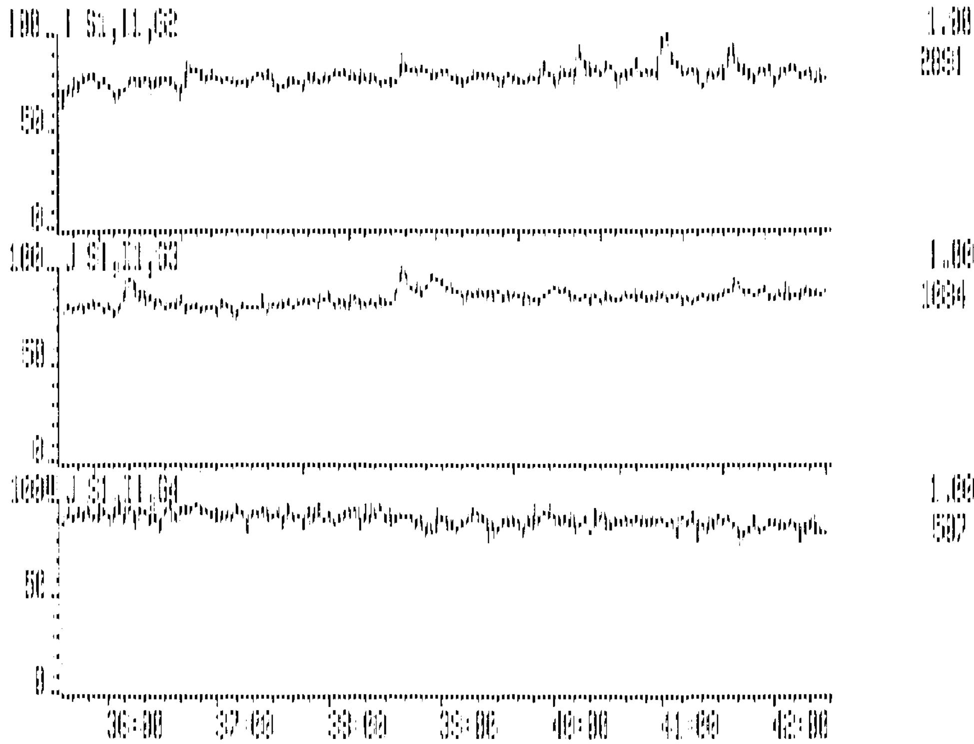
A	293	J	332	S	368
B	304	K	334	T	370
C	306	L	338	U	376
D	316	M	340	V	410
E	318	N	342		
F	320	O	352		
G	322	P	354		
H	328	Q	356		
I	331	R	358		

Channel I 330.9792 Peak top
Height .41 volts Span 200 ppm

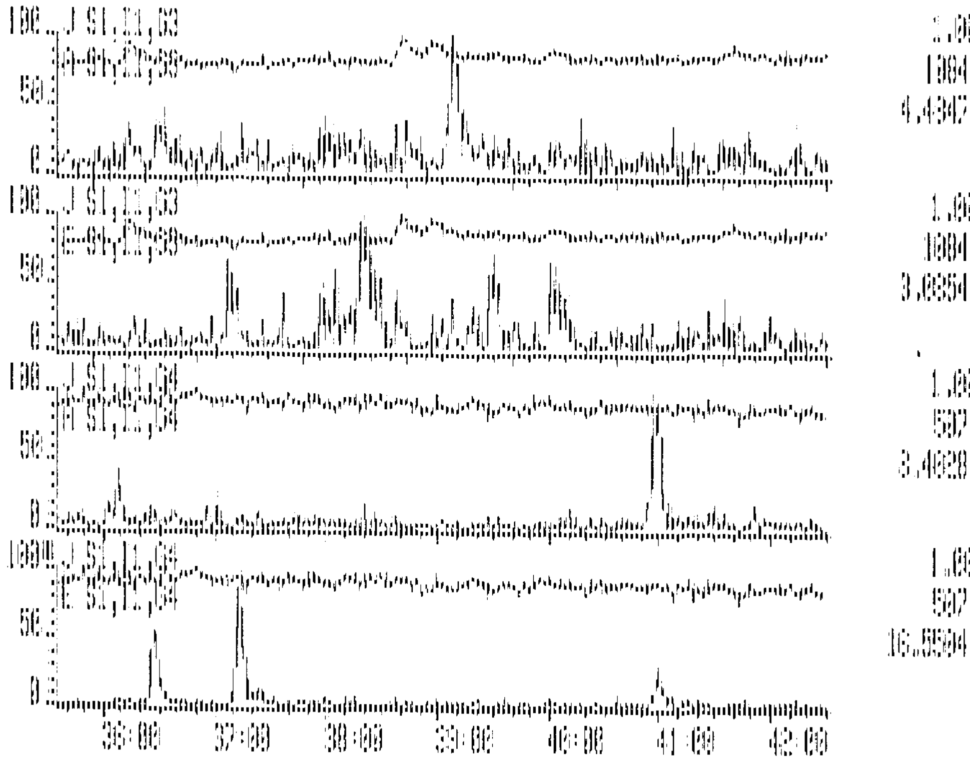
S921582 3-APR-92 02:28 795 (EI+) Sys NOB5US
GR 3 F 391.8127 G 392.9760 H 401.8558 I 403.8529 J 430.9729
Text: 2725 TEST 01 T.3# 205223



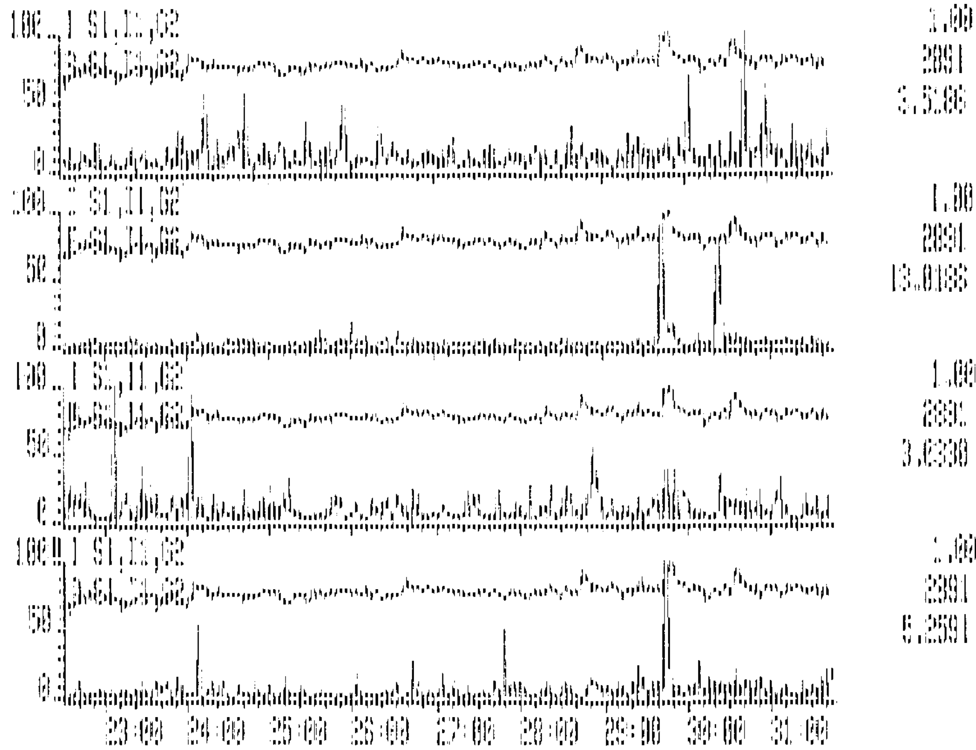
S921582 3-APR-92 02:23 705 (EI+) Sys:MDB5US
GR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2725 TEST 4I 7.1b 205228



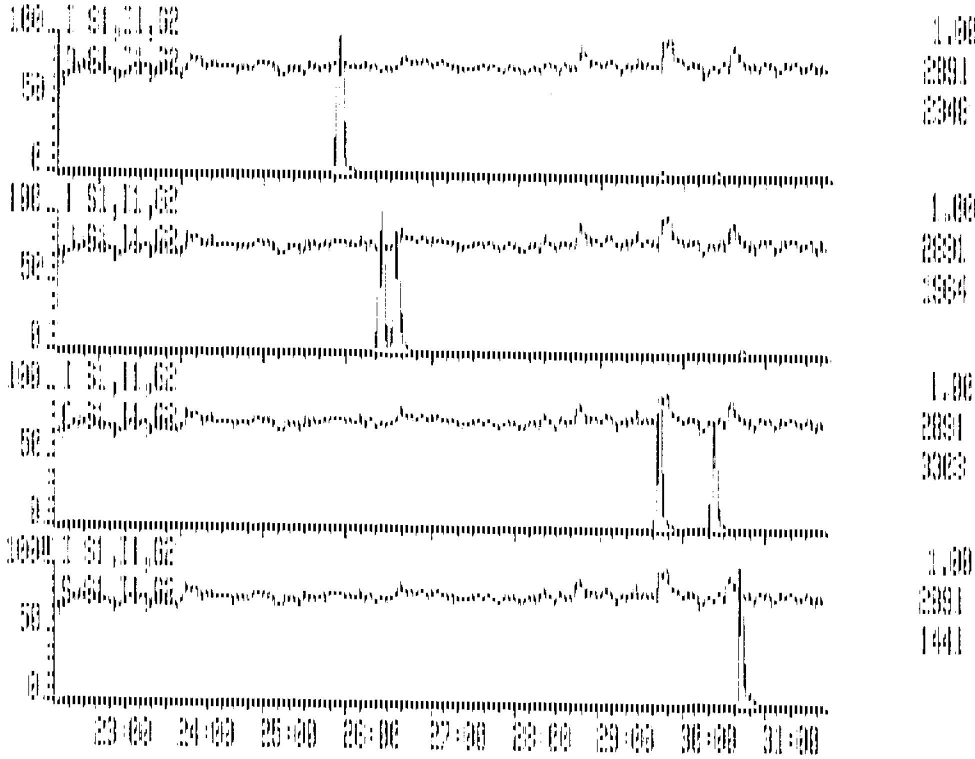
S921582 3-APR-92 02:23 706 (EI+) Sys:HD85LS
SR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2725 TEST 01 TL1# 205228



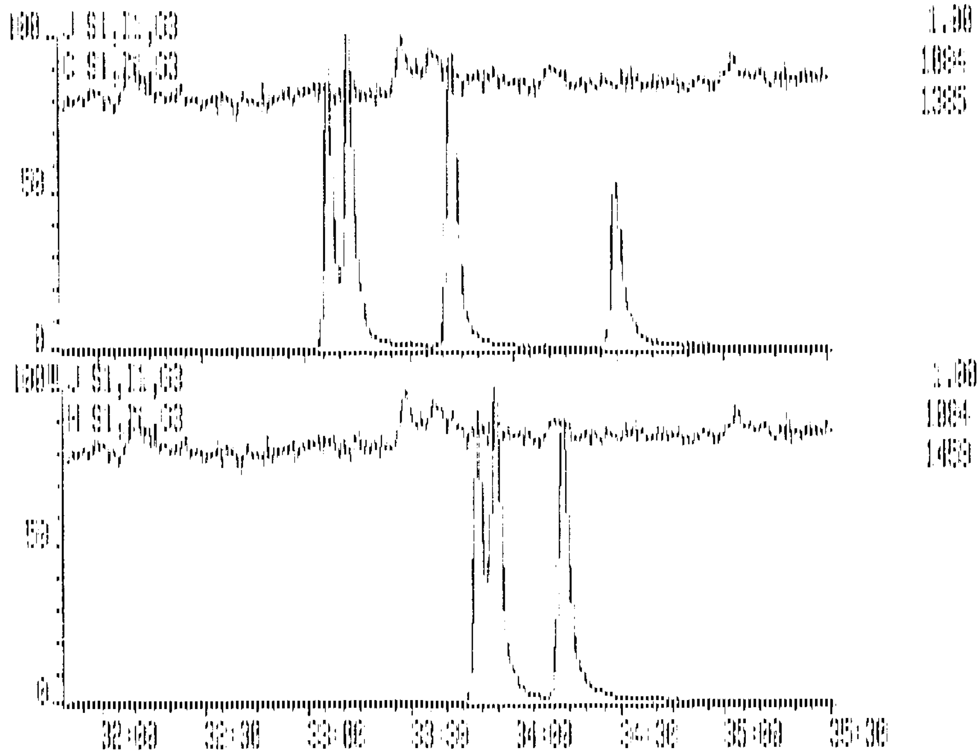
S921532   3-APR-92 02:28:70S   (EI+)   Sys:MOD5US
GR 2 F: 319.9065 G: 321.8936 H: 327.8847 I: 330.3252 J: 331.9368
Text:2725 TEST #1 *L1# 205226



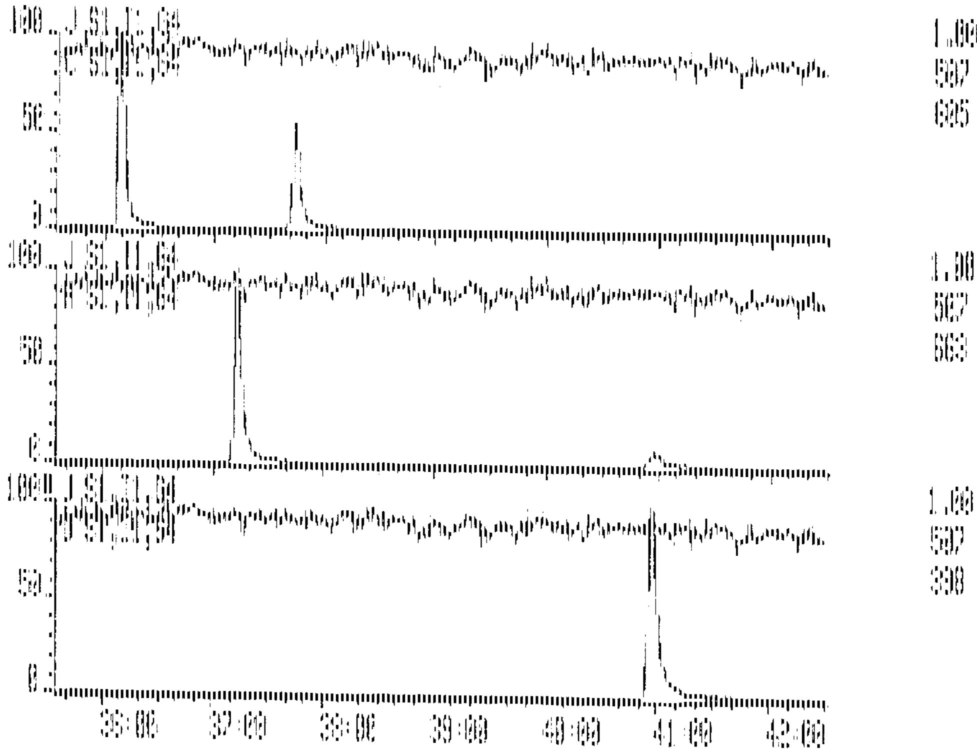
S92.582 3-APR-92 02:28 70S (EI+) Sys:AUTOSPEC
GP 2 F 319.8965 G 321.8936 H 327.8847 I 330.5792 J 331.9368
Text:2725 TEST B1 T.14 20522E



SS21582 3-APR-92 02:23 705 (EI+) Sys:HDB5JS
GR 3 F: 391.8127 G: 392.9760 H: 401.8558 I: 403.8529 J: 430.9729
Text:2725 TEST 41 TL1b 225223



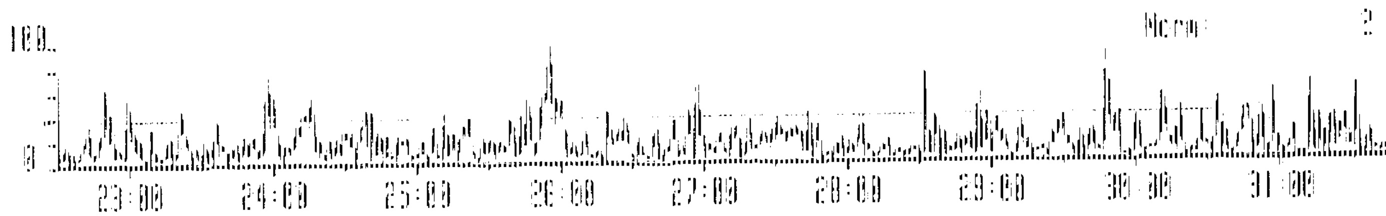
S921562 3-APR-92 02:28 70S (EI+) Sys:ND05US
GR 4 F: 425.7737 G: 430.9729 H: 435.3169 I: 437.8140 J: 442.9728
Text:2725 TEST B1 TL10 235223



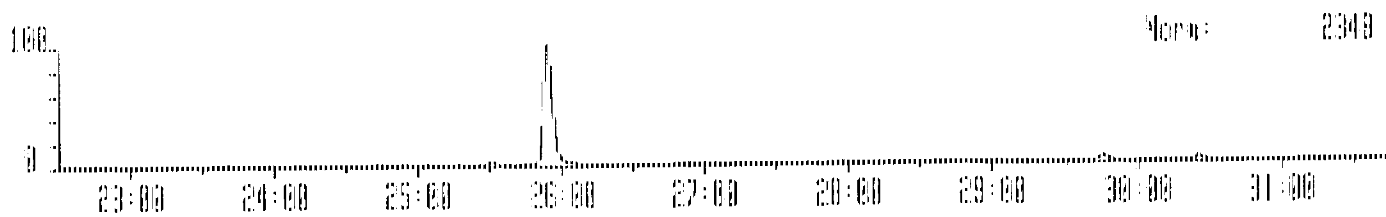
S921502 3-APR-92 Str:Voltage 70S Sys: N085US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2725 TEST #1 TL1# 205220

S921502 3-APR-92 Str:Voltage 70S Sys: N085US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2725 TEST #1 TL1# 205220

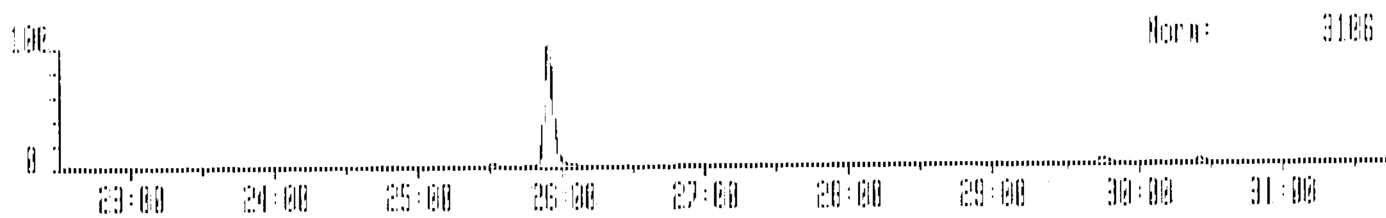
N = .4 x 2.5 x 2 = 0.460
4/13pm



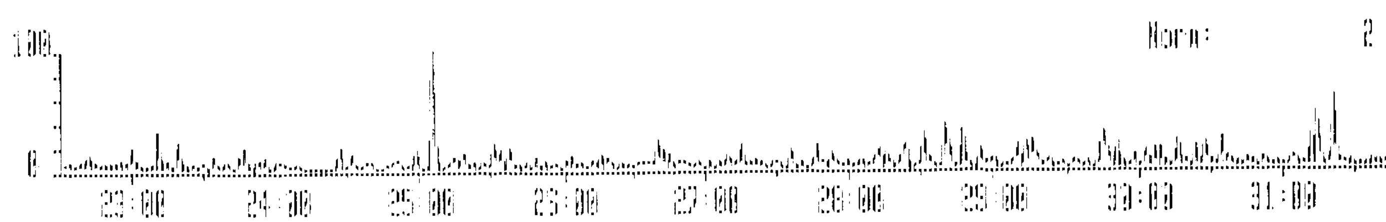
S921502 3-APR-92 Str:Voltage 70S Sys: N085US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2725 TEST #1 TL1# 205220



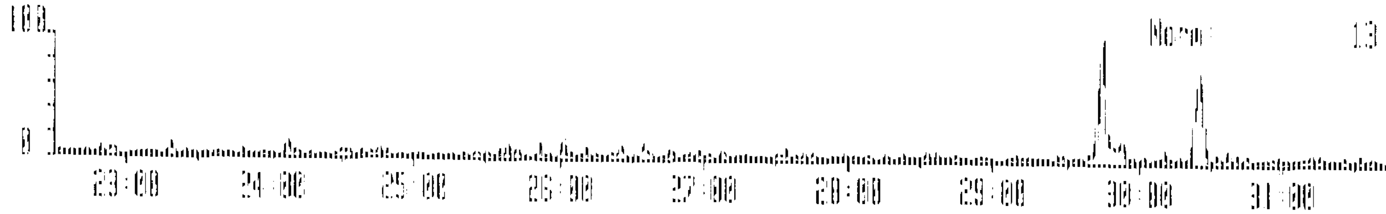
S921502 3-APR-92 Str:Voltage 70S Sys: N085US
Sample 1 Injection 1 Group 2 Mass 317.9339
Text:2725 TEST #1 TL1# 205220



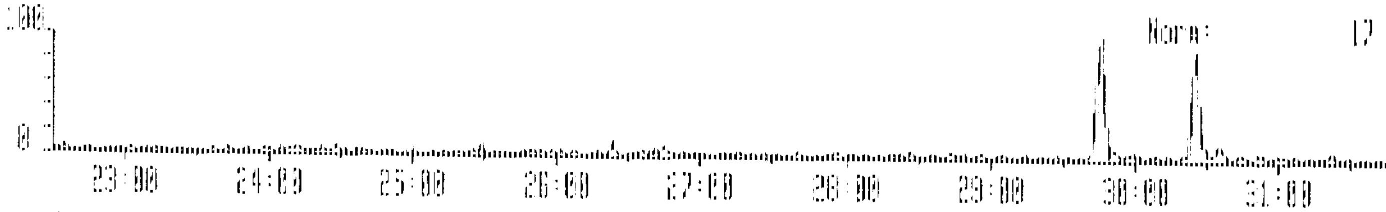
S921502 3-APR-92 Str:Voltage 70S Sys: N085US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2725 TEST #1 TL1# 205220



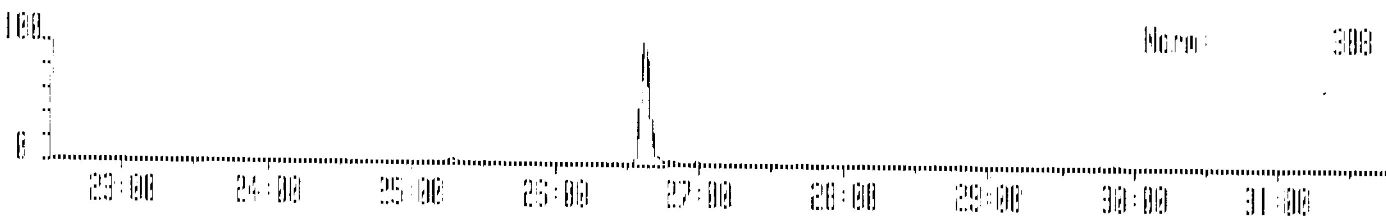
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 319.8965
Text:2725 TEST #1 TL1# 205228



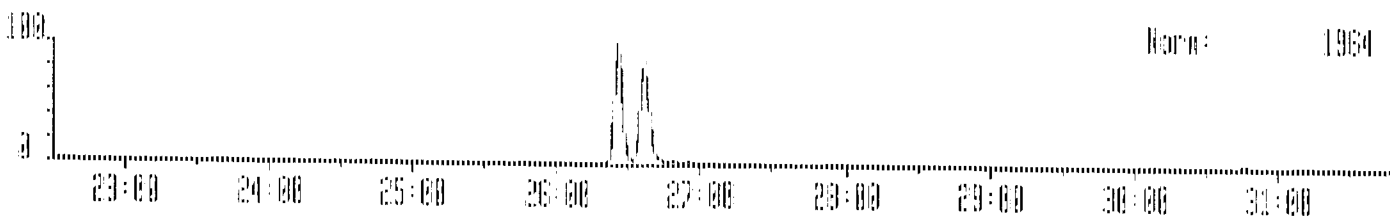
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 321.8936
Text:2725 TEST #1 TL1# 205228



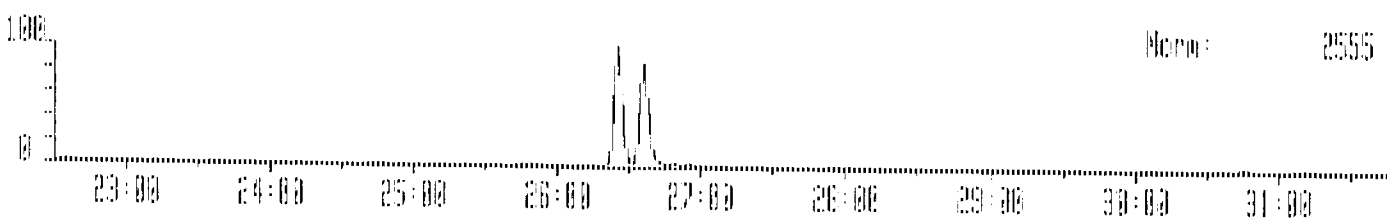
S921502 3-APR-92 Sir:Voltage 70S Sys NDB5US
Sample 1 Injection 1 Group 2 Mass 327.8847
Text:2725 TEST #1 TL1# 205228



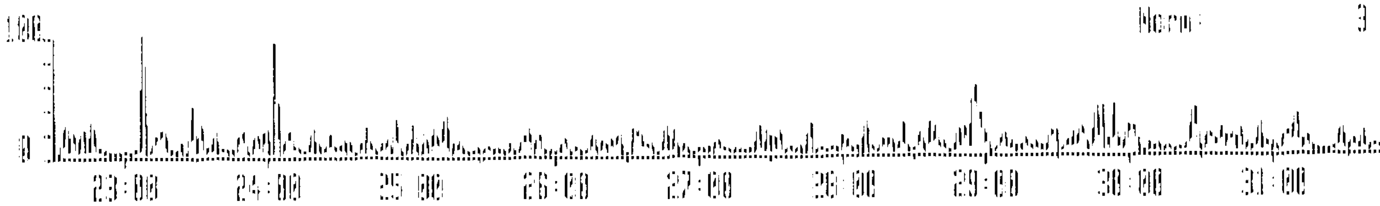
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 331.9368
Text:2725 TEST #1 TL1# 205228



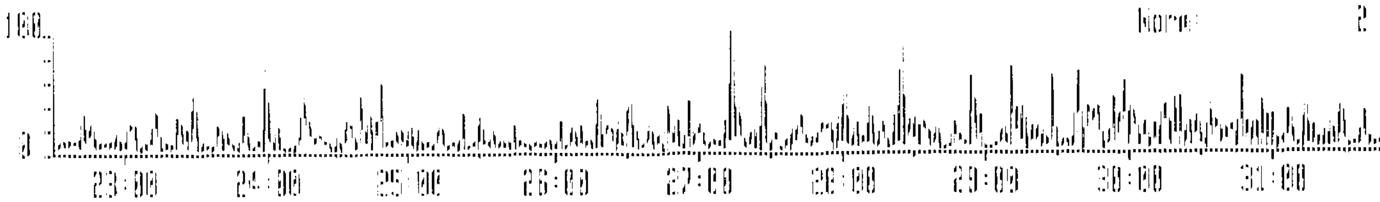
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 333.9338
Text:2725 TEST #1 TL1# 205228



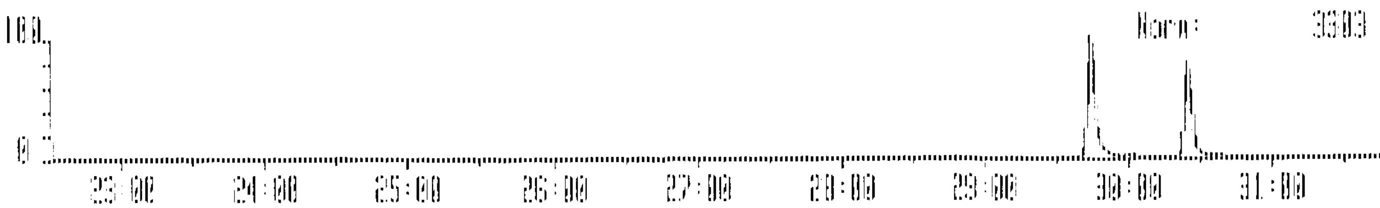
S921502 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 339.8597
Text:2725 TEST #1 TLI# 205228



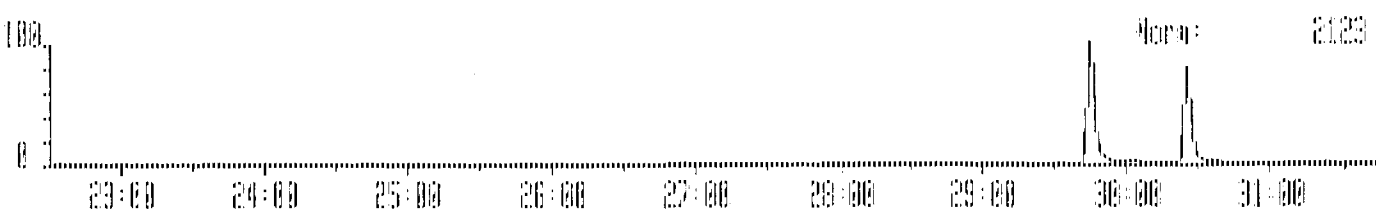
S921502 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 341.8567
Text:2725 TEST #1 TLI# 205228



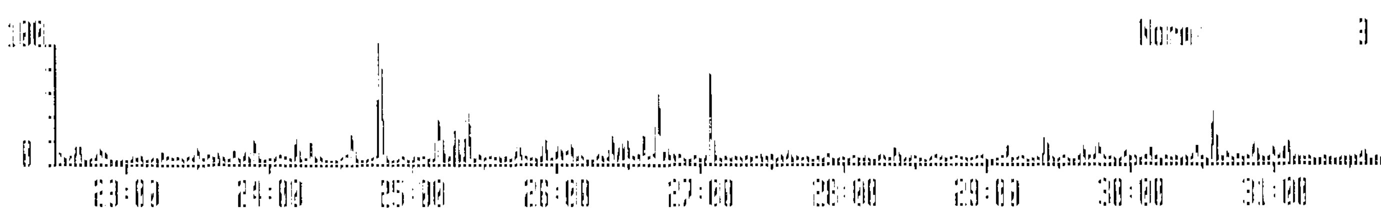
S921502 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 351.9000
Text:2725 TEST #1 TLI# 205228



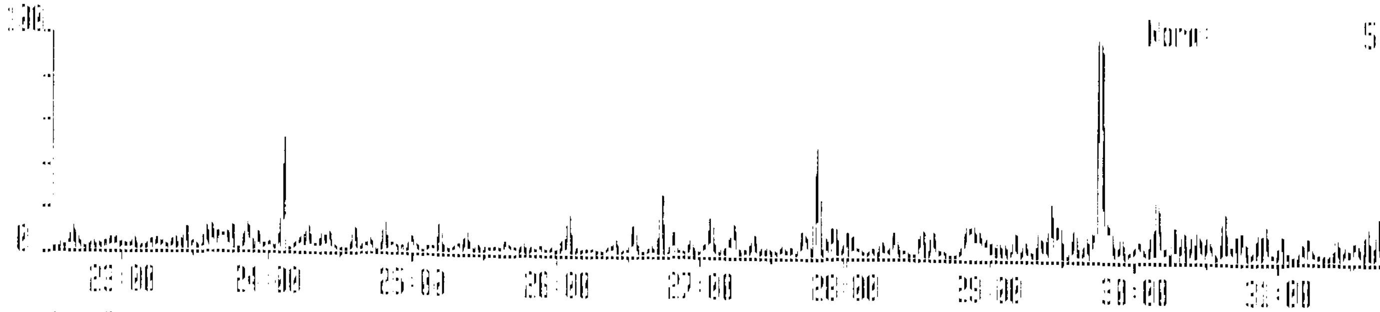
S921502 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 353.8970
Text:2725 TEST #1 TLI# 205228



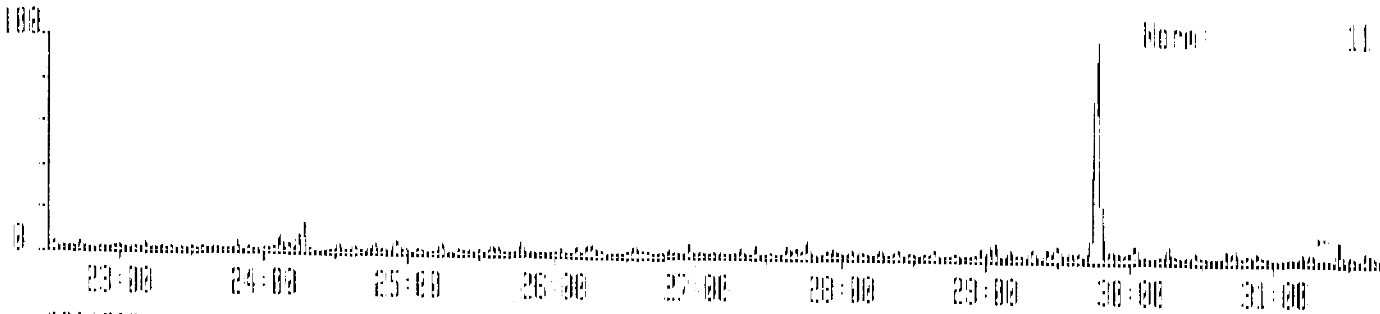
S921502 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 2 Mass 409.7974
Text:2725 TEST #1 TLI# 205228



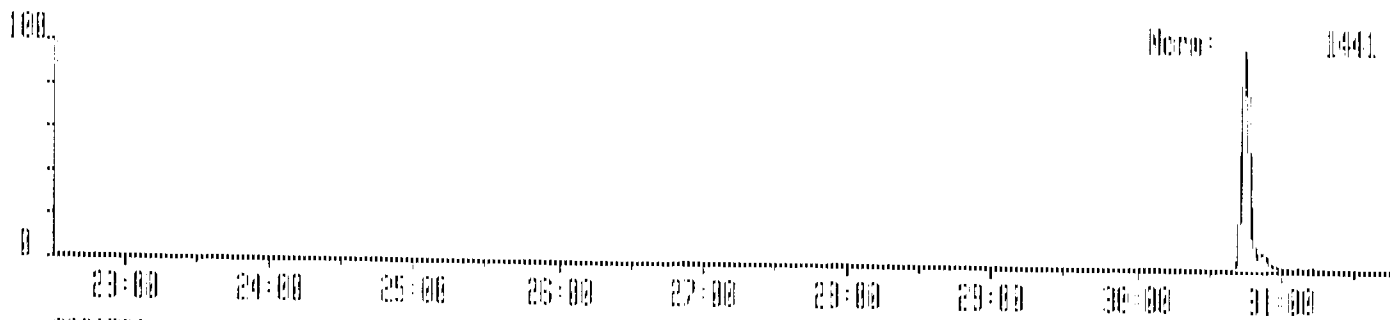
S921502 3-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 355.8546
Text:2725 TEST #1 TL1# 205228



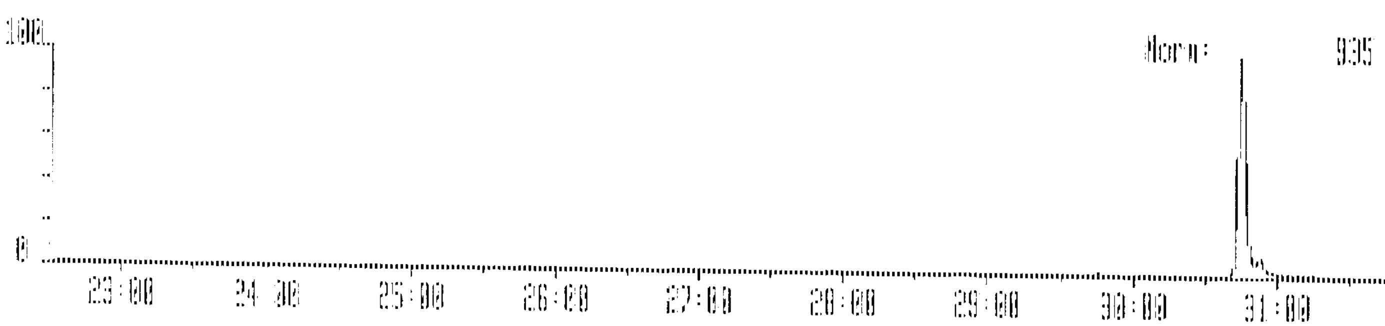
S921502 3-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 357.8516
Text:2725 TEST #1 TL1# 205228



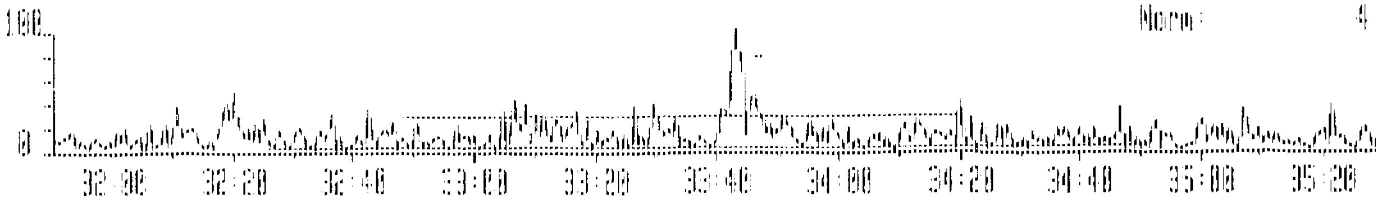
S921502 3-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 367.8949
Text:2725 TEST #1 TL1# 205228



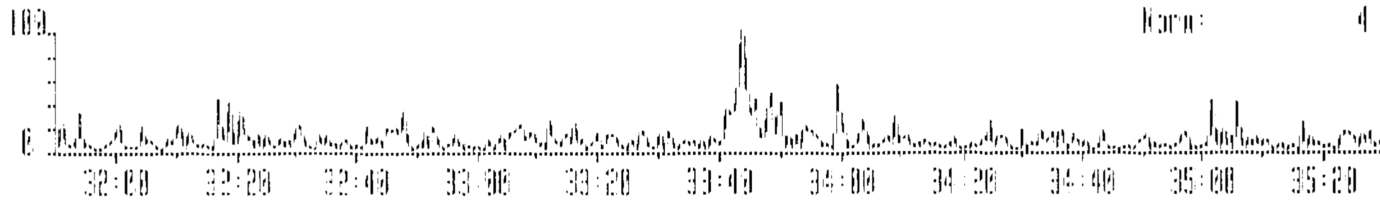
S921502 3-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 369.8919
Text:2725 TEST #1 TL1# 205228



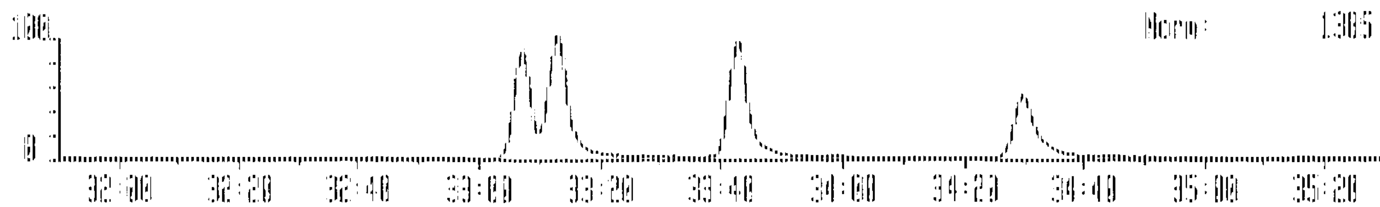
S921582 3-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 373.8208
Text:2725 TEST #1 TL1# 205228



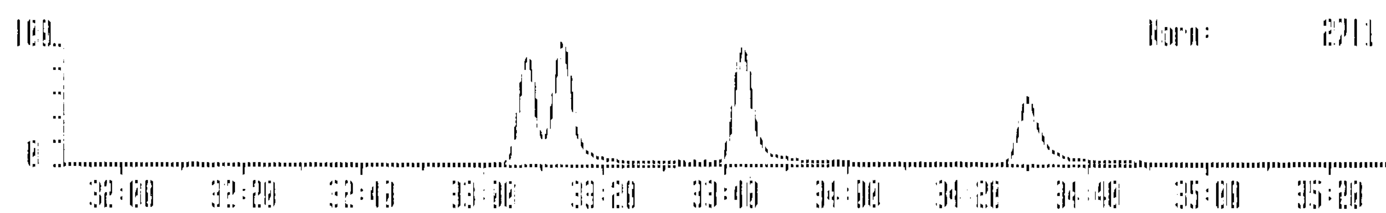
S921582 3-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 375.8178
Text:2725 TEST #1 TL1# 205228



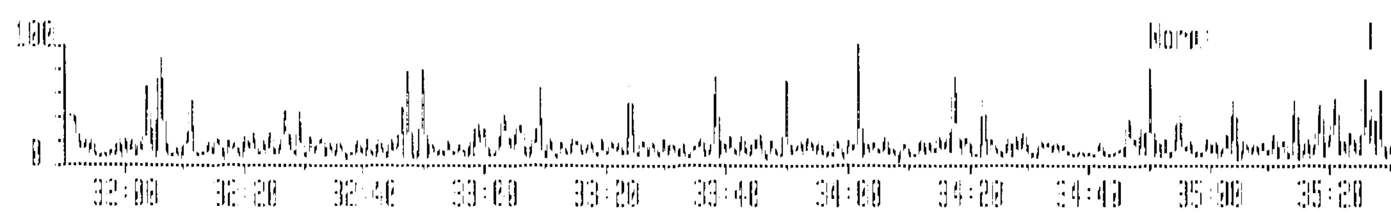
S921582 3-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 383.8639
Text:2725 TEST #1 TL1# 205228



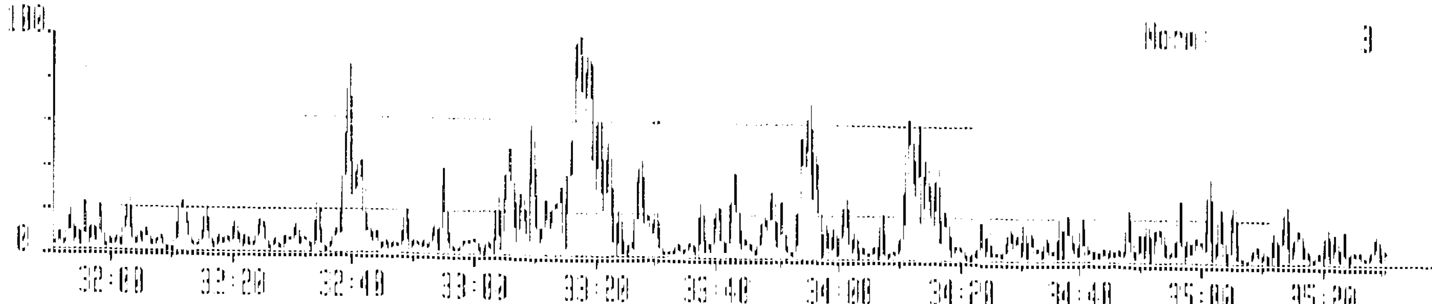
S921582 3-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 385.8610
Text:2725 TEST #1 TL1# 205228



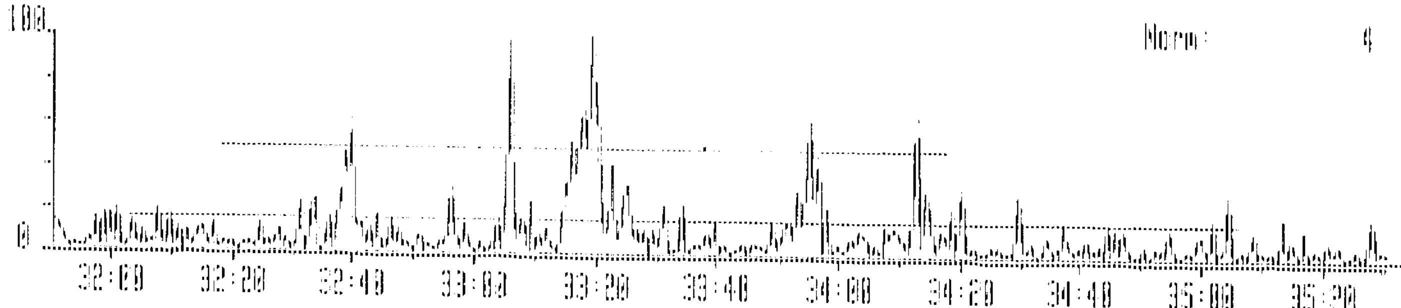
S921582 3-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 445.7555
Text:2725 TEST #1 TL1# 205228



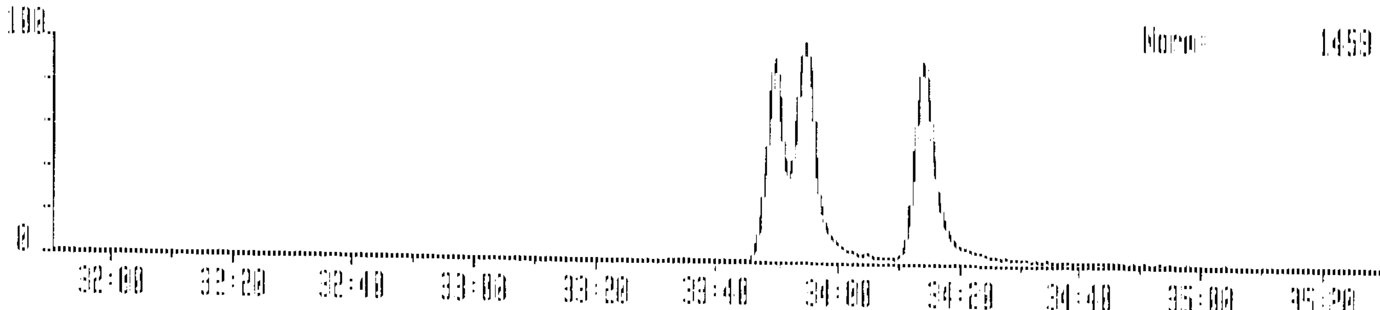
S921582 3-APR-92 Sir:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 3 Mass 389.8156
Text:2725 TEST #1 TL# 205228



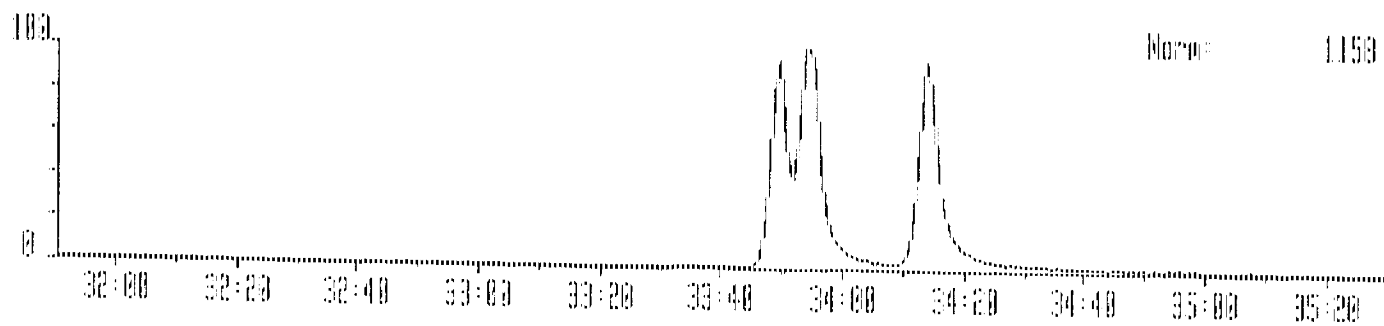
S921582 3-APR-92 Sir:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 3 Mass 391.8127
Text:2725 TEST #1 TL# 205228



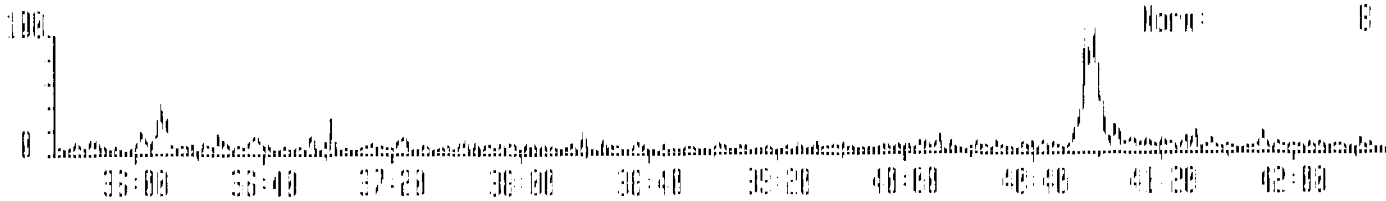
S921582 3-APR-92 Sir:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 3 Mass 401.8553
Text:2725 TEST #1 TL# 205228



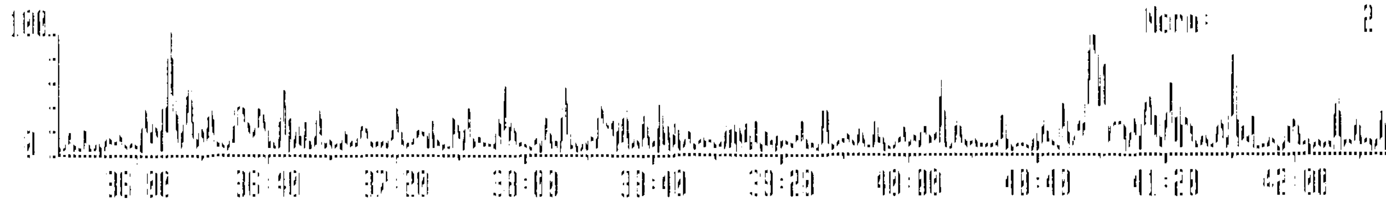
S921582 3-APR-92 Sir:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 3 Mass 403.8529
Text:2725 TEST #1 TL# 205228



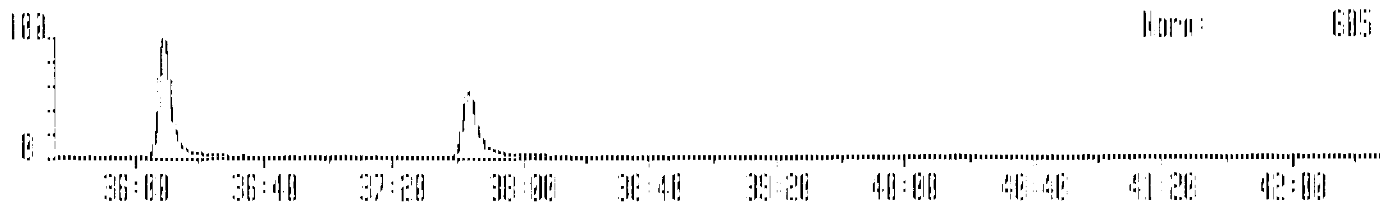
S921582 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 407.7818
Text:2725 TEST #1 TLI# 205228



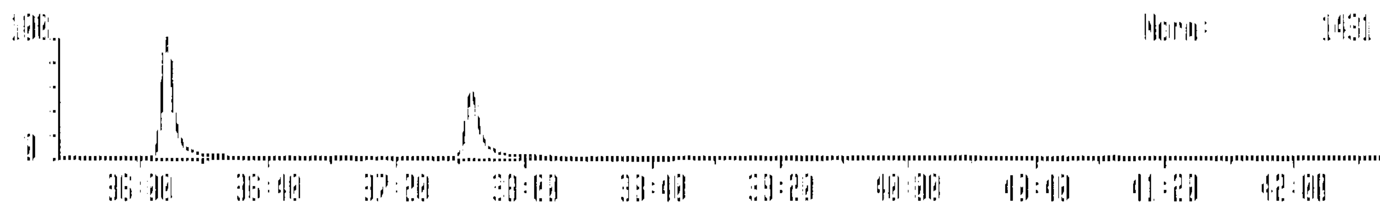
S921582 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 409.7789
Text:2725 TEST #1 TLI# 205228



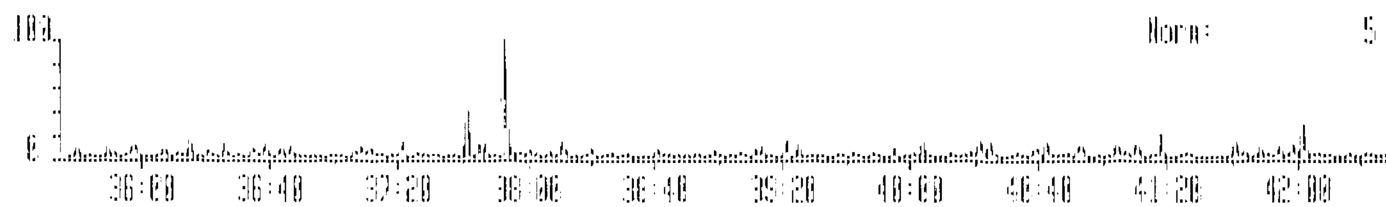
S921582 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 417.8253
Text:2725 TEST #1 TLI# 205228



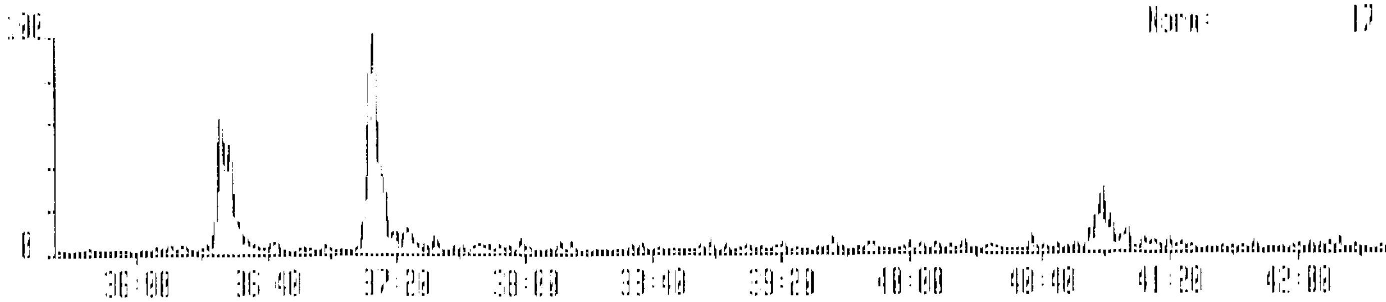
S921582 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 419.8220
Text:2725 TEST #1 TLI# 205228



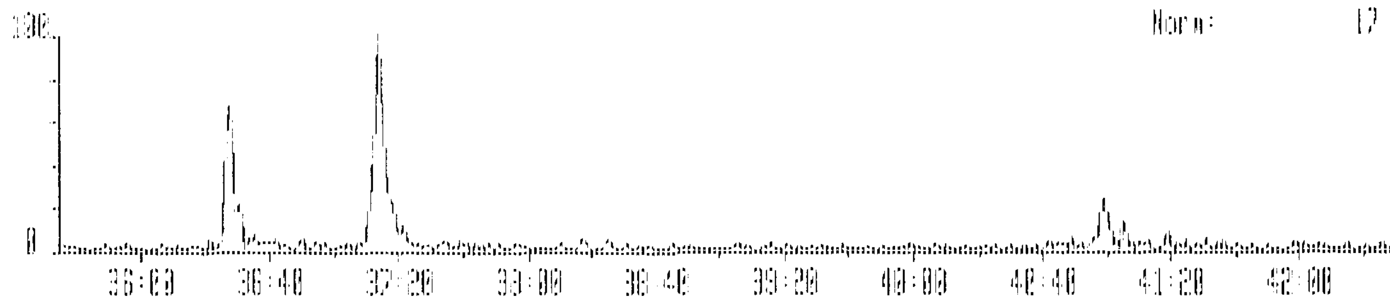
S921582 3-APR-92 Sir:Voltage 70S Sys: MD85US
Sample 1 Injection 1 Group 4 Mass 479.7165
Text:2725 TEST #1 TLI# 205228



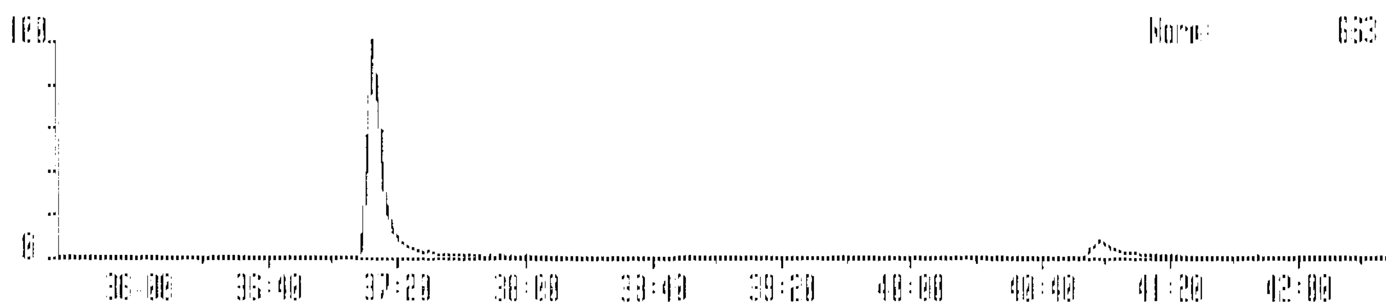
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 423.7766
Text:2725 TEST #1 TLI# 205228



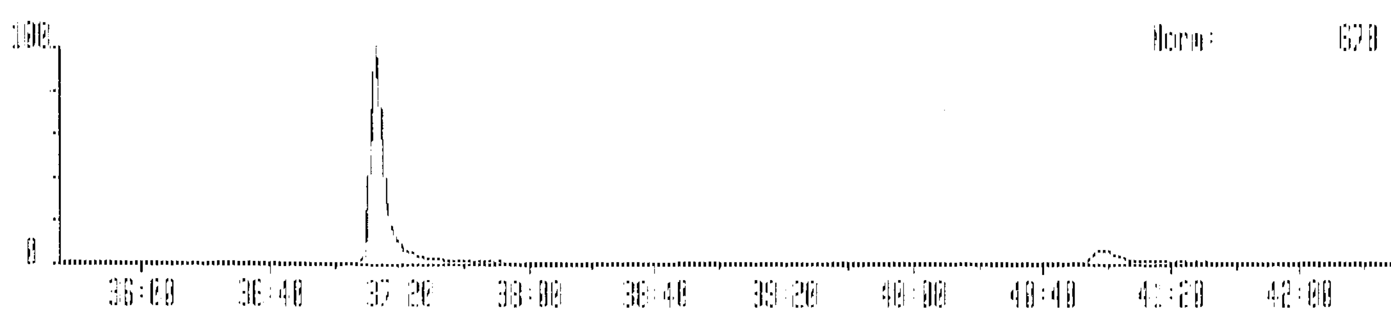
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 425.7737
Text:2725 TEST #1 TLI# 205228



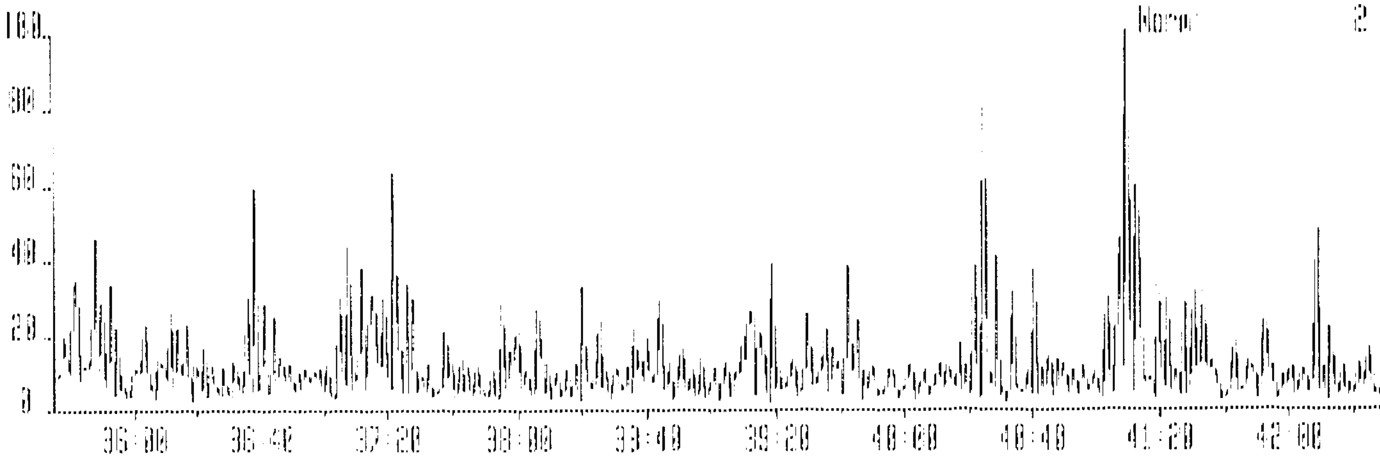
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 435.8163
Text:2725 TEST #1 TLI# 205228



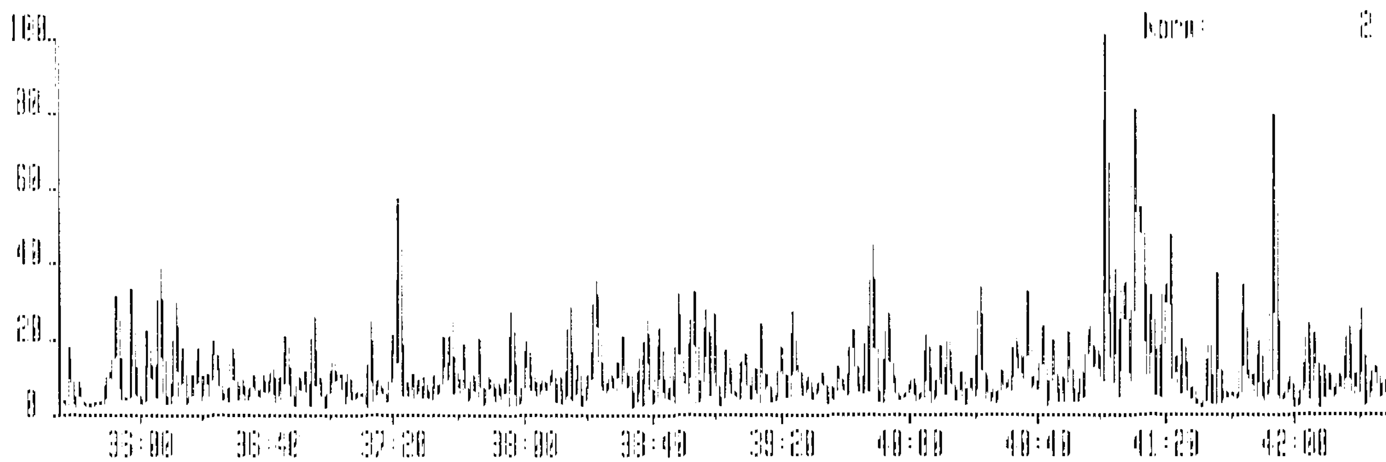
S921502 3-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 437.8140
Text:2725 TEST #1 TLI# 205228



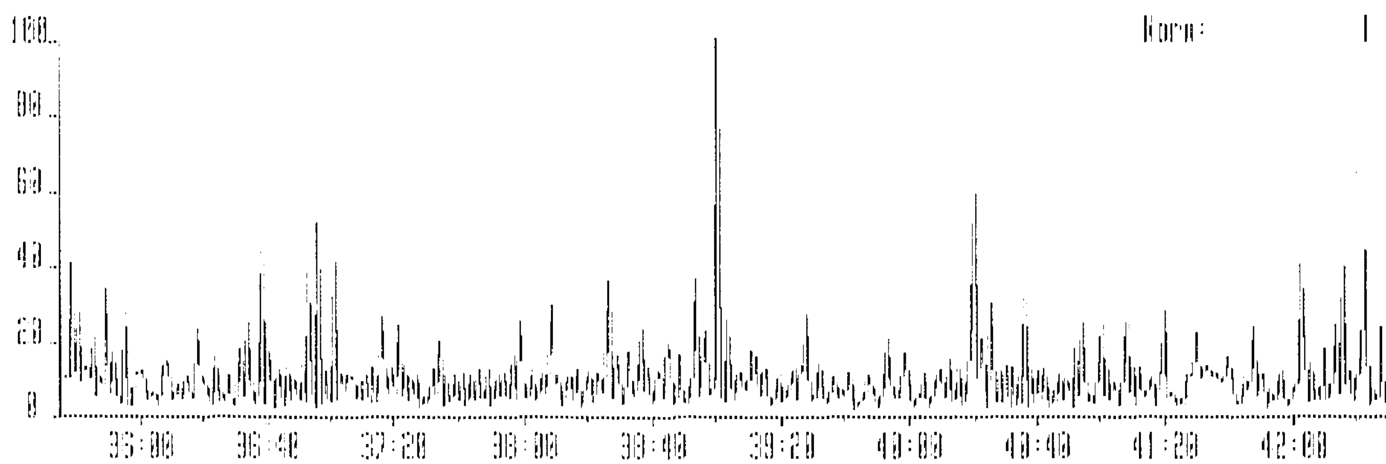
S921502 3-APR-92 Sir:Voltage 70S Sys: N0850S
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2725 TEST #1 TLI# 205220



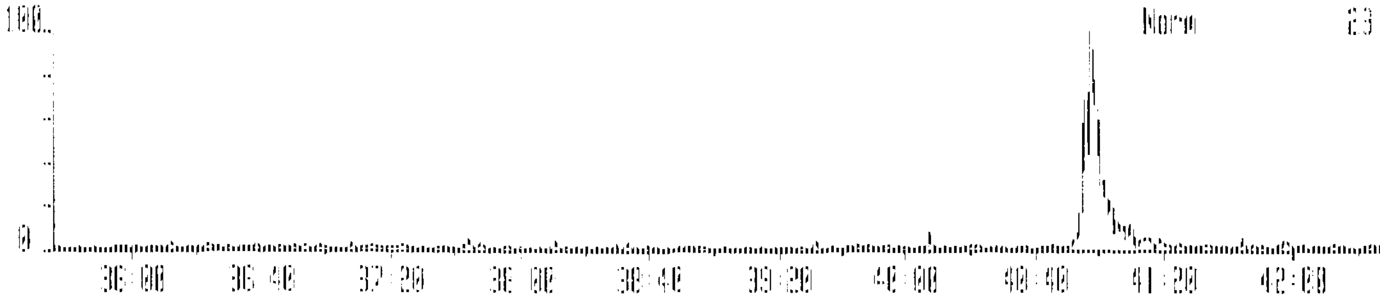
S921502 3-APR-92 Sir:Voltage 70S Sys: N0850S
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2725 TEST #1 TLI# 205220



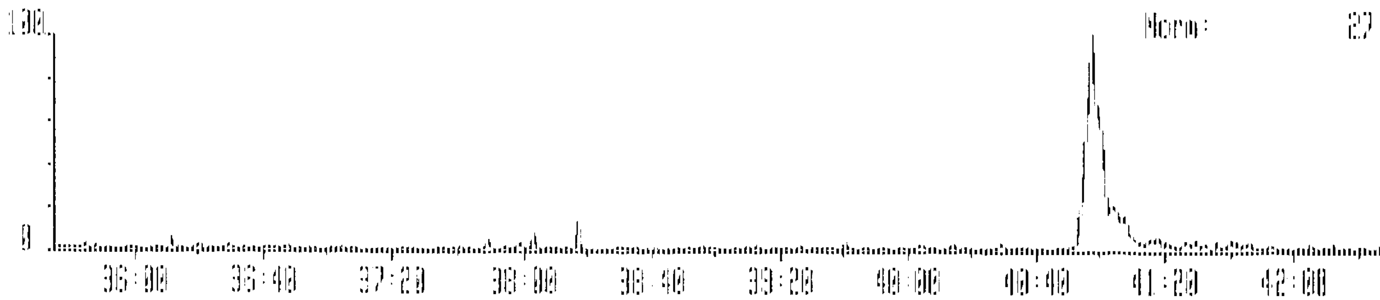
S921502 3-APR-92 Sir:Voltage 70S Sys: N0850S
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2725 TEST #1 TLI# 205220



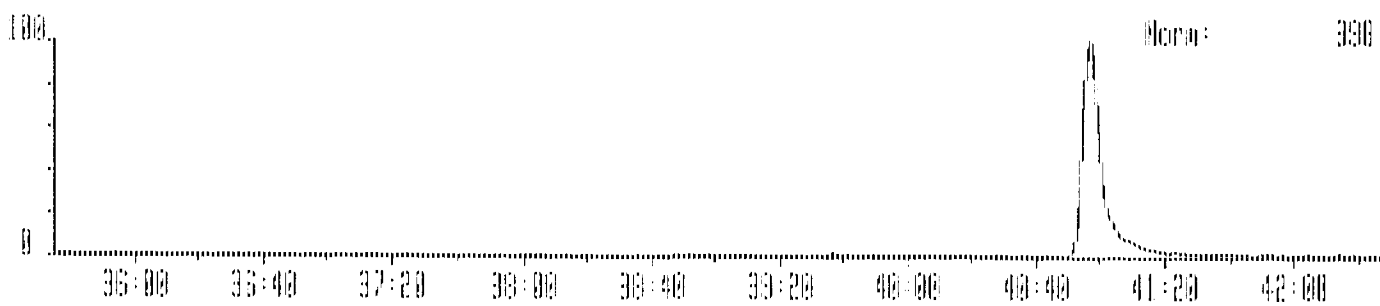
S921582 3-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 457.7377
Text:2725 TEST #1 TLI# 205228



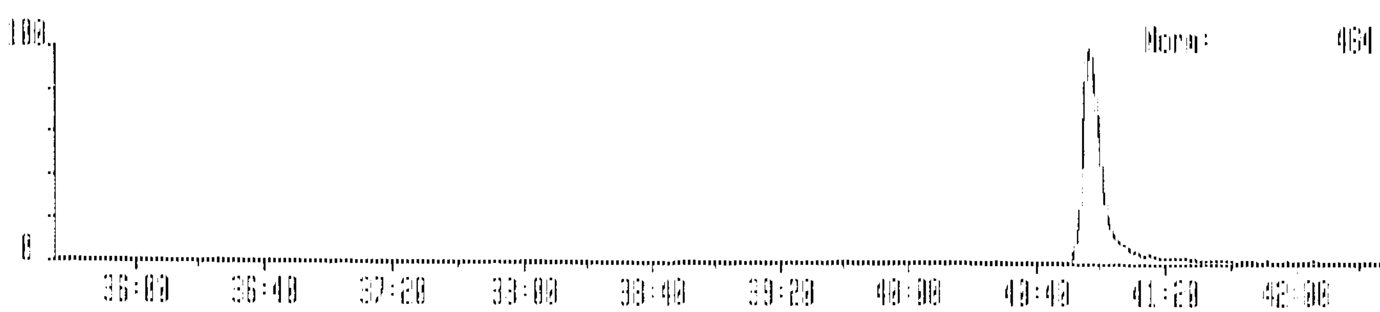
S921582 3-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 459.7348
Text:2725 TEST #1 TLI# 205228



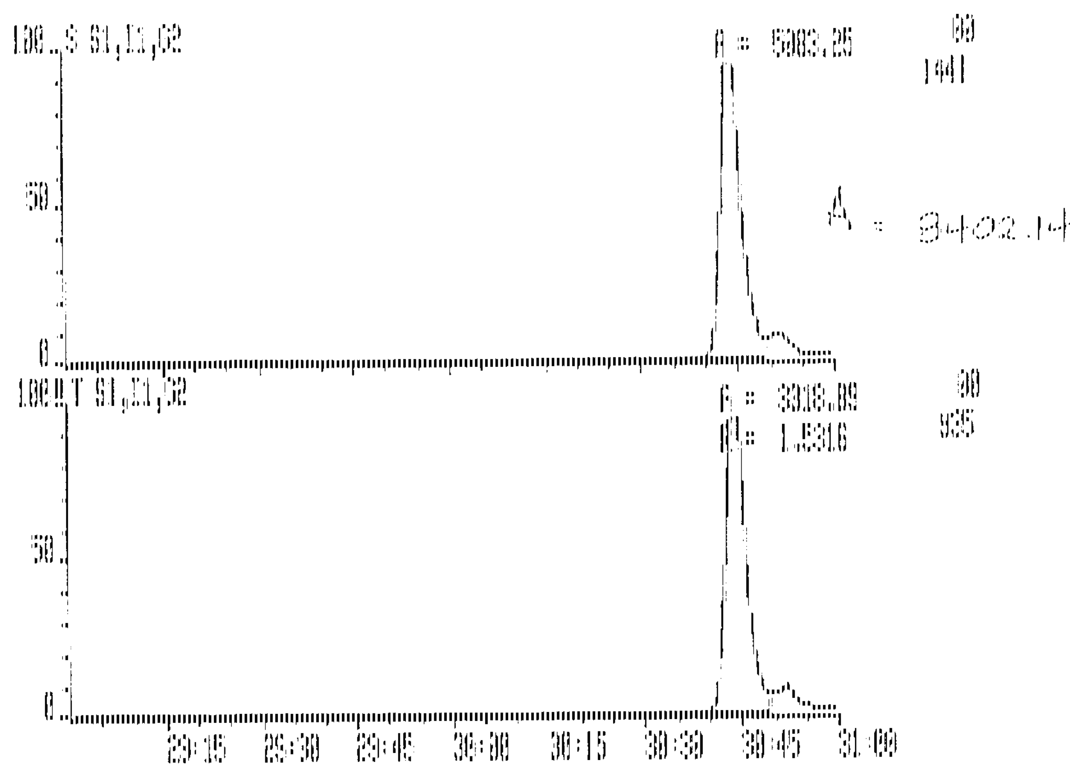
S921582 3-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 469.7779
Text:2725 TEST #1 TLI# 205228



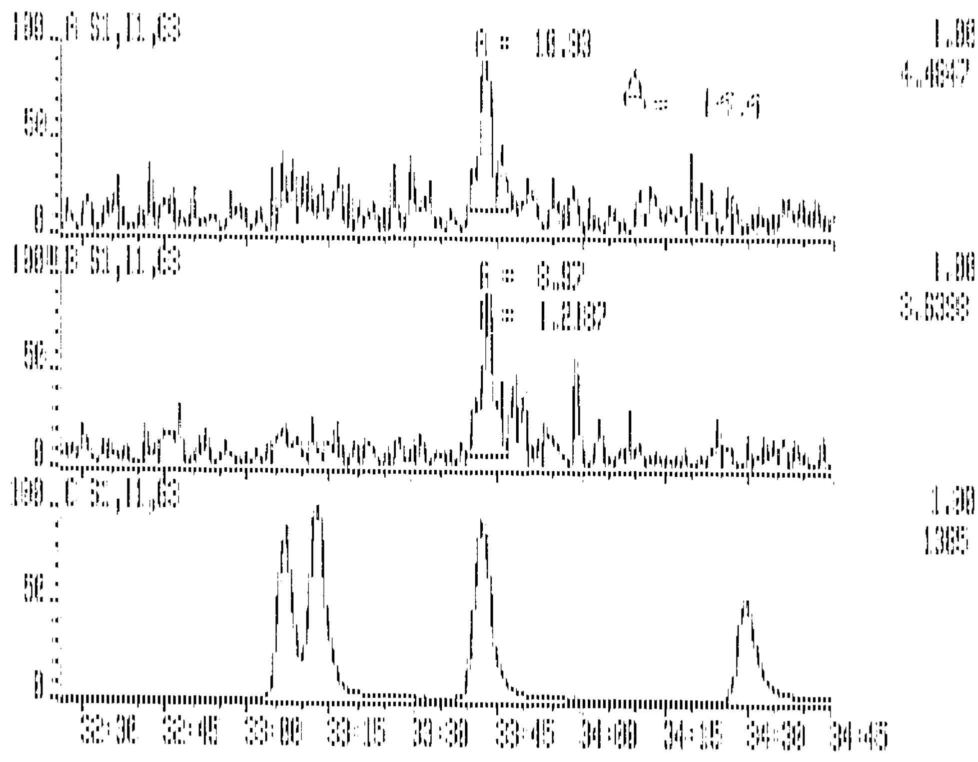
S921582 3-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 471.7750
Text:2725 TEST #1 TLI# 205228



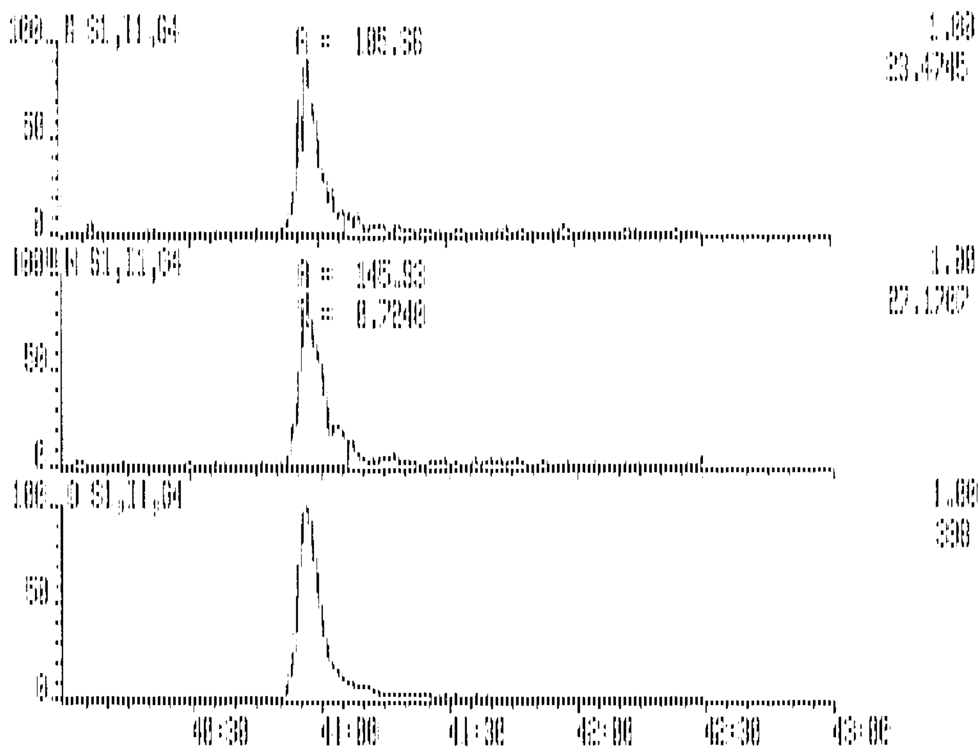
S921582 3-APR-92 02:26 70S (EI+) Sys:NDB5JS
GR 2 T: 369.3919 U: 375.8364 V: 409.7574
Text:2725 TEST 01 7.1B 20522B



5921502 3-APR-92 02:23 705 (EI-) Sys:NDESUS
GR 3 A: 373.8208 B: 375.8178 C: 383.8639 D: 385.8610 E: 389.8156
Text:2725 TEST #1 TLI# 205228



5921582   3-APR-92 02:28 703   (EI+)   Sys:NDE5U3
GR 4 M: 457.7377 N: 459.7348 O: 469.7779 P: 471.7750 Q: 479.7165
Text:2725 TEST B1 TL14 205228



#'2

TRIANGLE LABORATORIES OF RTP, INC.
PCDD/PCDF 2378X ANALYSIS (aa)

FILE NAME.....: SS21620 CLIENT.........: RMC TLI SAMPLE ID.: *
CONCAL........: SS21612 SAMPLE ID.....: 2727,2728,2730
ANALYST.......: SP ANALYSIS DATE: 04/04/92 PROJECT NUMBER: 20522A
SAMPLE SIZE...: 1.00 SAMPLE MATRIX: MM5 DATE RECEIVED.: 03/31/92
ICAL DATE.....: 12/12/91 SAMPLE ORIGIN: n/a DATE COLLECTED: / /
SPIKE FILE....: SPX23704 CLIENT PROJECT: n/a
GC COLUMN.....: DB-5

NAME	AMT(ng)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				
12378-PeCDD	ND		0.04				
123478-HxCDD	ND		0.04				
123678-HxCDD	0.04				1.40	33:56	
123789-HxCDD	ND		0.04				
1234678-HpCDD	0.22				0.99	37:16	B
OCDD	0.58				0.85	41:01	B
2378-TCDF	0.14				0.75	25:58	
12378-PeCDF	EMPC			0.04			
23478-PeCDF	0.04				1.54	30:27	
123478-HxCDF	0.14				1.08	33:09	
123678-HxCDF	0.05				1.32	33:15	
234678-HxCDF	0.05				1.05	33:45	
123789-HxCDF	ND		0.05				
1234678-HpCDF	0.14				0.92	35:13	
1234789-HpCDF	ND		0.04				
OCDF	EMPC			0.14			
TOTAL TCDD	0.32	3		0.35	0.80		
TOTAL PeCDD	0.24	2		0.39	1.52		
TOTAL HxCDD	0.39	4			1.20		
TOTAL HpCDD	0.43	2			0.97		
TOTAL TCDF	0.41	7		0.51	0.76		
TOTAL PeCDF	0.26	6		0.42	1.52		
TOTAL HxCDF	0.35	5			1.16		
TOTAL HpCDF	0.18	1			0.92		

* TLI SAMPLE ID.:55-55-5,6,8

Reviewed By: | SW 4/10/92 | X237_RPT 4.00, LARS 4.20

TRIANGLE LABORATORIES OF RTP, INC.
PCDD/PCDF 2378X ANALYSIS (aa) QA/QC SUMMARY

04/10/92

FILE NAME....: S921620
CONCAL.......: S921612
ANALYST......: SP
SAMPLE SIZE..: 1.00
ICAL DATE....: 12/12/91
SPIKE FILE...: SPX23704
GC COLUMN....: DB-5

CLIENT.......: RMC
SAMPLE ID....: 2727,2728,2730
ANALYSIS DATE: 04/04/92
SAMPLE MATRIX: MMS
SAMPLE ORIGIN: n/a

TLI SAMPLE ID.: #
PROJECT NUMBER: 20522A
DATE RECEIVED.: 03/31/92
DATE COLLECTED: / /
CLIENT PROJECT: n/a

SURROGATE RECOVERY SUMMARY (TYPE AA)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	5.5	139		26:36	
13C12-PeCDF 234	4.8	121	1.50	30:27	
13C12-HxCDF 478	4.7	117	0.47	33:09	
13C12-HxCDD 478	4.4	111	1.17	33:51	
13C12-HpCDF 789	5.1	127	0.45	37:47	

ALTERNATE STANDARDS RECOVERY SUMMARY (TYPE AA)

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-HxCDF 789	3.2	79.3	0.46	34:32	
13C12-HxCDF 234	3.5	88.3	0.48	33:45	

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	AMT (ng)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.6	65.3	0.76	25:56	
13C12-2378-TCDD	2.1	51.6	0.80	26:38	
13C12-PeCDF 123	2.0	50.5	1.55	29:47	
13C12-PeCDD 123	1.5	38.7	1.56	30:46	
13C12-HxCDF 678	3.3	83.2	0.50	33:15	
13C12-HxCDD 678	3.0	74.9	1.24	33:56	
13C12-HpCDF 678	3.0	76.2	0.43	36:12	
13C12-HpCDD 678	2.7	68.5	0.97	37:15	
13C12-OCDD	4.0	49.7	0.85	41:00	

RECOVERY STANDARDS RECOVERY SUMMARY

NAME	RATIO	RT	FLAGS
13C12-1234-TCDD	0.82	26:27	
13C12-HxCDD 789	1.21	34:15	

Reviewed By: | rw 04/10/92 |

X237_RPT 4.00, LARS 4.20

	Initial	Date
B-file/Header Changes	gm	9/10/92
Manual Integrations		
Transcription		
Dbase Corrections		

Ratio = 0.07 (see plot)

Page No. 1
04/08/92

Listing of 39216208.dof

Matched SC Peaks / Ratio / Ret. Time

I_Z	Omit	Ratio	RT.	Area	Match Rat	Match RT	REL_RT	who/why
304		0.35	22:54	49.70	F	F	0.883	
		0.46	23:23	71.96	F	F	0.902	
		0.45	23:38	52.61	F	F	0.911	
		0.77	24:01	395.44	T	F	0.926	
		0.75	24:41	224.87	T	F	0.952	
		0.71	24:58	221.95	T	F	0.963	
		0.76	25:15	212.00	T	F	0.974	
		0.75	25:23	294.61	T	F	0.979	
		0.60	25:34	163.26	F	F	0.986	
		0.57	25:47	101.29	F	F	0.994	
		0.75	25:59	734.34	T	T	1.001	
		0.95	26:22	97.85	F	F	1.017	
		0.81	26:37	82.59	T	F	1.026	
	DC	0.97	31:36	58.57	F	F	1.219	WH
304		*** Total ***		2761.14	# of Peaks:		14	
316		0.61	24:58	100.46	F	F	0.963	
		0.78	25:33	236.77	T	F	0.985	
		0.76	25:56	21846.58	T	T	1.000	
		0.98	26:21	243.04	F	F	1.016	
	DC	0.73	29:48	379.64	T	F	1.149	WH
	DC	0.94	30:28	442.61	F	F	1.175	WH
316		*** Total ***		23249.10	# of Peaks:		6	
320		0.84	24:12	559.78	T	F	0.909	
		0.77	24:33	301.18	T	F	0.922	
		0.33	24:50	58.42	F	F	0.932	
		0.91	25:29	109.12	F	F	0.957	
		1.00	25:41	20.59	F	F	0.964	
		0.38	25:45	52.06	F	F	0.967	
		1.21	26:09	30.97	F	F	0.982	
		~~0.38~~ 0.79	26:32	~~95.30~~ 114	~~F~~ T	F	0.996	
	DC	0.64	29:47	67.77	F	F	1.118	WH
	DC	0.59	30:27	83.59	T	F	1.143	WH
320		*** Total ***		1463.78	# of Peaks:		10	
328		0.00	25:19	187.21	T	F	0.950	
		0.00	26:38	16064.59	T	T	1.000	
		0.00	27:00	195.04	T	F	1.014	
		0.00	27:14	53.65	T	F	1.023	
	DC	0.00	29:53	925.88	T	F	1.122	WH
	DC	0.00	30:33	68.78	T	F	1.147	WH
328		*** Total ***		17495.15	# of Peaks:		6	

plot (see)

Listing of 3921620B.dbf

Matched 3C Peaks / Ratio / Ret. Time

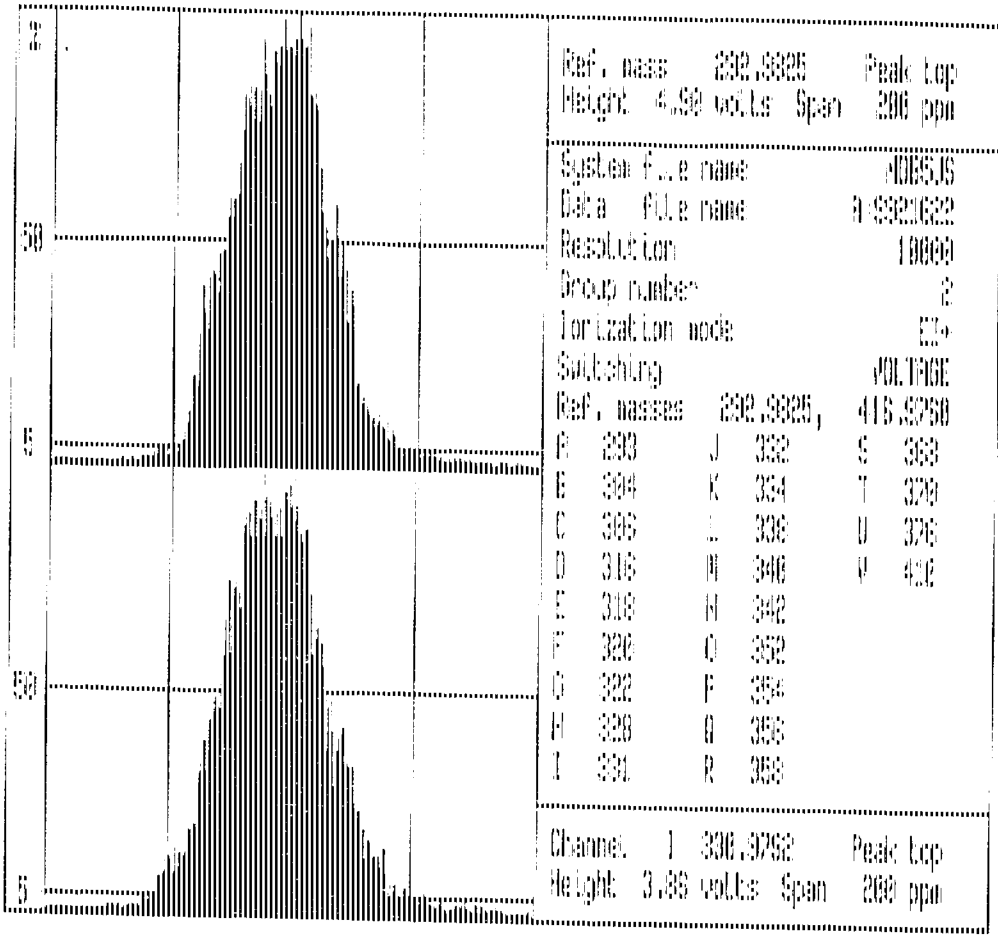
M_I	Ornt	Ratio	RT	Area	Match Rat	Match RT	RF_RT	Who/Why
332		0.8[illegible]	2[illegible]:2[illegible]	1[illegible]6[illegible].09	[illegible]	T	0.[illegible]	
		0.80	29:38	12911.78	[illegible]	T	1.000	
	DC	0.85	30:47	165.56	[illegible]	F	1.156	WH
332		*** Total ***		32678.43	# of Peaks:		3	
340		2.00	27:51	110.[illegible]	F	[illegible]	0.933	
		1.50	28:48	51.34	[illegible]	F	0.967	
		1.65	28:55	217.97	T	[illegible]	0.971	
		1.19	29:01	51.31	[illegible]		0.977	
	0	1.15	29:15	16.83	[illegible]	[illegible]	0.983	
		1.48	29:25	61.50	T	[illegible]	0.988	
		1.59	29:30	138.83	T	[illegible]	0.990	
		1.36	29:42	73.21	T	F	0.997	
$\mathcal{E}^{D}$	ch	1.11	29:47	116.44	F	T	1.000	
		1.02	29:55	29.54	F	F	1.004	
		1.27	30:04	94.90	F	F	1.010	
		1.54	30:27	117.73	T	T	1.022	
		1.25	30:36	101.80	F	F	1.027	
340		*** Total ***		1287.36	# of Peaks:		13	
352		1.21	28:56	55.71	F	F	0.971	
		1.55	29:47	11033.28	T	T	1.000	
		1.77	30:03	318.93	T	F	1.009	
		1.50	30:27	12592.21	T	T	1.022	
		1.28	31:24	133.55	[illegible]	[illegible]	1.054	
352		*** Total ***		24133.68	# of Peaks:		5	
356		1.53	29:02	216.96	T	F	0.944	
		1.79	29:44	167.23	F	F	0.965	
	0	1.82	29:52	20.79	F	F	0.971	
		1.51	30:03	118.13	T	F	0.977	
		2.30	30:29	35.53	F	F	0.991	
356		*** Total ***		559.64	# of Peaks:		5	
368	sp lk	~~1.58~~ 1.56	30:46	~~5[illegible].71~~ 4997	[illegible]	[illegible]	1.000	
		1.49	31:14	69.10	T	F	1.015	
368		*** Total ***		5393.81	# of Peaks:		2	
374		1.12	32:13	91.99	T	F	0.959	
		1.21	32:21	208.10	T	F	0.973	
	0	1.14	32:47	17.21	T	F	0.985	
		1.08	33:09	312.58	T	T	0.997	
		1.32	33:15	154.79	T	T	1.000	
	0	0.91	33:21	16.56	F	~~T~~ F	1.003	
	0	0.71	33:33	28.48	F	F	1.009	
ch		~~0.98~~ 1.05	33:45	~~145.91~~ 109	~~T~~ T	T	1.015	
	b	1.50	34:36	34.19	F	T	1.041	
374		*** Total ***		979.81	# of Peaks:		9	
384		0.47	33:09	9930.55	T	T	0.997	
		0.50	33:15	10661.13	T	T	1.000	
		0.48	33:45	9752.95	T	T	1.015	

Listing of S921620B.dbf

Matched QC Peaks / Ratio / Ret Time

M_Z	Crit	Ratio	RT	Area	Match Rat	Match RT	REL_RT	Who/ Why
384		0.46	34:32	6667.64	T	T	1.039	
384		*** Total ***		37012.37	# of Peaks:		4	
390		1.05	32:41	55.47	T	F	0.963	
		1.23	33:07	325.05	T	F	0.975	
		1.13	33:20	153.55	T	F	0.982	
		1.40	33:56	70.77	T	T	1.000	
	D	1.74	34:17	51.56	F	T	1.010	
390		*** Total ***		654.40	# of Peaks:		5	
402		1.17	33:51	5584.63	T	T	0.998	
		1.24	33:56	7103.22	T	T	1.000	
		1.21	34:15	8585.41	T	T	1.009	
		1.58	34:33	178.56	F	F	1.018	
402		*** Total ***		21457.82	# of Peaks:		4	
408		0.92	36:13	290.23	T	T	1.000	
		0.63	36:28	38.95	F	F	1.007	
	D	0.84	36:37	47.05	F	F	1.012	
		0.62	37:50	44.96	F	T	1.045	
408		*** Total ***		421.20	# of Peaks:		4	
418		0.43	36:12	5423.72	T	T	1.000	
		0.45	37:47	4619.05	T	T	1.044	
		0.44	38:11	55.84	T	F	1.055	
		0.58	38:22	28.48	F	F	1.060	
418		*** Total ***		10127.09	# of Peaks:		4	
424		0.94	36:25	186.68	T	F	0.975	
		0.99	37:16	199.62	T	T	1.000	
	D	0.90	41:01	38.86	T	F	1.101	
424		*** Total ***		425.16	# of Peaks:		3	
436		0.97	37:15	3864.57	T	T	1.000	
		0.75	37:48	33.83	F	F	1.015	
	CC	0.77	41:02	362.89	F	F	1.102	W-
	CC	0.86	41:19	22.67	F	F	1.109	#-
436		*** Total ***		4283.96	# of Peaks:		4	
442		0.67	41:13	83.24	F	T	1.005	
442		*** Total ***		83.24	# of Peaks:		1	
458		0.85	41:01	291.28	T	T	1.000	
		0.84	41:10	29.88	T	F	1.004	
458		*** Total ***		321.16	# of Peaks:		2	
470		0.85	41:00	3149.90	T	T	1.000	
470		*** Total ***		3149.90	# of Peaks:		1	

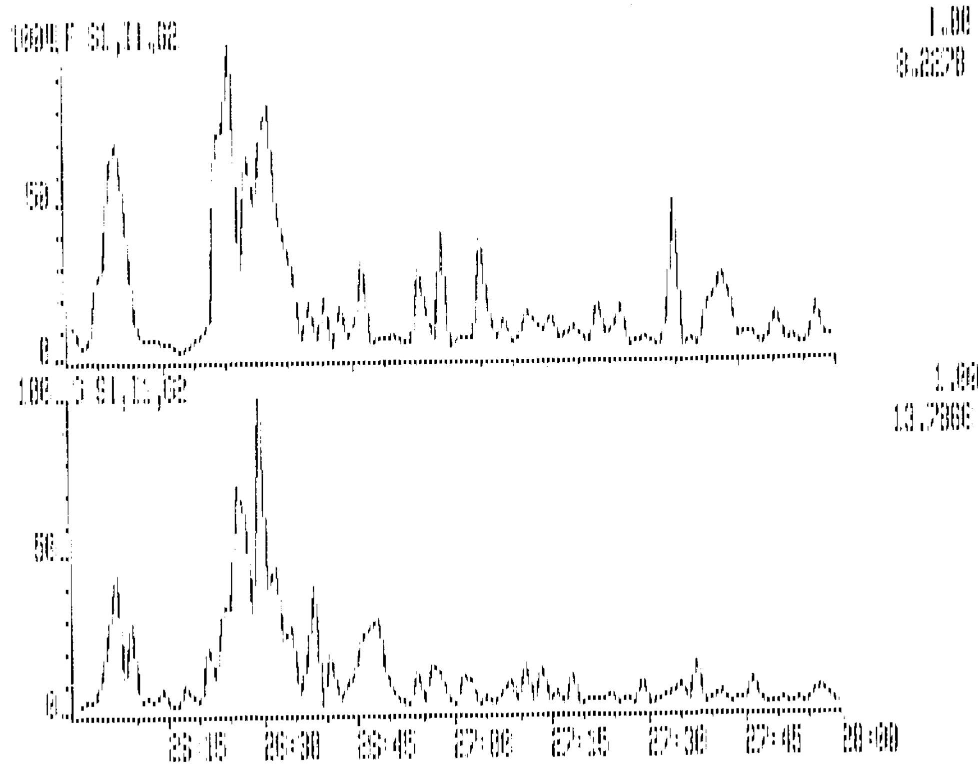
*** End of Report ***



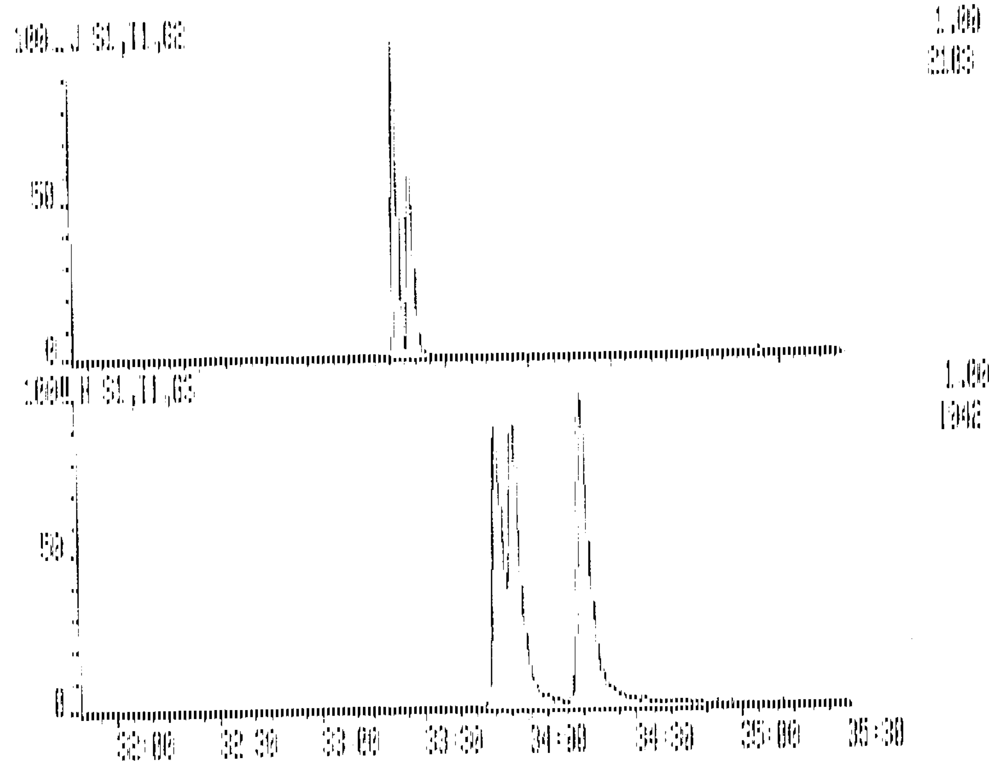
Ref. mass 292.9825 Peak top
Height 4.90 volts Span 200 ppm
System file name ADBSJS
Data file name A:S921622
Resolution 10000
Group number 2
Ionization mode EI+
Switching VOLTAGE
Ref. masses 292.9825, 416.9760
A 298 J 332 S 368
B 304 K 334 T 370
C 306 L 338 U 376
D 316 M 340 V 412
E 318 N 342
F 320 O 352
G 322 P 354
H 328 Q 356
I 331 R 358
Channel 1 330.9792 Peak top
Height 3.88 volts Span 200 ppm
%
50
5
50
5

S921520 4-APR-92 14:25 70S (EI+) Sys:NCB5US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1020522A

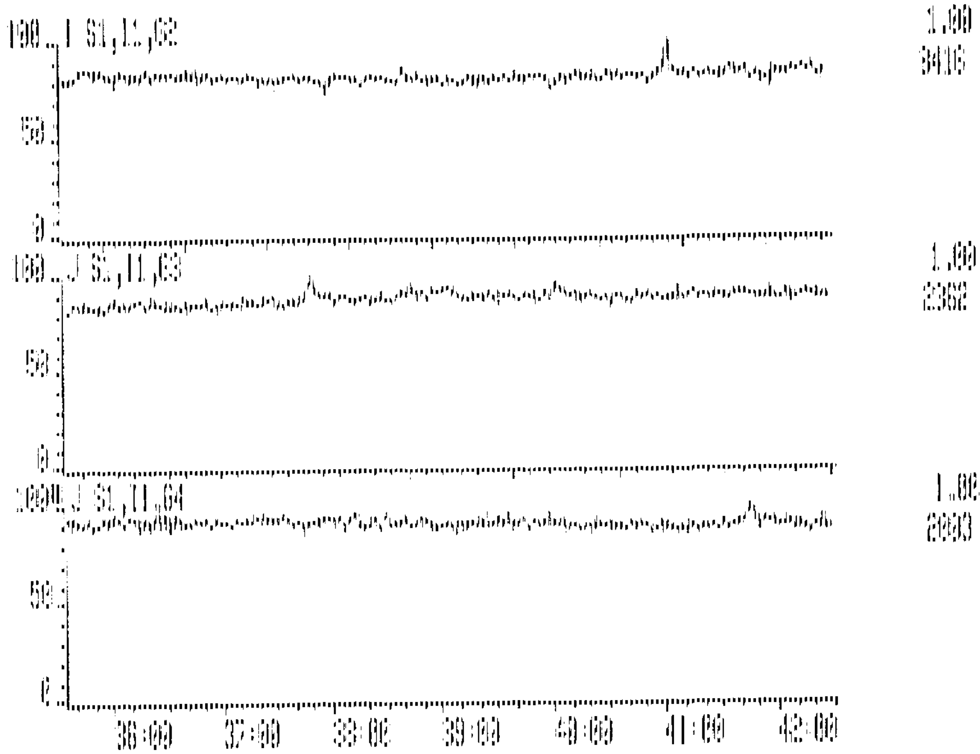
Verified by [illegible] 4-4-92
Verified by Unit QC:



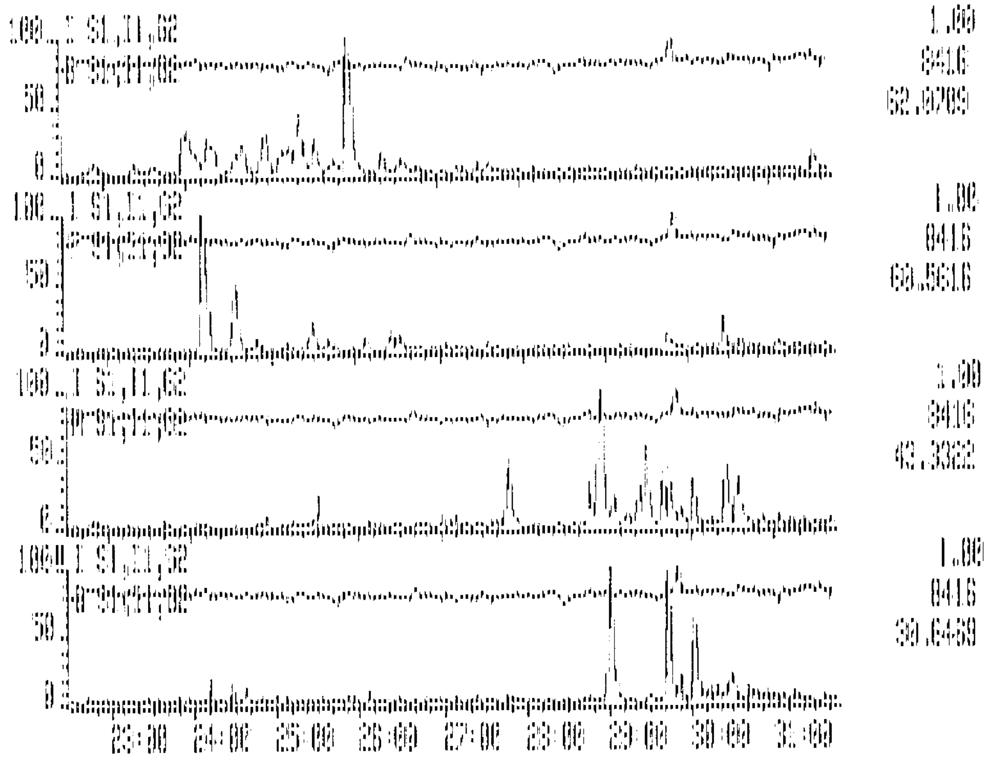
S921620 4-APR-92 14:25 70S (EI+) Sys:HDB5US
GR 3 F: 391.0127 G: 392.9700 H: 401.8558 I: 403.8529 J: 430.9729
Text:2727,2728,2730 TL1420522A



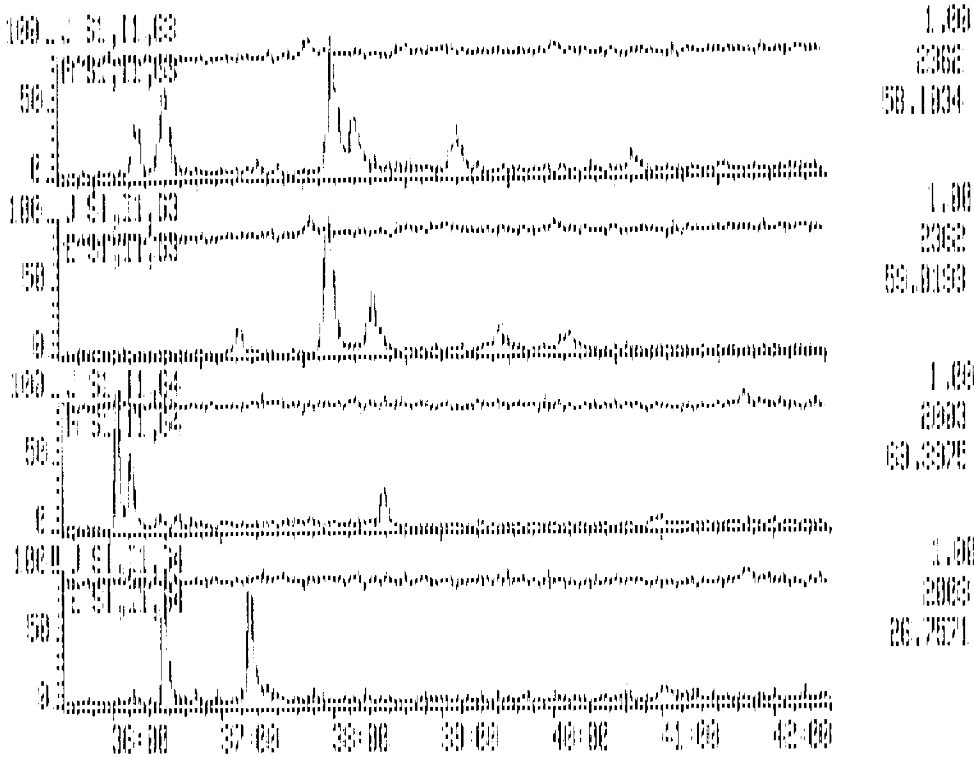
S921620   4-APR-92 14:25 705   (EI+)   Sys:NOBEL6
GR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TL1B2052P



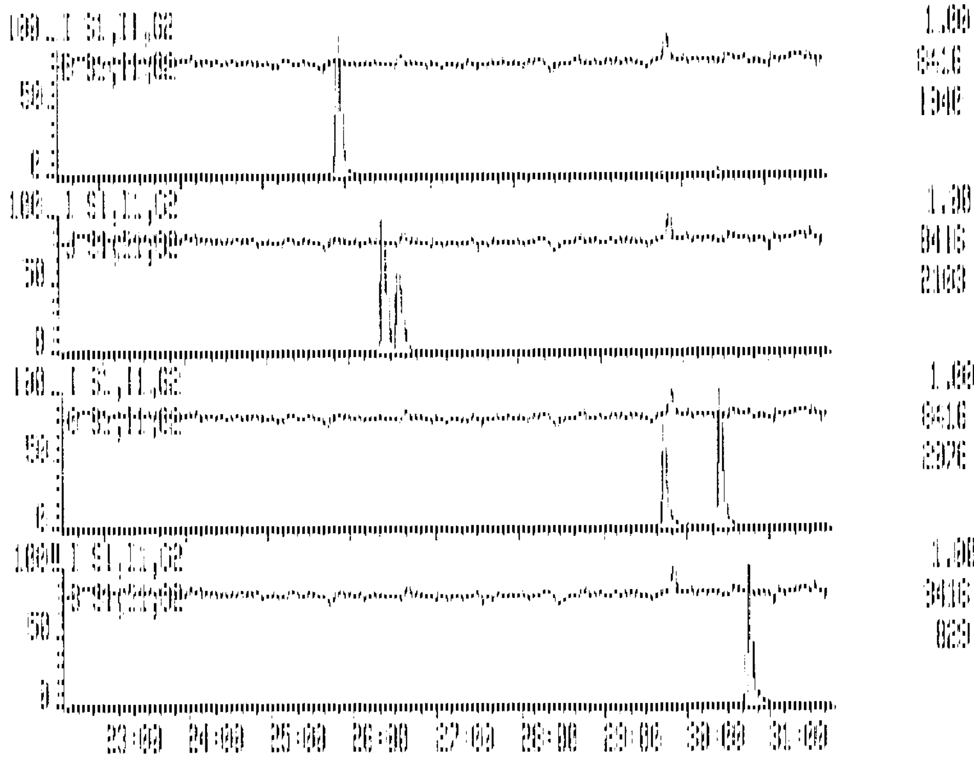
S921620 4-APR-92 14:25 70S (E+) Sys:NOBSUS
GR 2 F: 315.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TLIB0522B



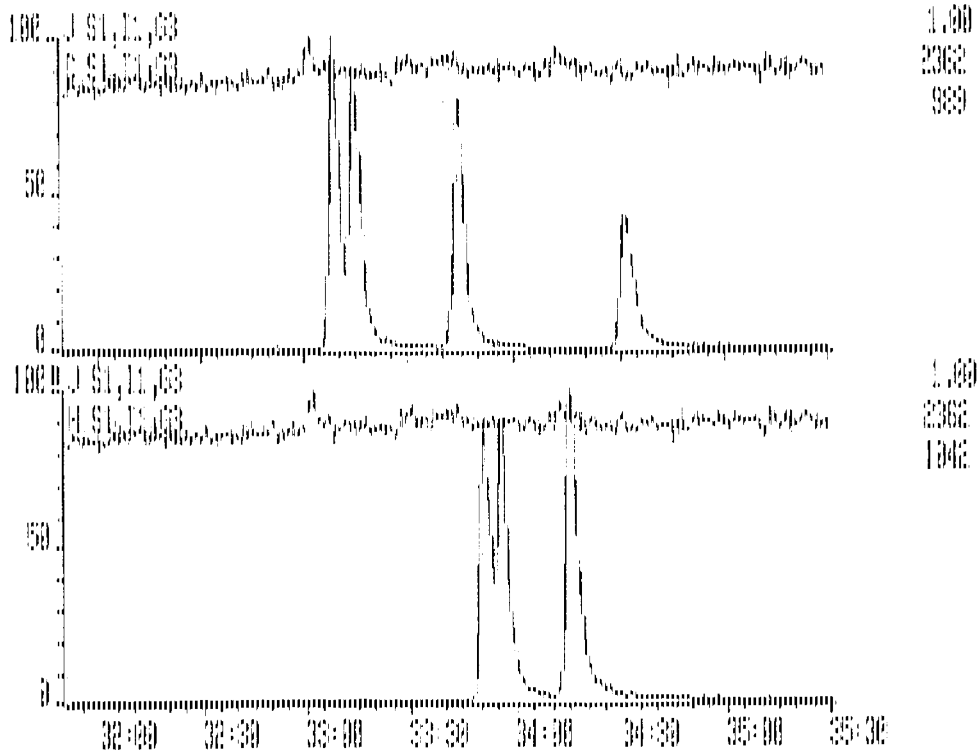
S921520 4-APR-92 14:25 70S (EI+) Sys NODSUS
GR 4 F: 425.7737 G: 430.9725 H: 435.8269 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TL1120522A



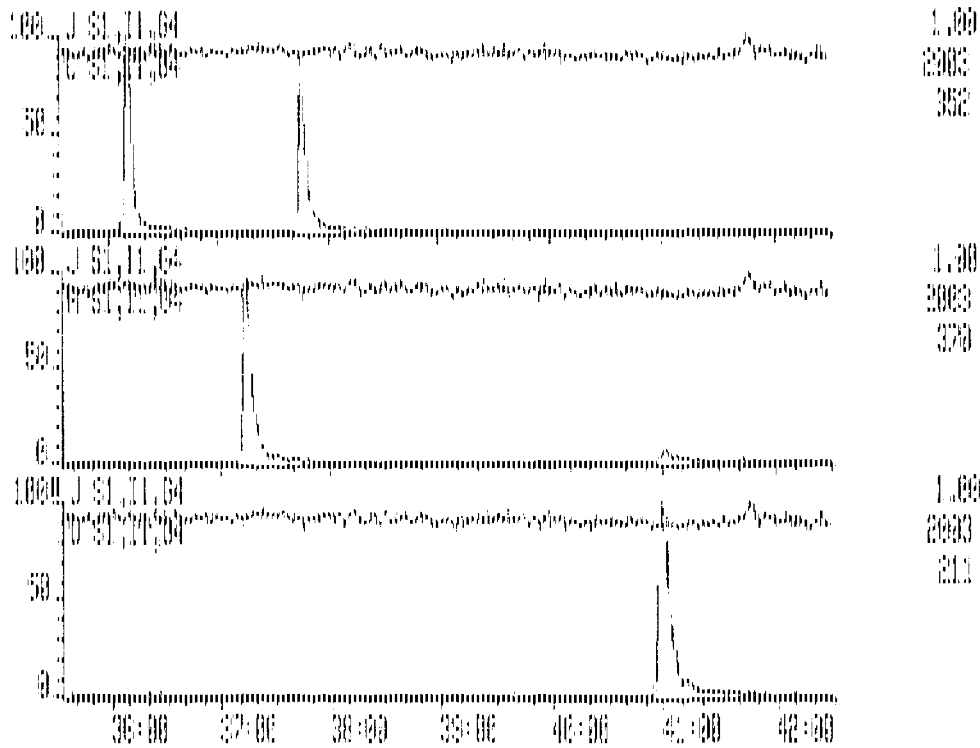
S921620 4-APR-92 14:25 706 (EI+) Sys:MDE5JS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TLM205220



S921620 4-APR-92 14:25 70S (EI+) Sys:NOBSUS
GR 3 F: 391.9127 G: 392.9760 H: 401.8558 I: 403.8529 J: 430.9729
Text:2727,2728,2730 T.10205229

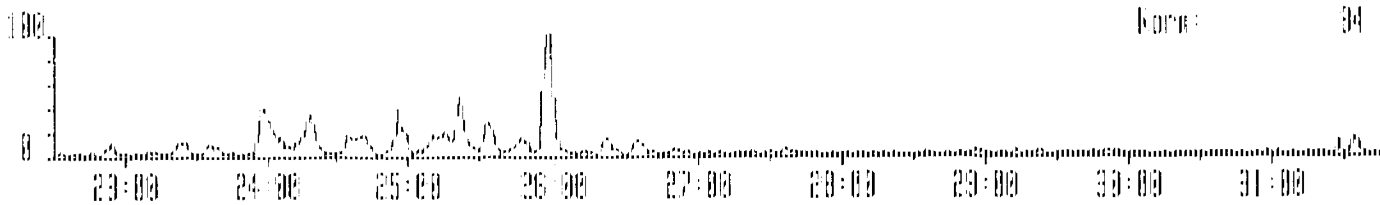


S921520 4-APR-92 14:25 705 (EI+) Sys:NDB5JS
SR 4 F: 425.7732 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9788
Text: 2727,2726,2730 7.14205228

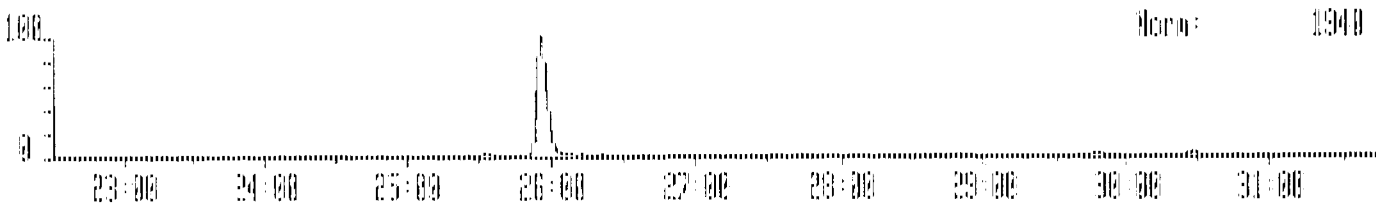


S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TL10205220

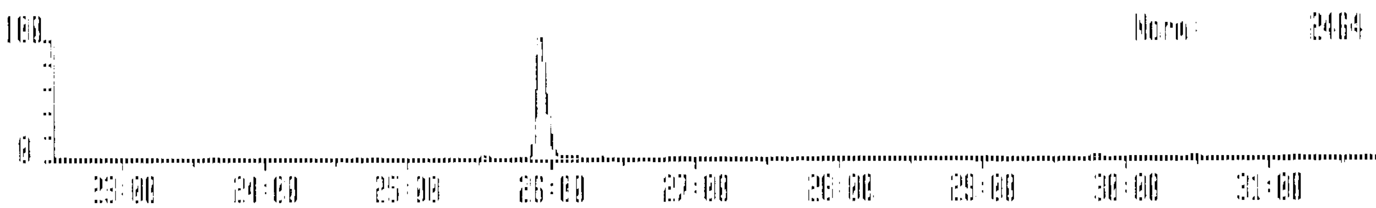
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TL10205220



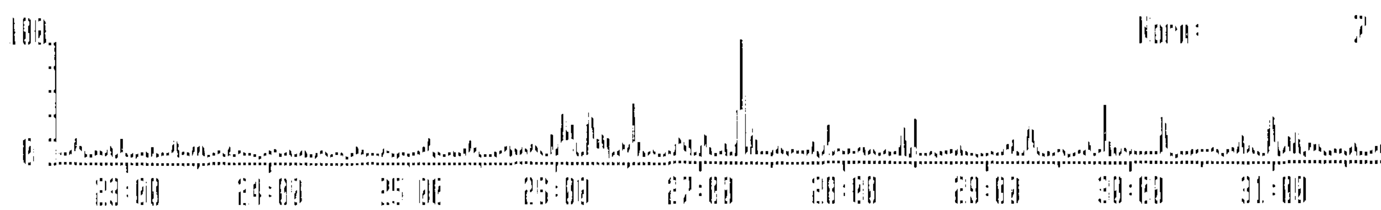
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TL10205220



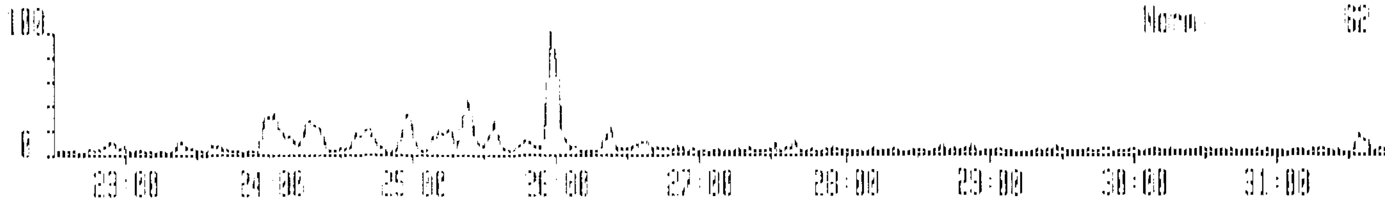
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TL10205220



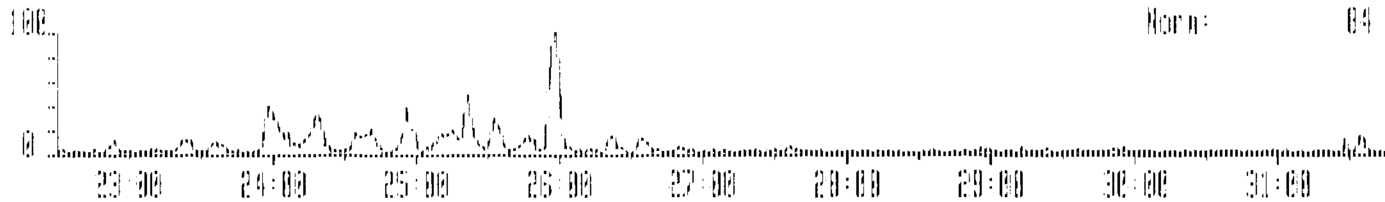
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TL10205220



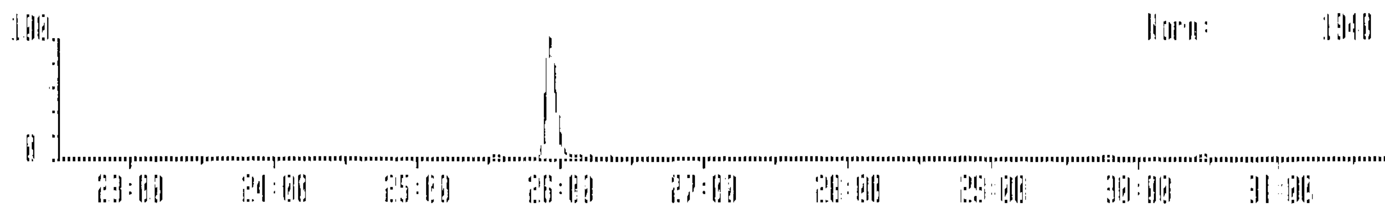
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TL1420522A



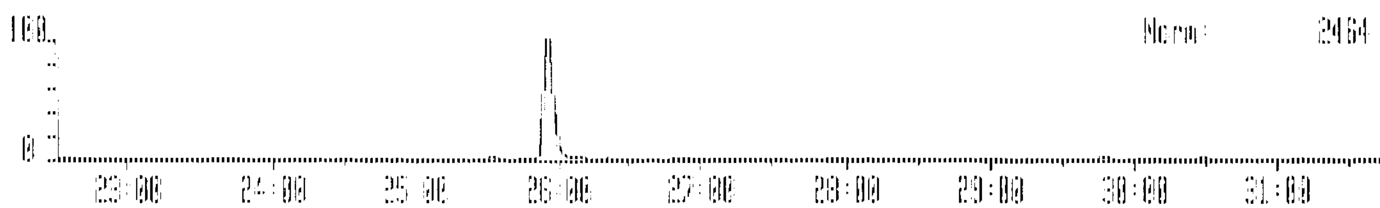
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TL1420522A



S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TL1420522A

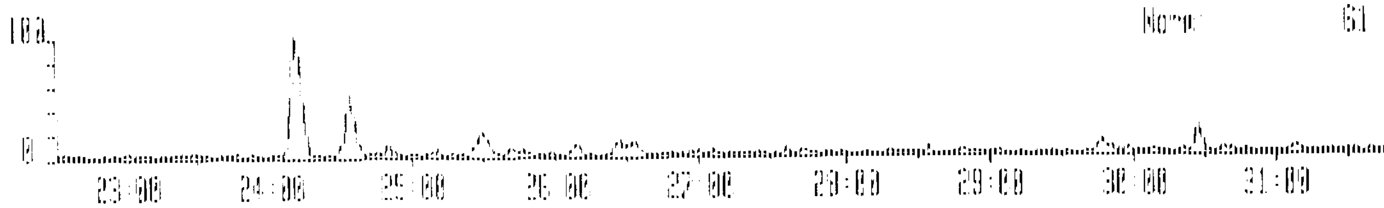


S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TL1420522A

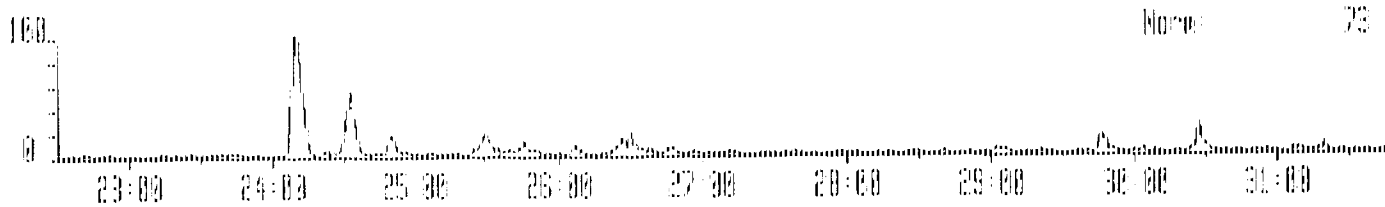


S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TL1420522A

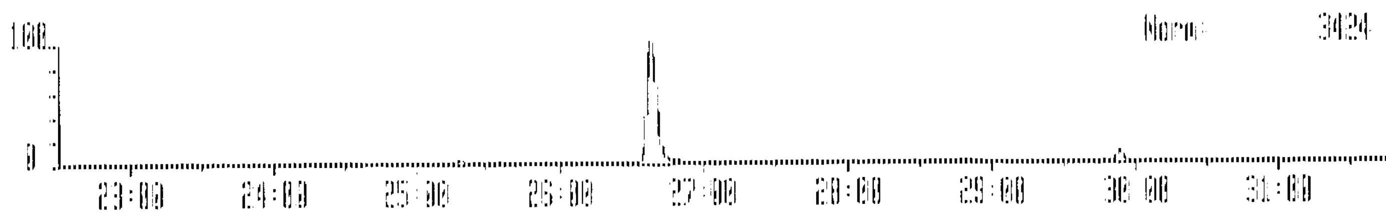
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 319.8965
Text:2727,2728,2730 TL1H205220



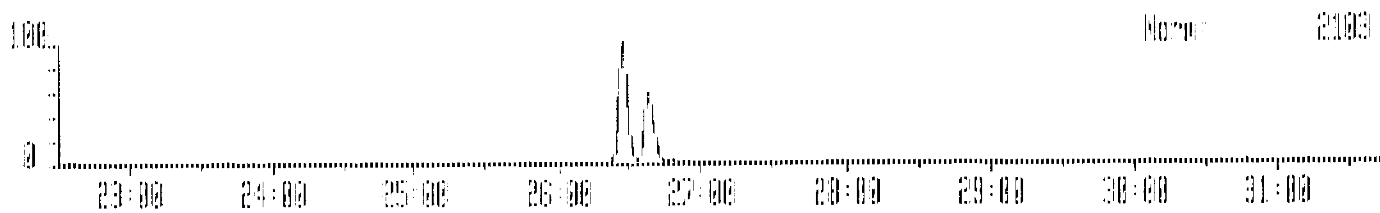
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 321.8935
Text:2727,2728,2730 TL1H205220



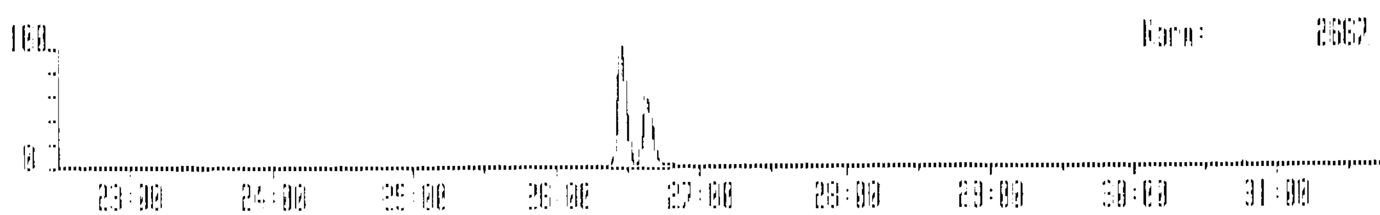
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 327.8847
Text:2727,2728,2730 TL1H205220



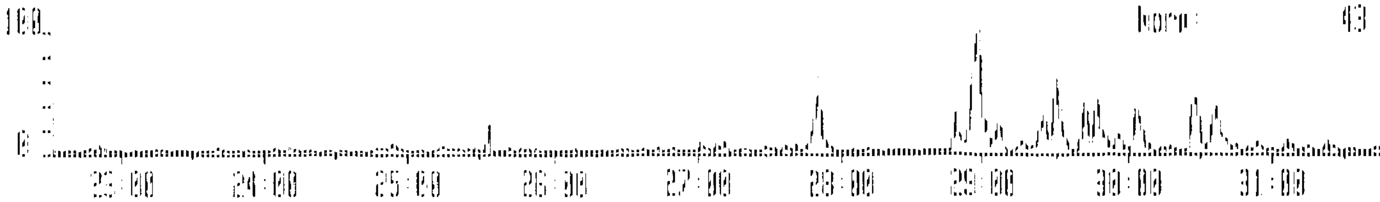
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 331.9368
Text:2727,2728,2730 TL1H205220



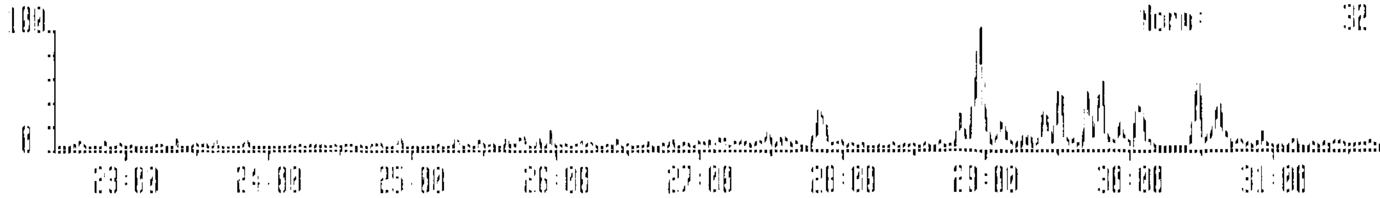
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 333.9338
Text:2727,2728,2730 TL1H205220



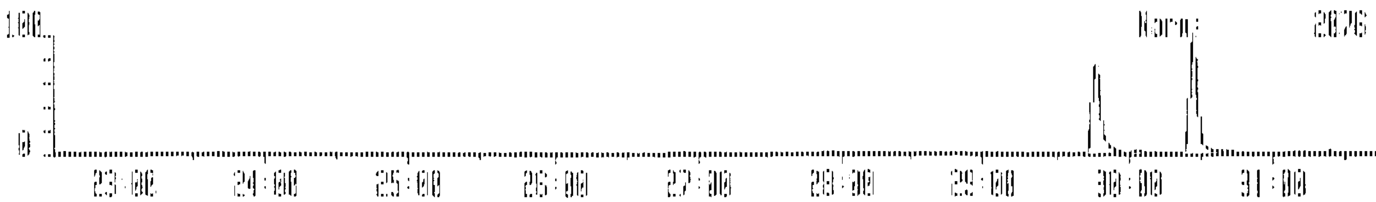
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 339.8597
Text:2727,2728,2730 TL1#20522A



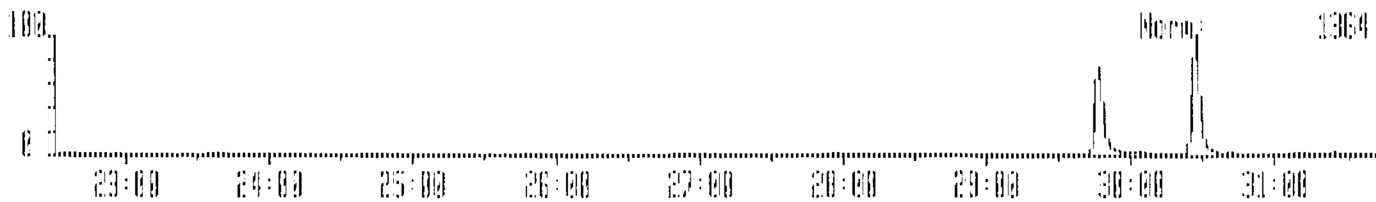
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 341.8567
Text:2727,2728,2730 TL1#20522A



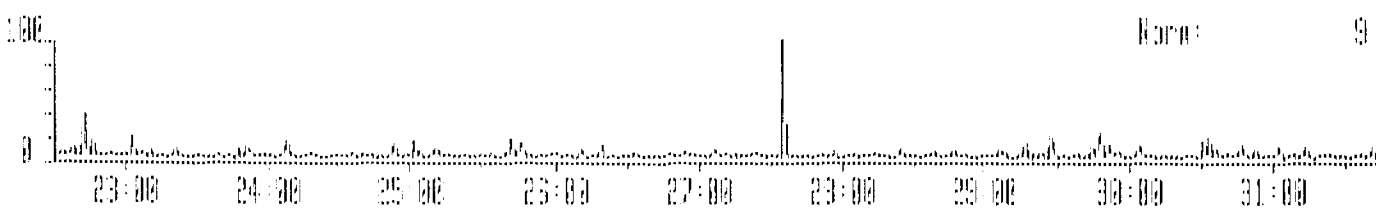
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 351.9000
Text:2727,2728,2730 TL1#20522A



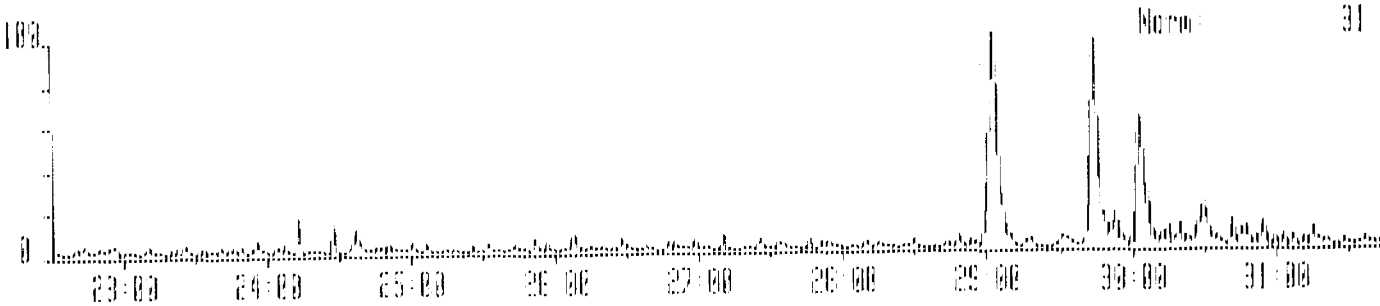
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 353.8970
Text:2727,2728,2730 TL1#20522A



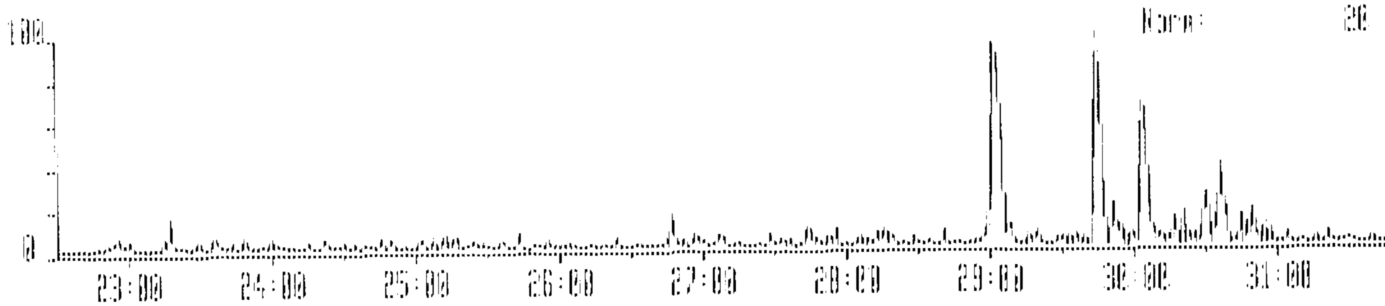
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 409.7974
Text:2727,2728,2730 TL1#20522A



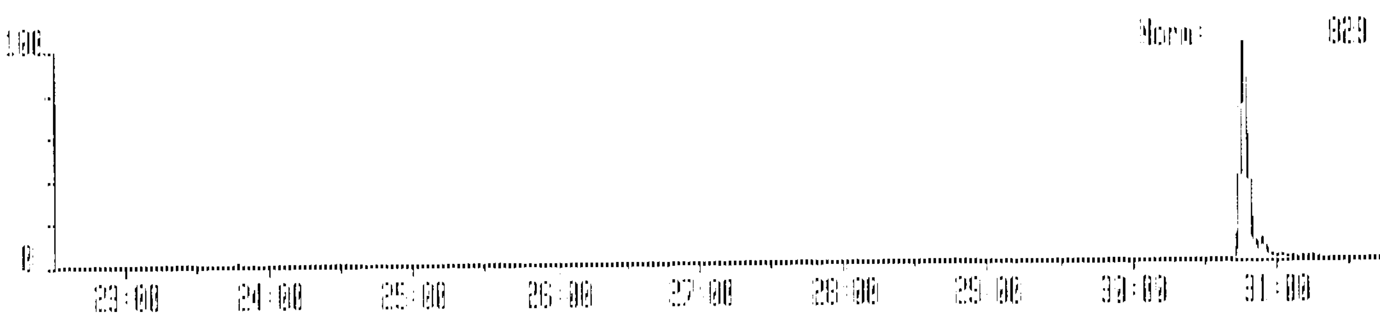
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 355.8546
Text:2727,2728,2730 TL1I0205229



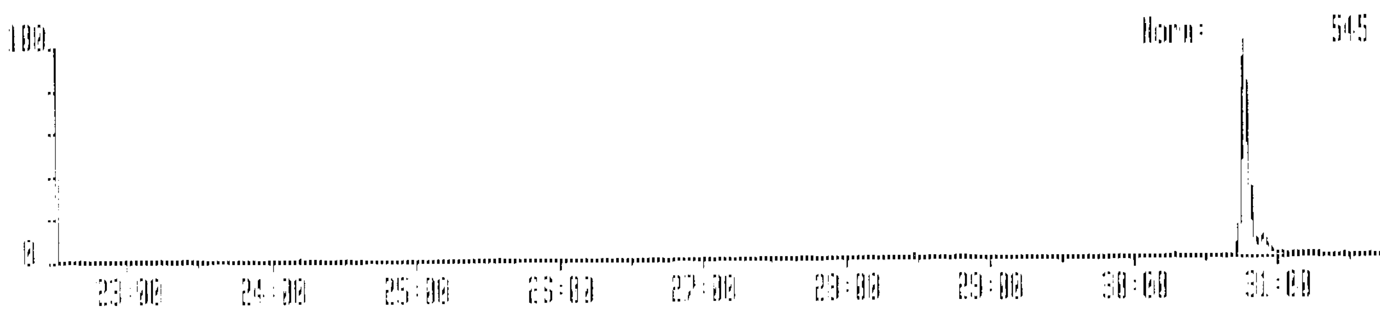
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 357.8516
Text:2727,2728,2730 TL1I0205229



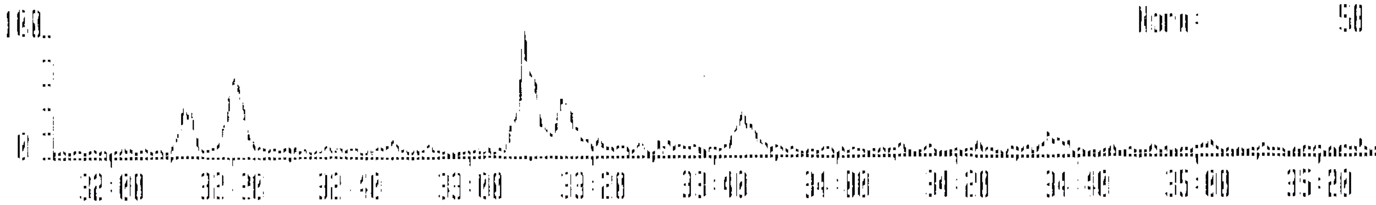
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 367.8949
Text:2727,2728,2730 TL1I0205229



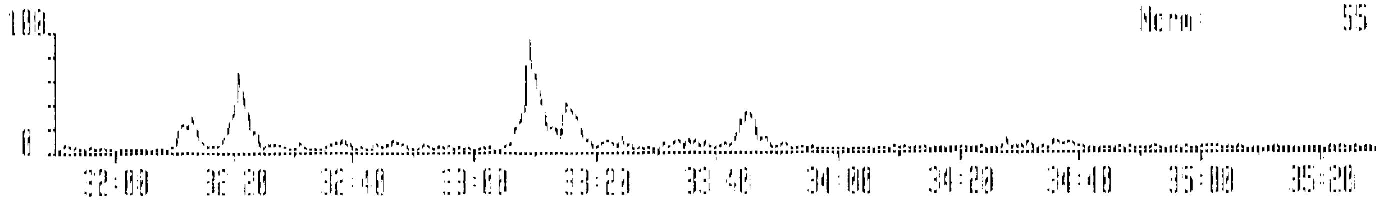
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 369.8919
Text:2727,2728,2730 TL1I0205229



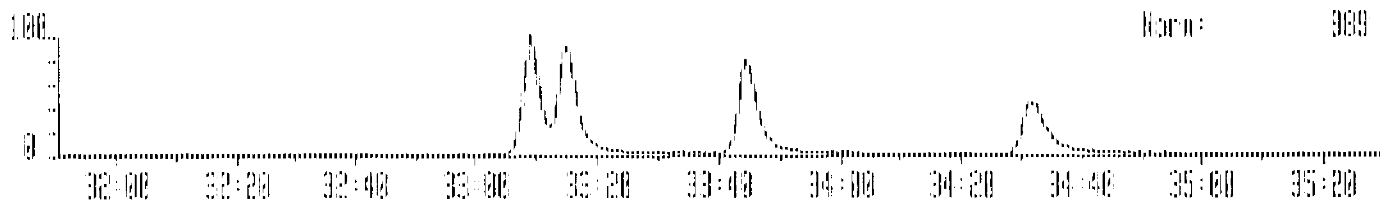
S921620 4-APR-92 Str-Voltage 70S Sys: N035US
Sample 1 Injection 1 Group 3 Mass 373.3208
Text:2727,2728,2730 TL1820522A



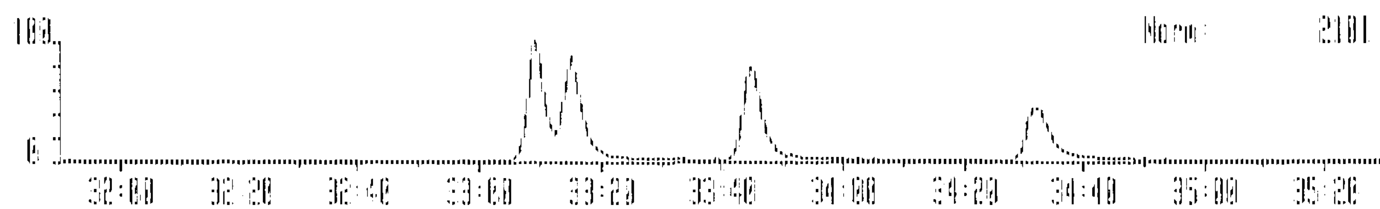
S921620 4-APR-92 Str-Voltage 70S Sys: N035US
Sample 1 Injection 1 Group 3 Mass 375.8178
Text:2727,2728,2730 TL1820522A



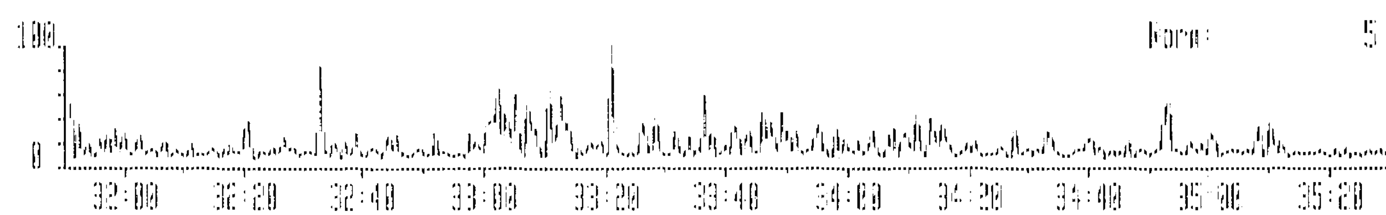
S921620 4-APR-92 Str-Voltage 70S Sys: N035US
Sample 1 Injection 1 Group 3 Mass 383.6639
Text:2727,2728,2730 TL1820522A



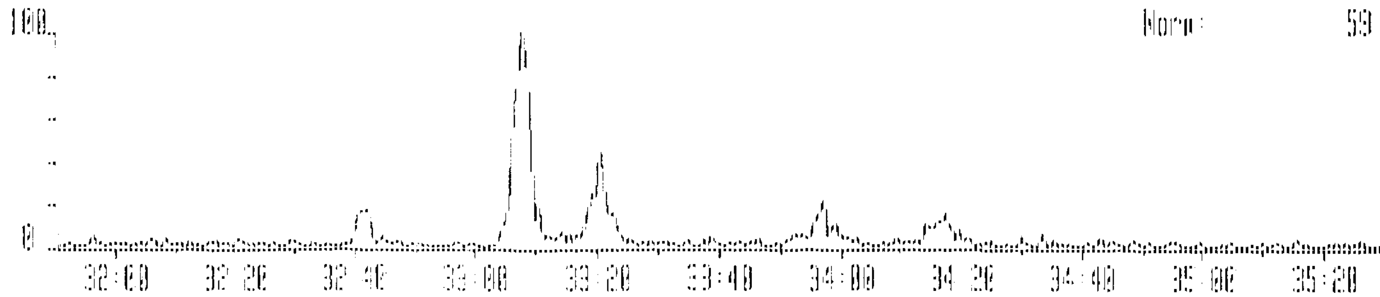
S921620 4-APR-92 Str-Voltage 70S Sys: N035US
Sample 1 Injection 1 Group 3 Mass 395.8610
Text:2727,2728,2730 TL1820522A



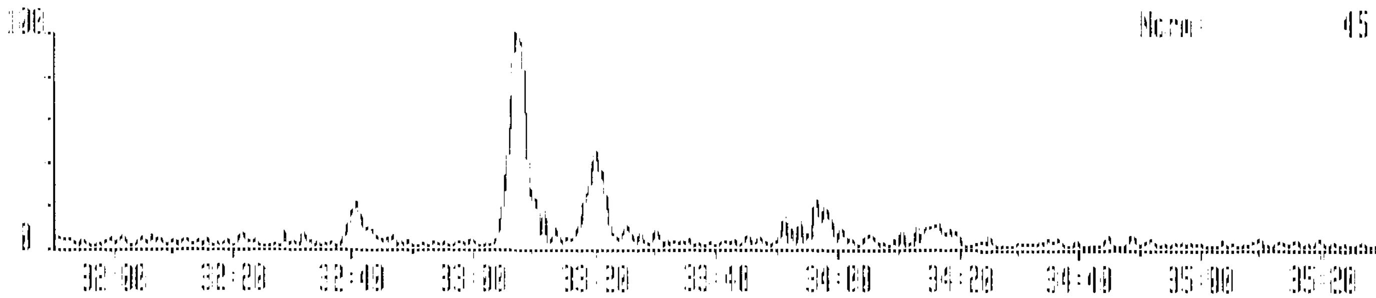
S921620 4-APR-92 Str-Voltage 70S Sys: N035US
Sample 1 Injection 1 Group 3 Mass 445.7555
Text:2727,2728,2730 TL1820522A



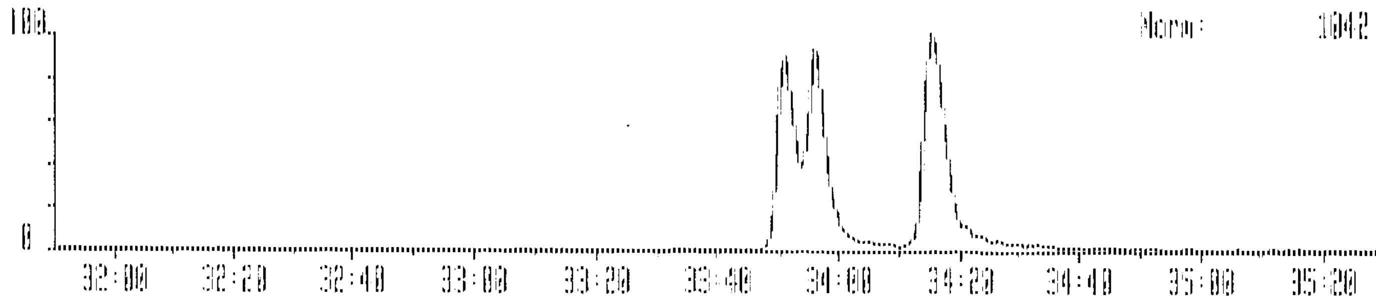
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 389.8156
Text:2727,2728,2730 TLI#20522A



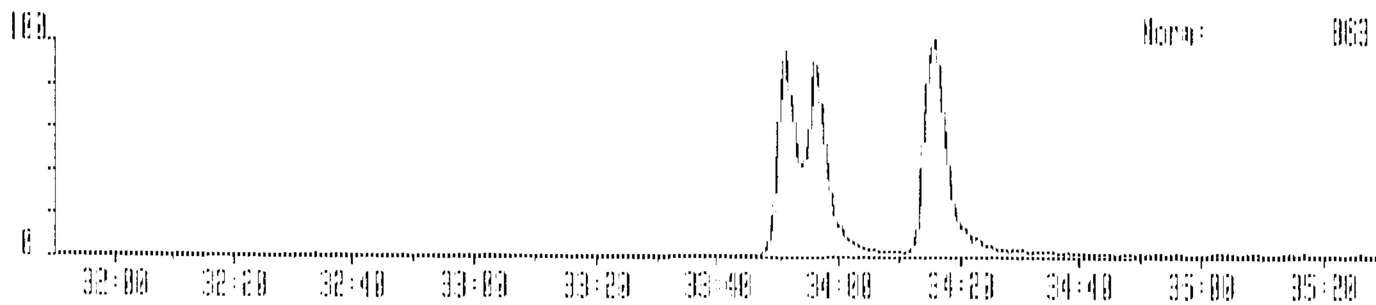
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 391.8127
Text:2727,2728,2730 TLI#20522A



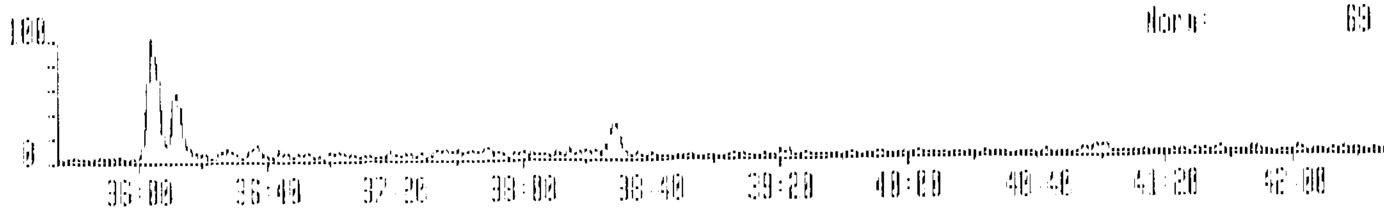
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 401.8558
Text:2727,2728,2730 TLI#20522A



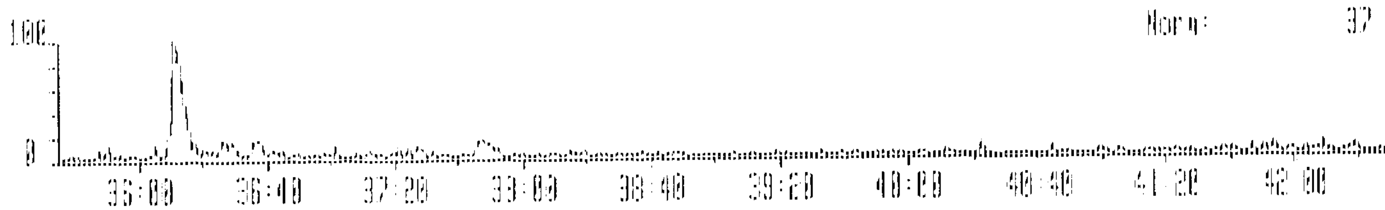
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 403.8529
Text:2727,2728,2730 TLI#20522A



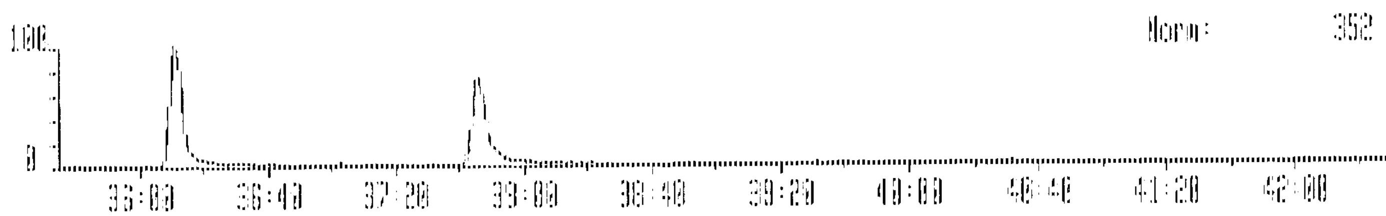
S921620 4-APR-92 Str Voltage 705 Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 407.7818
Text:2727,2728,2730 TL1#20522A



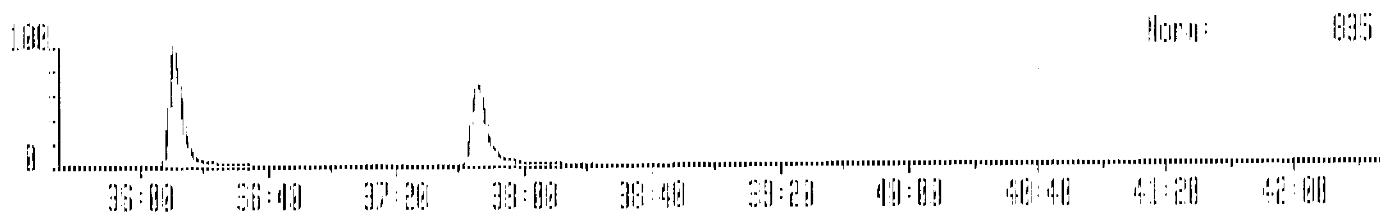
S921620 4-APR-92 Str Voltage 705 Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 409.7789
Text:2727,2728,2730 TL1#20522A



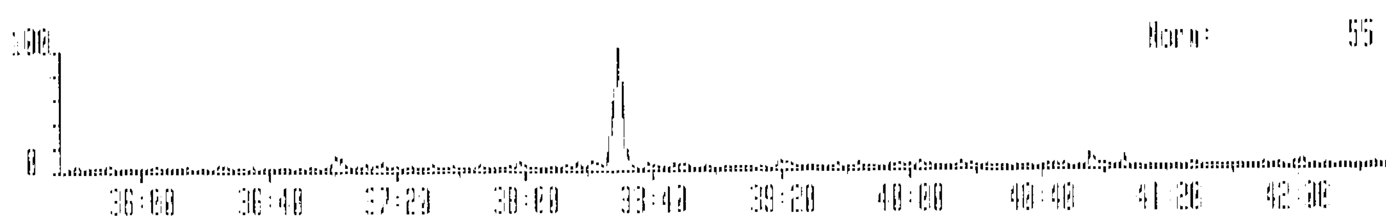
S921620 4-APR-92 Str Voltage 705 Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 417.8253
Text:2727,2728,2730 TL1#20522A



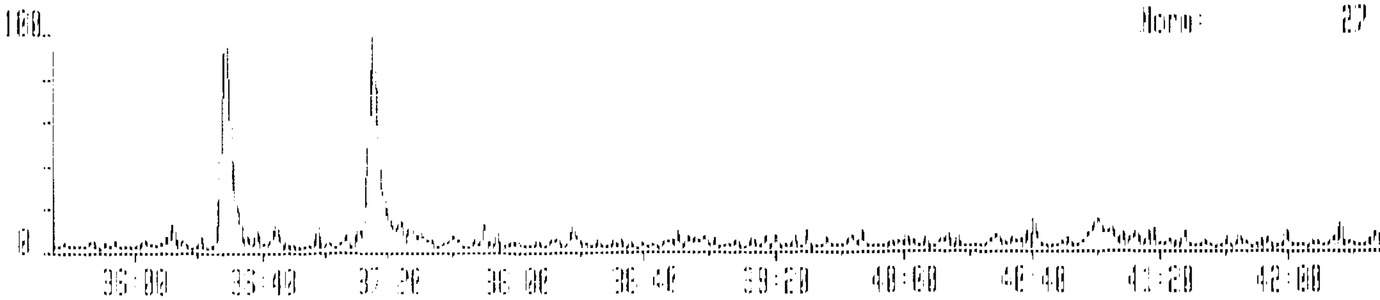
S921620 4-APR-92 Str Voltage 705 Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 419.8220
Text:2727,2728,2730 TL1#20522A



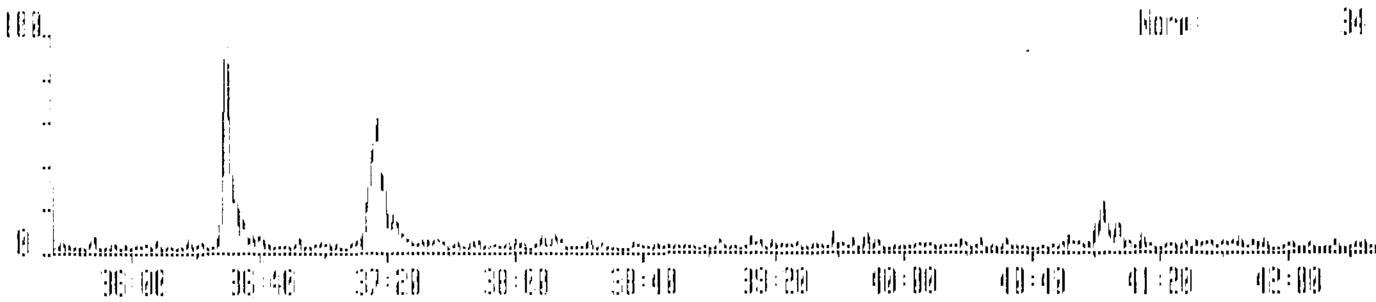
S921620 4-APR-92 Str Voltage 705 Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 479.7165
Text:2727,2728,2730 TL1#20522A



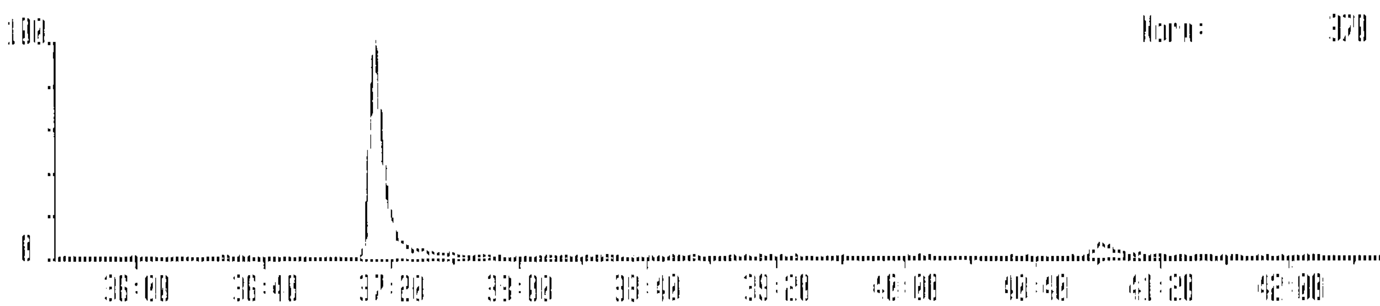
S921620 4-APR-92 Str Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 423.7766
Text:2727,2728,2730 TL14205228



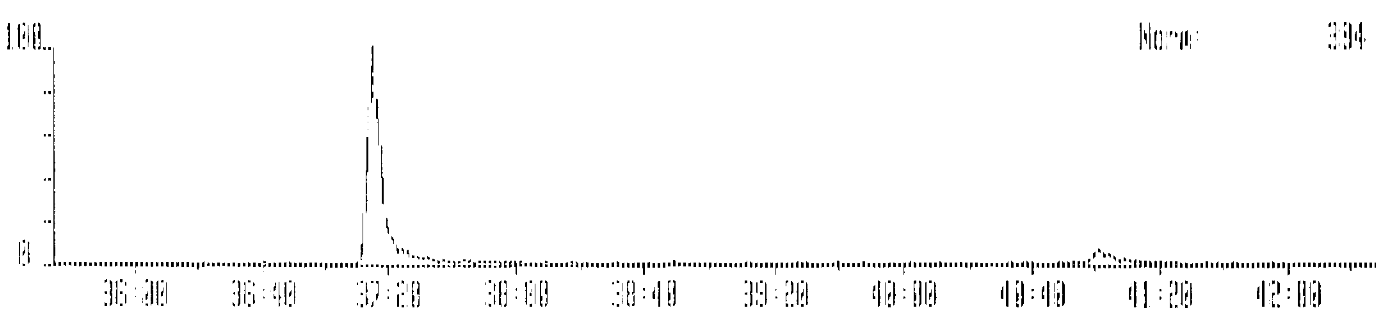
S921620 4-APR-92 Str Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 425.7737
Text:2727,2728,2730 TL14205228



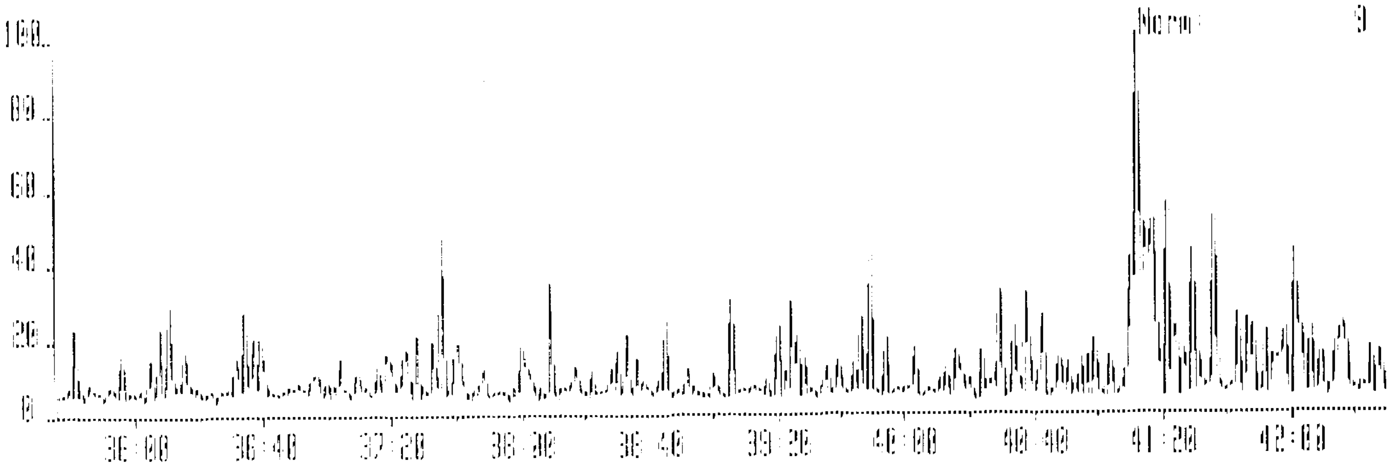
S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 435.8169
Text:2727,2728,2730 TL14205228



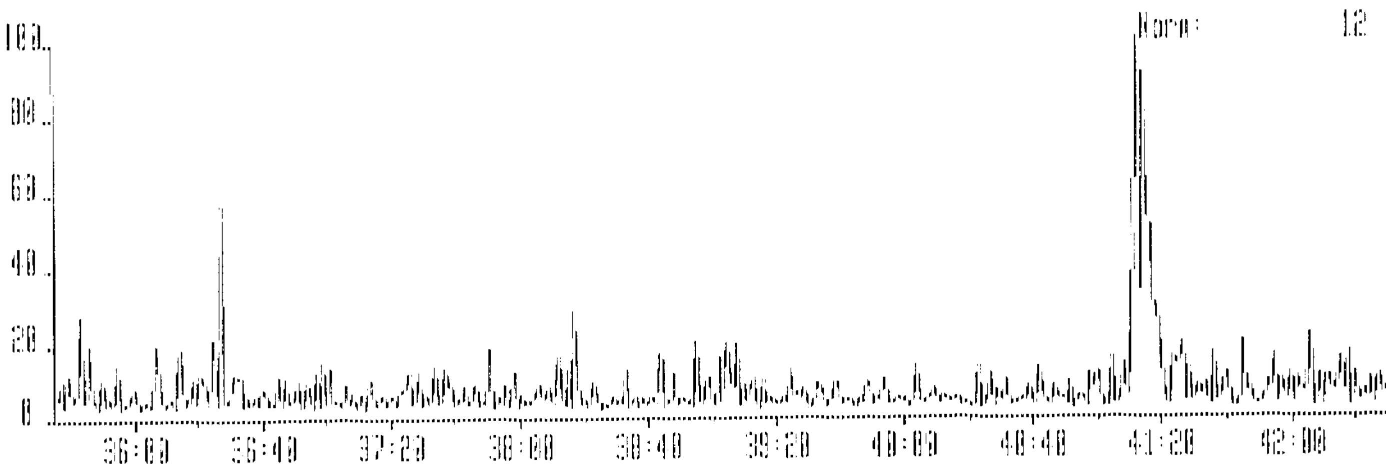
S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 437.8140
Text:2727,2728,2730 TL14205228



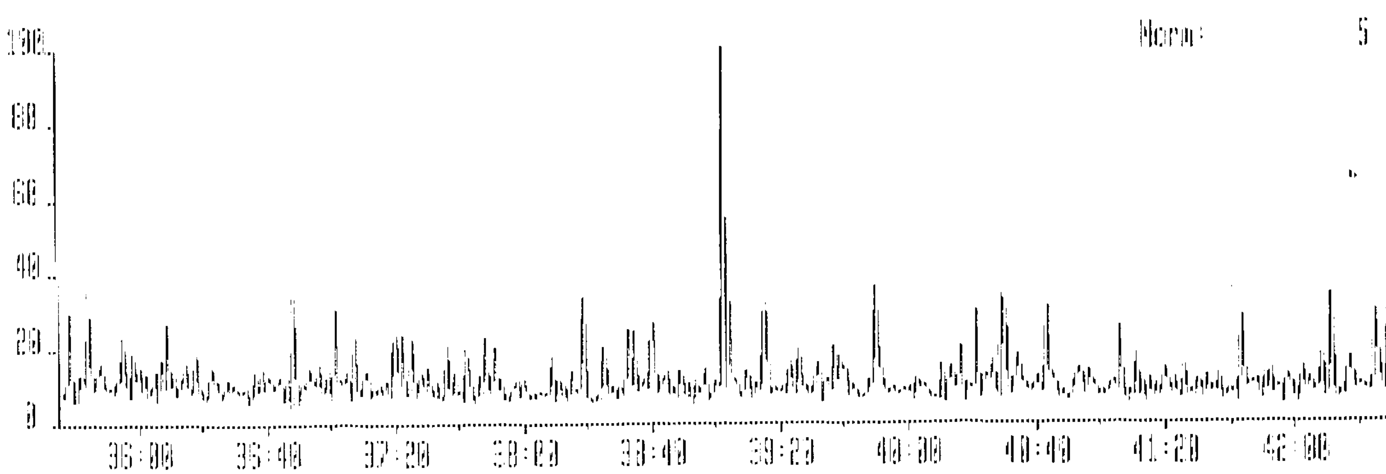
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 441.7420
Text:2727,2728,2730 TL1020522A



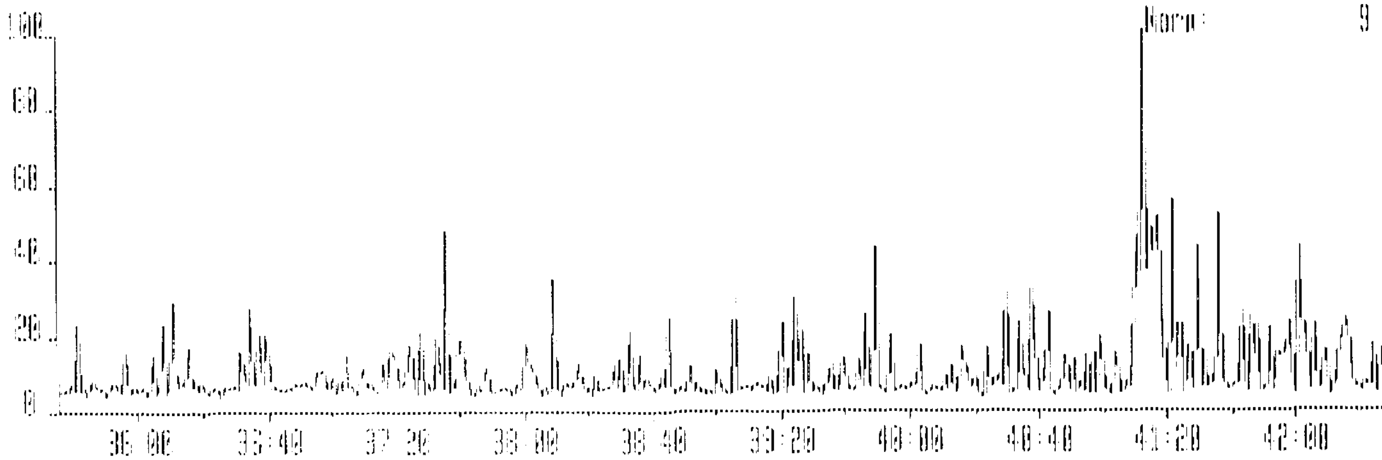
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1020522A



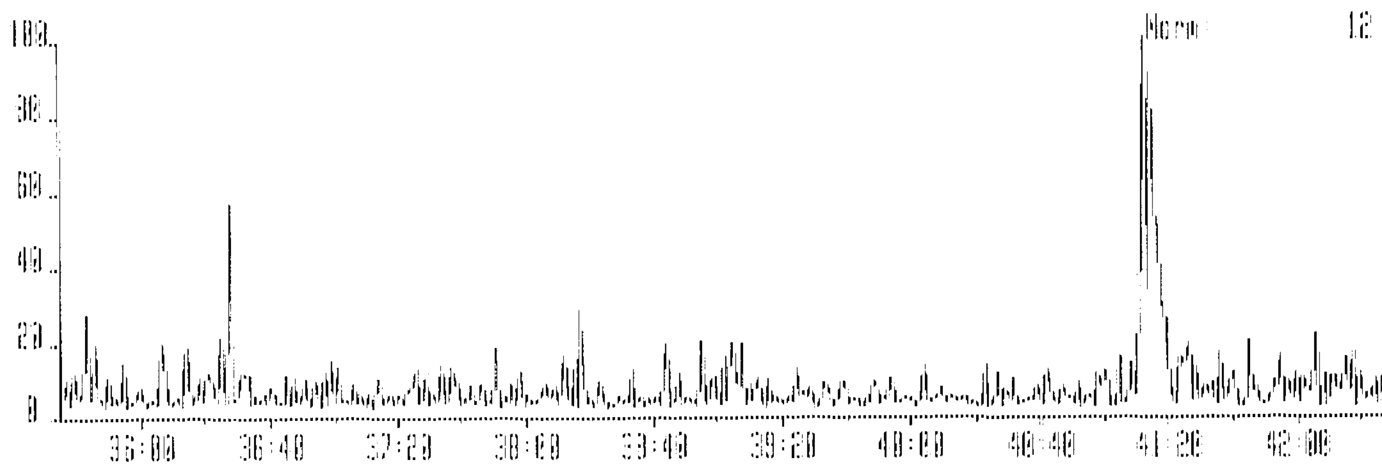
S921620 4-APR-92 Str:Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1420522A



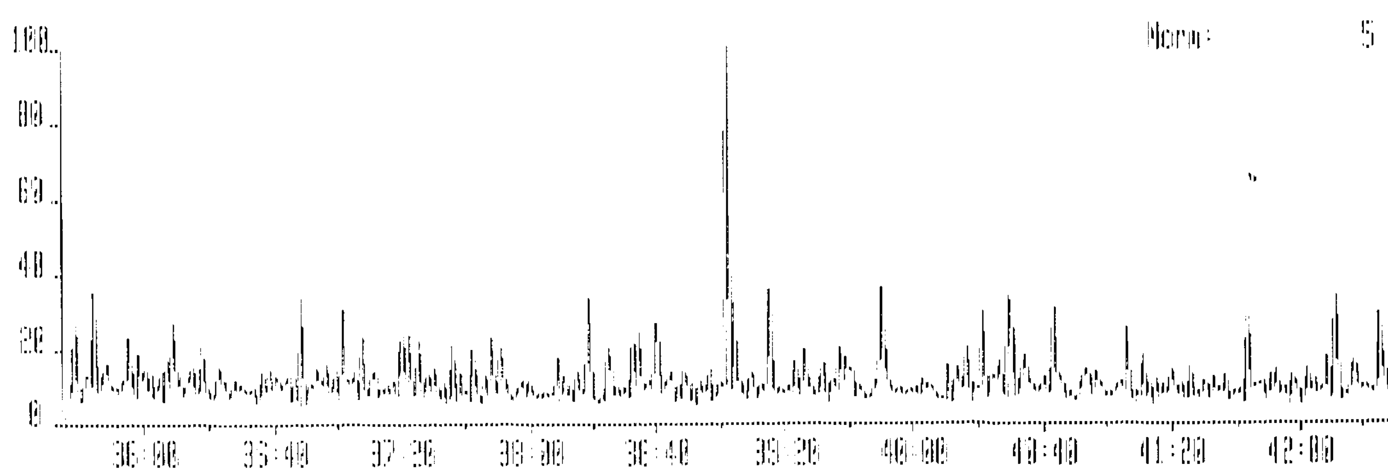
SS921620 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1020522A



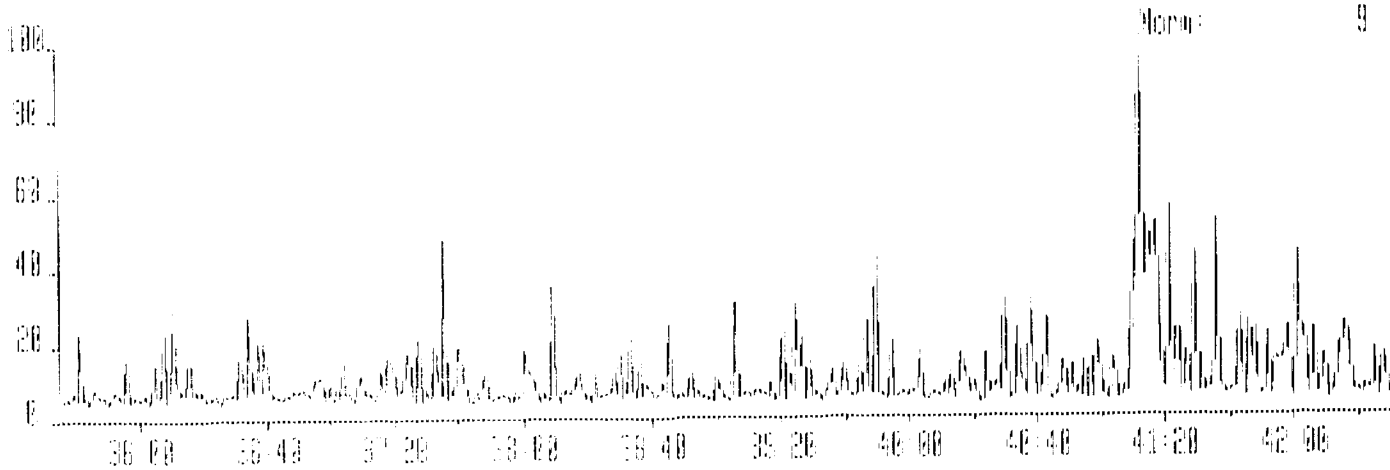
SS921620 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1020522A



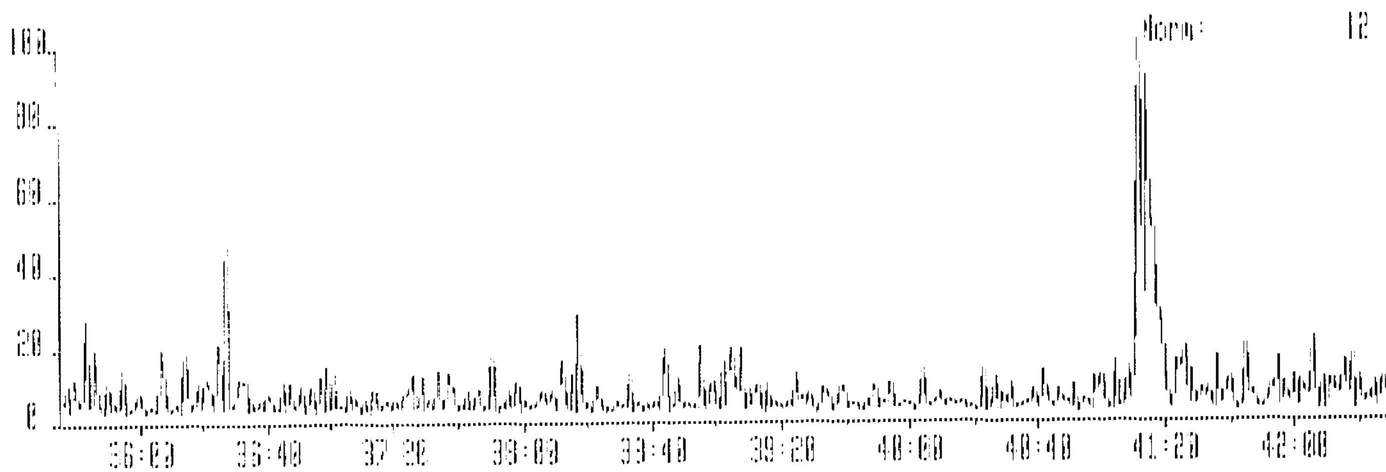
SS921620 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1020522A



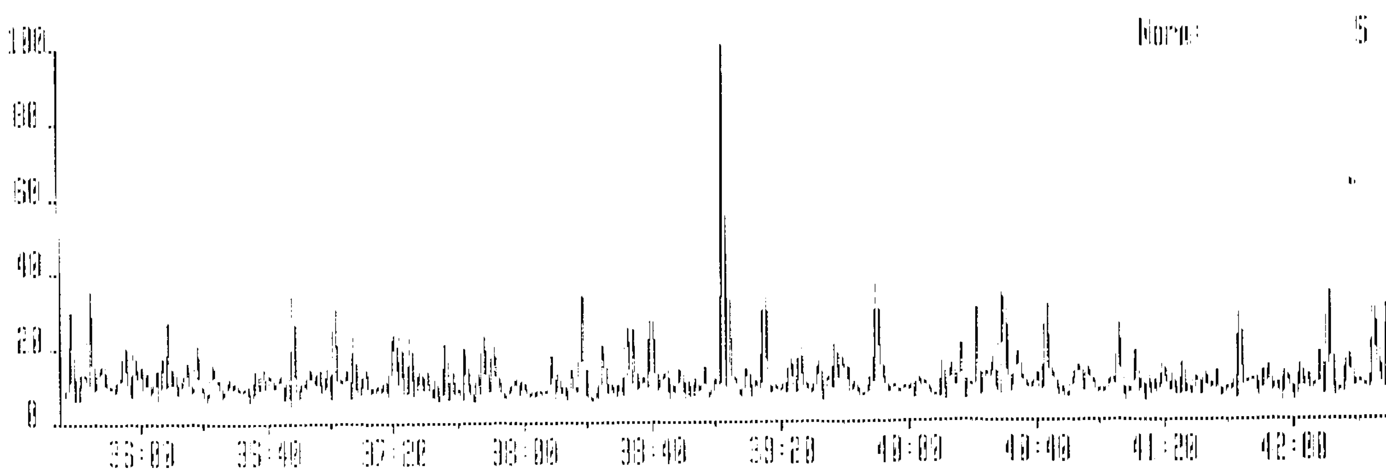
S921620 4-APR-92 Sir Voltage 705 Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1020522A



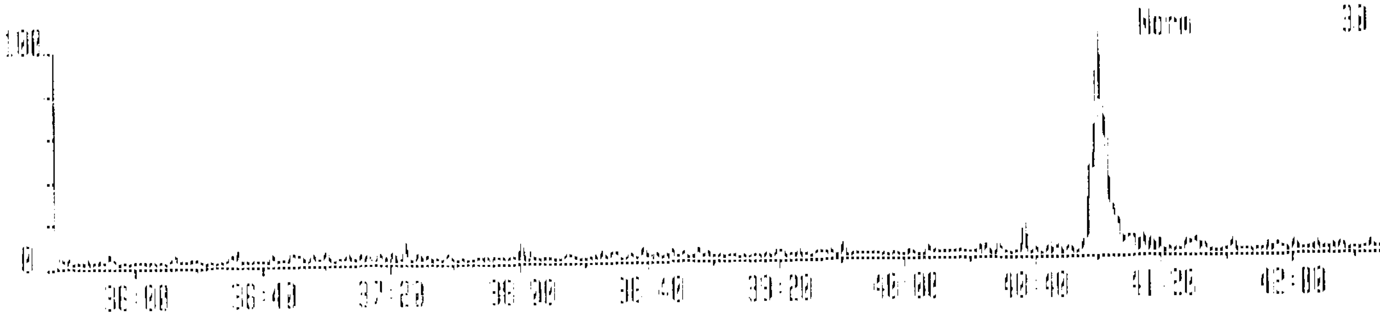
S921620 4-APR-92 Sir Voltage 705 Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1020522A



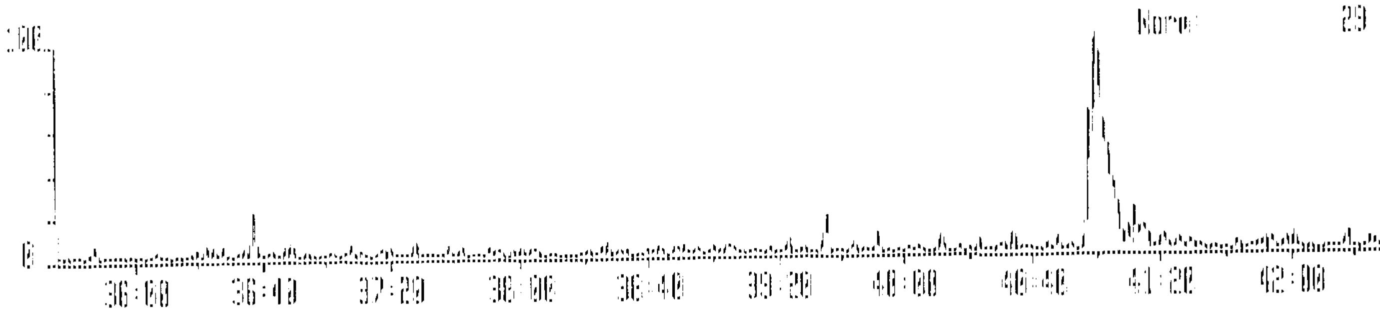
S921620 4-APR-92 Sir:Voltage 705 Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1020522A



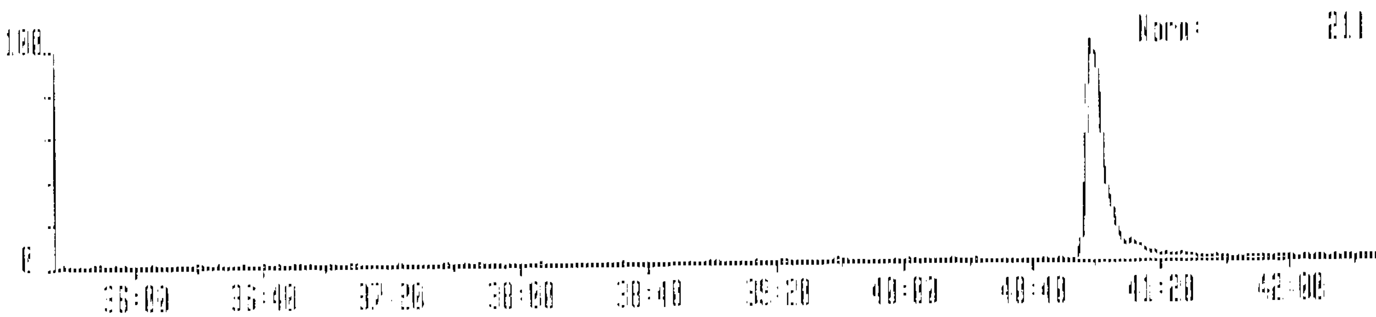
S921620 4-APR-92 Sir:Voltage 70S Sys: M0E5US
Sample 1 Injection 1 Group 4 Mass 457.7377
Text:2727,2728,2730 TL1H205228



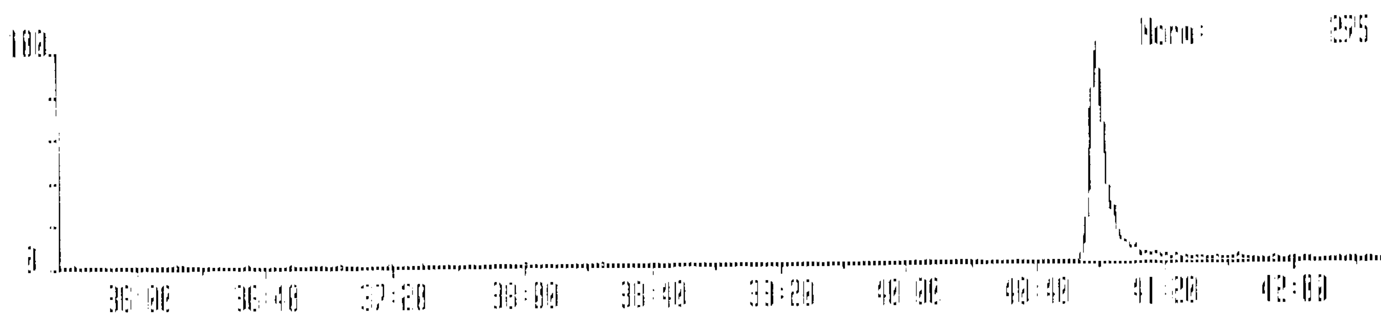
S921620 4-APR-92 Sir:Voltage 70S Sys: M0E5US
Sample 1 Injection 1 Group 4 Mass 459.7348
Text:2727,2728,2730 TL1H205228



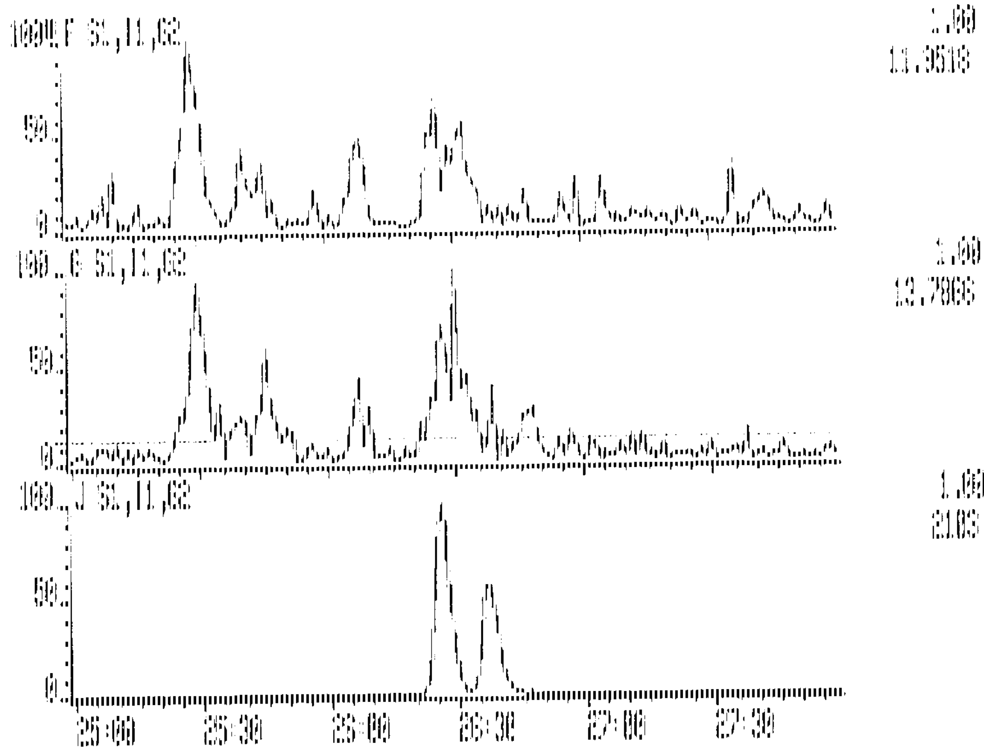
S921620 4-APR-92 Sir:Voltage 70S Sys: M0E5US
Sample 1 Injection 1 Group 4 Mass 469.7779
Text:2727,2728,2730 TL1H205228



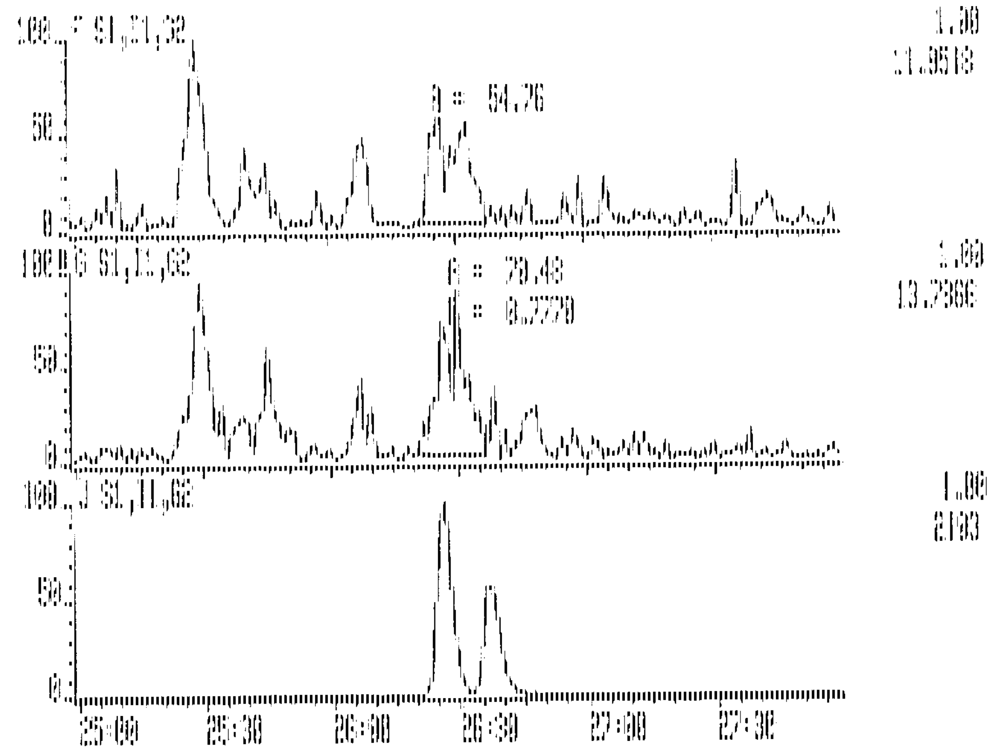
S921620 4-APR-92 Sir:Voltage 70S Sys: M0E5US
Sample 1 Injection 1 Group 4 Mass 471.7750
Text:2727,2728,2730 TL1H205228



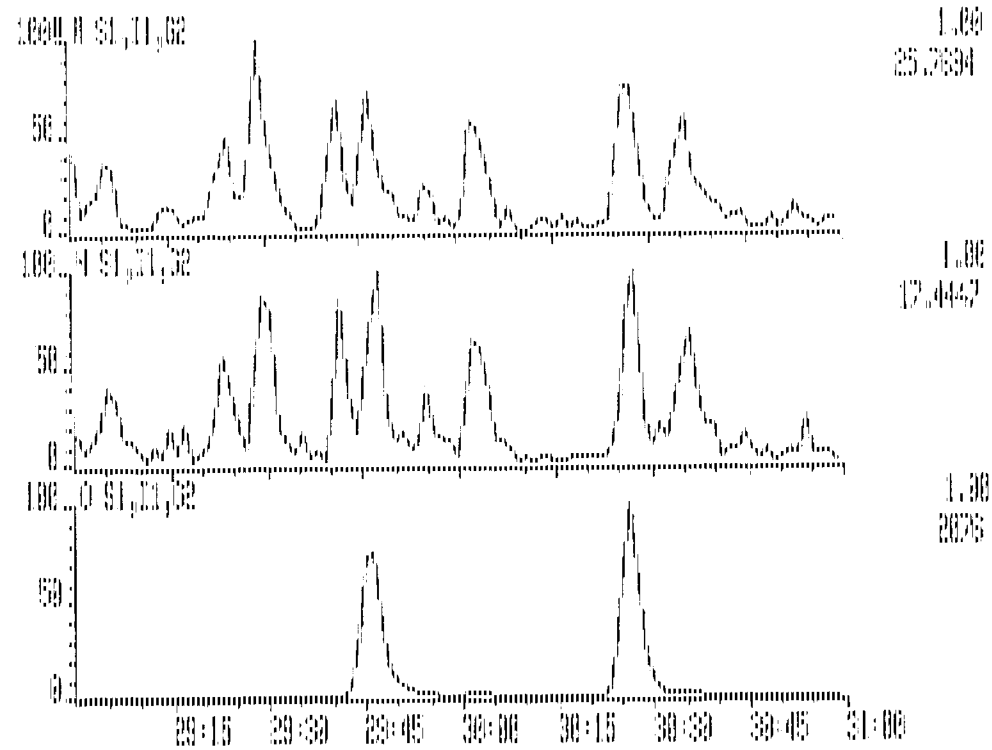
S921520   4-APR-92 14:25 70S   (EI-)   Sys:NOB5US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TLJ1205220



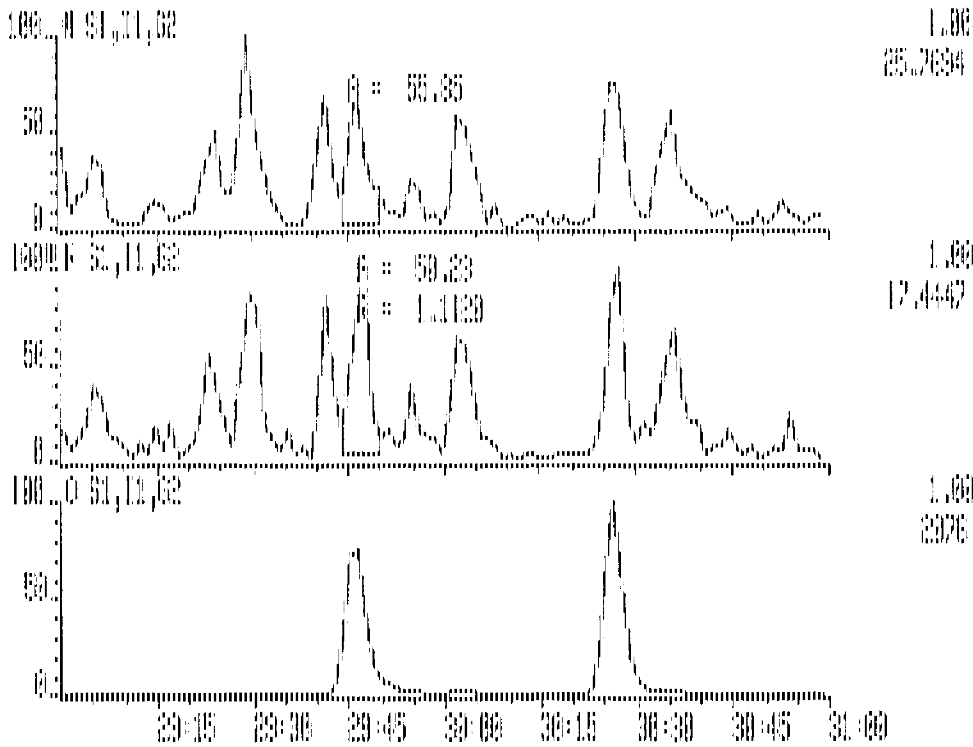
S921620   4-APR-92 14 25 70S   (EI+)   Sys:HDB5US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 T.J0205228



S921620 4-APR-92 14:25 70S (EI+) Sys:HOBSUS
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TLTH20522A



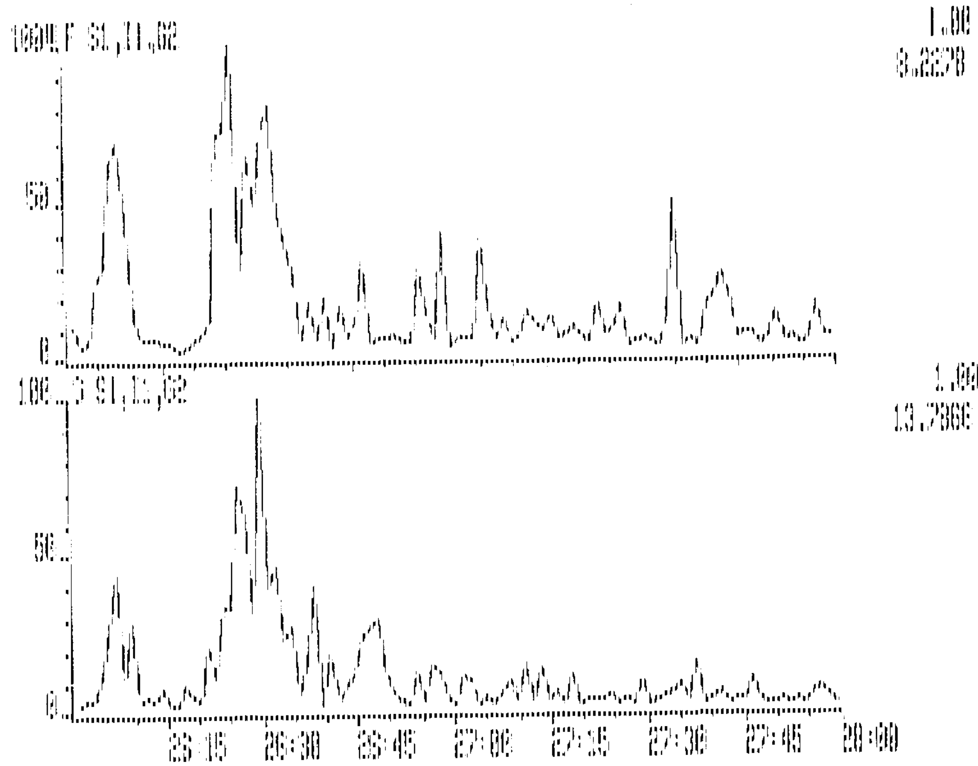
S921620 4-APR-92 14:25 709 (EI+) Sys:NO85L6
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TL H020522A



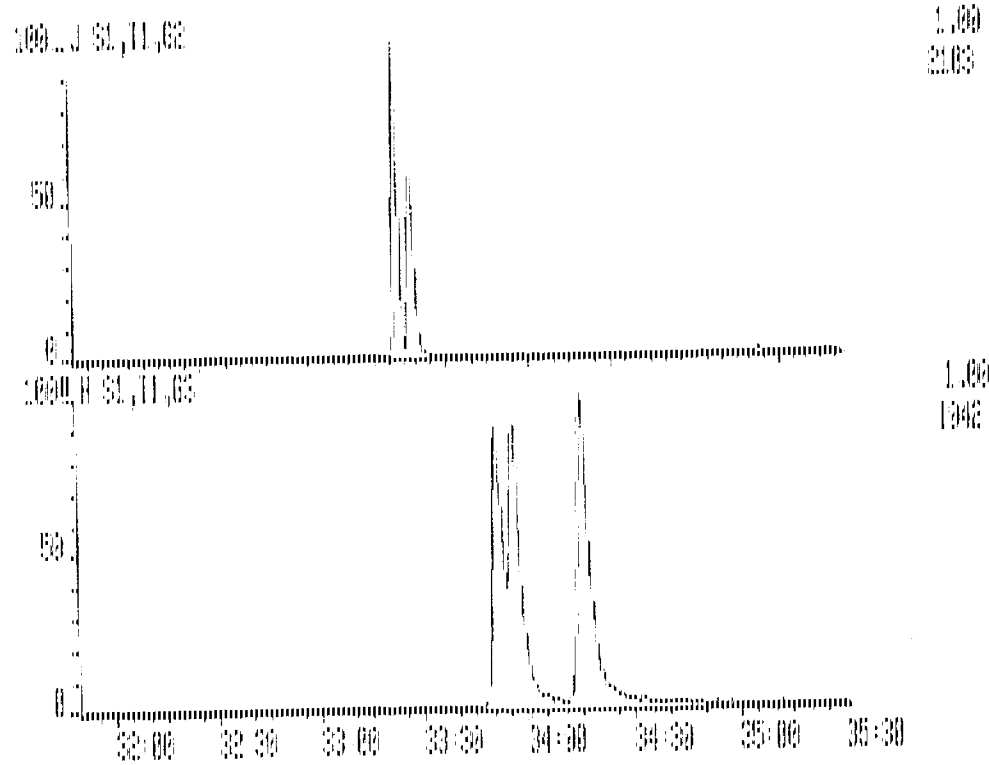
S921620 4-APR-92 14:25 70S (EI+) Sys:N0365G
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1020522A

Verified by [illegible] 4-4-92

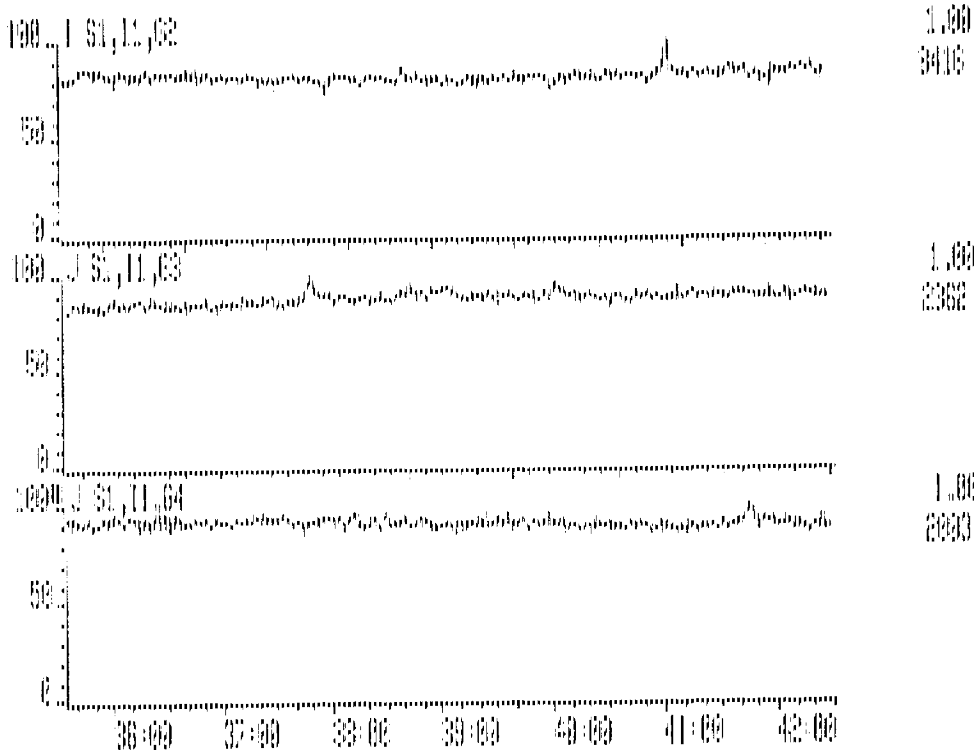
Verified by Unit QC:



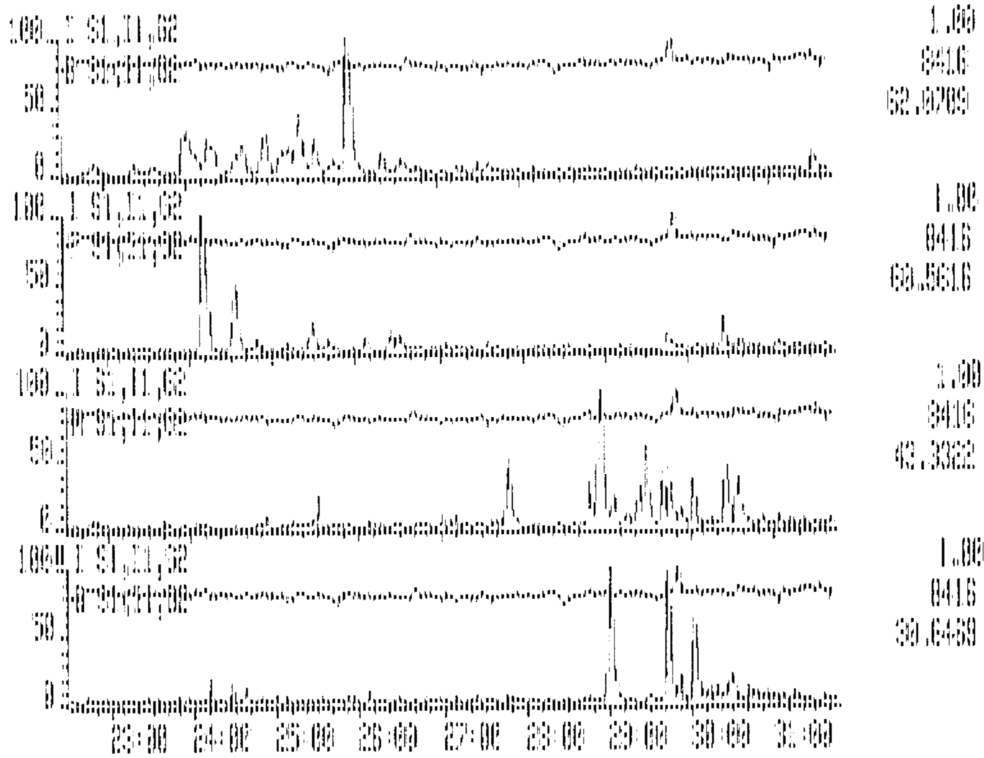
SS921620 4-APR-92 14:25 70S (EI+) Sys:HDE5DS
GR. 3 F: 391.0127 G: 392.9760 H: 401.0558 I: 403.8525 J: 430.9729
Text:2727,2728,2730 TLT4205229



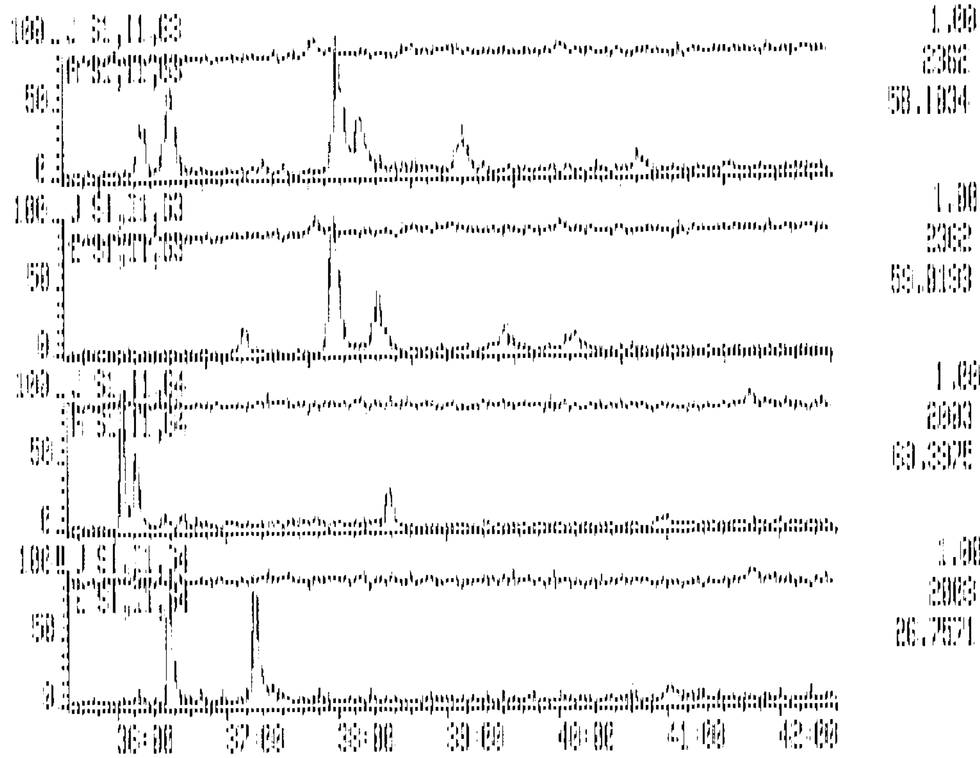
S931620 4-APR-92 14:25 70S (EI+) Sys:NOBSUS
GR 4 F: 425.7732 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TL1B2052A



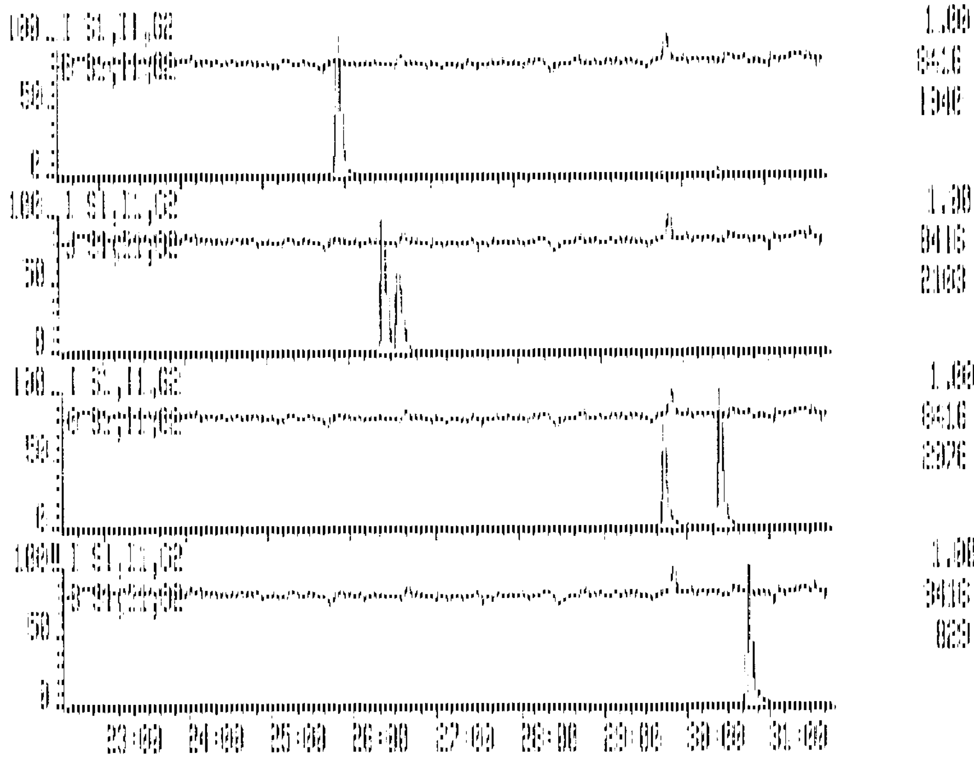
S921620 4-APR-92 14:25 70S (EI+) Sys:N085US
GR 2 F: 315.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1B20522F



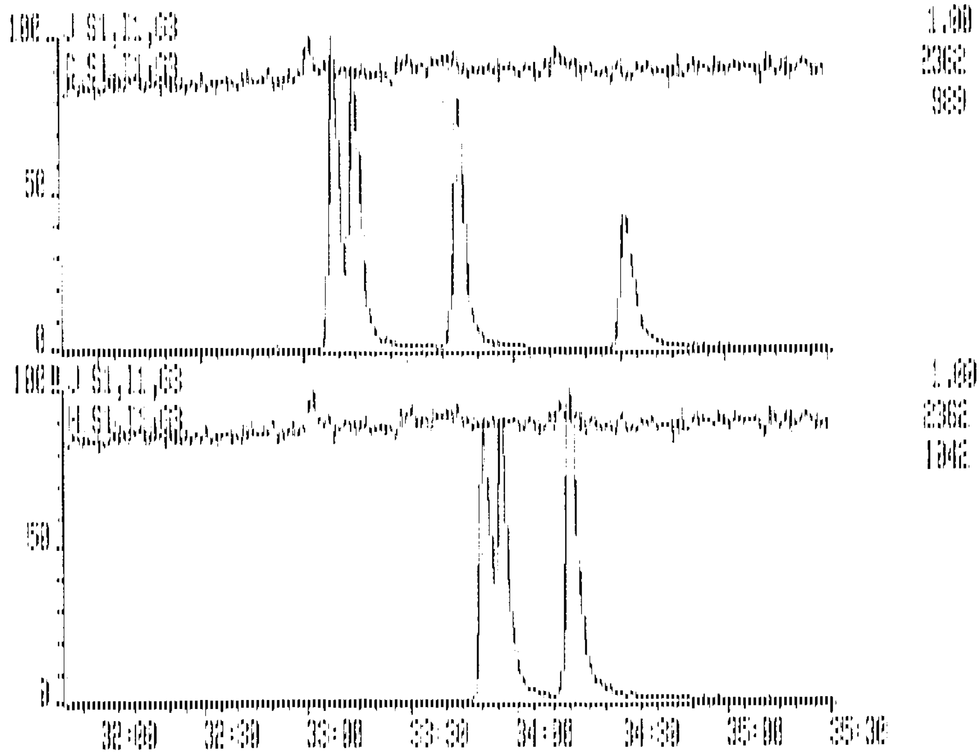
S921520 4-APR-92 14:25 70S (EI+) Sys HCB5US
GR 4 F: 425.7737 G: 430.9729 H: 435.3169 I: 437.8149 J: 442.9728
Text: 2727,2728,2730 TL11920522A



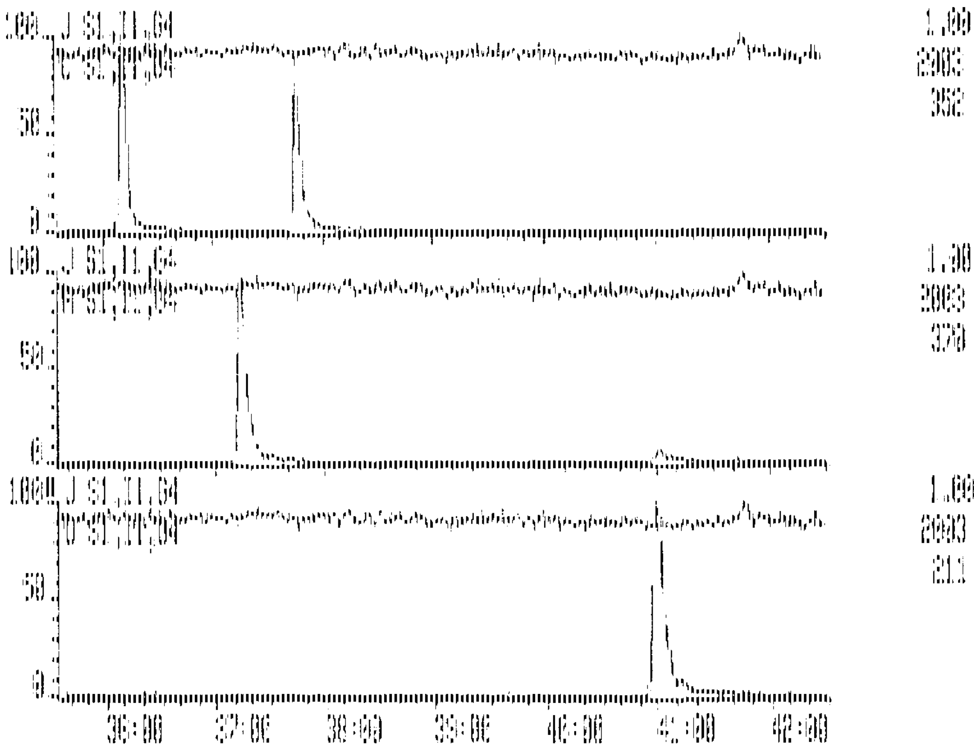
S921620 4-APR-92 14:25 ?06 (EI+) Sys:HDE5JS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9363
Text:2727,2728,2730 TL:H205220



S921620 4-APR-92 14:25 705 (EI+) Sys:NDBSUS
GR 3 F: 391.9127 G: 392.9760 H: 401.8558 I: 403.8529 J: 430.9729
Text:2727,2728,2730 T.110205229

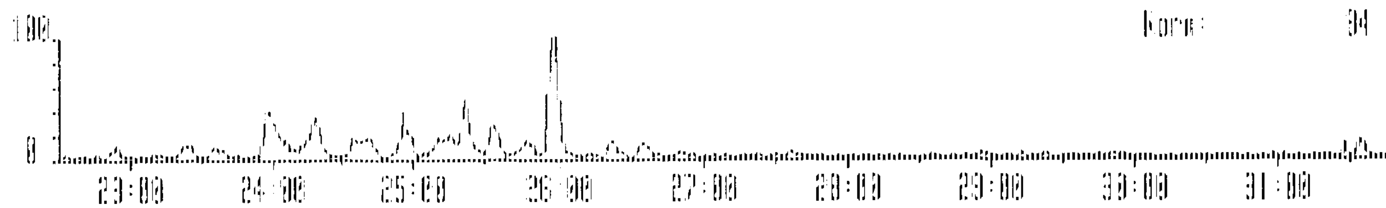


S9E1520 4-APR-92 14:25 70S (EI+) Sys:NDB5JS
SR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9788
Text:2727,2726,2730 TLH205228

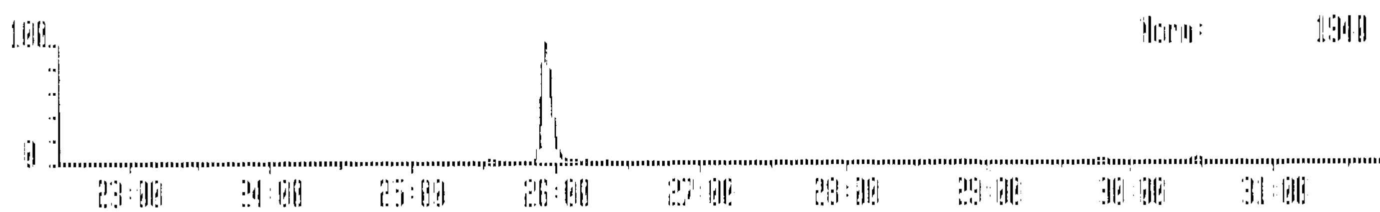


S921620 4-APR-92 Sir:Voltage 70S Sys: M0B5US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TL18205228

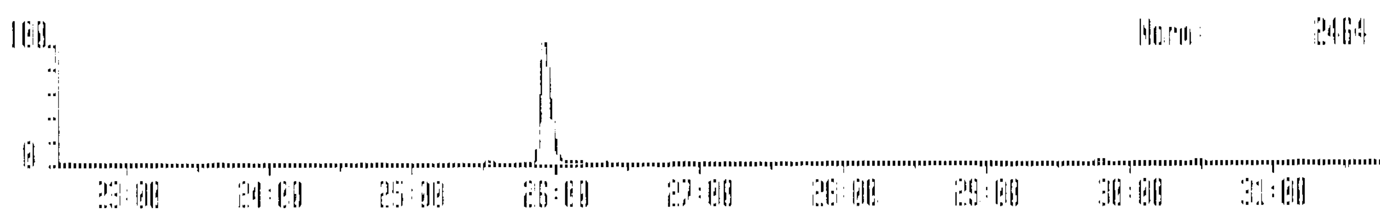
S921620 4-APR-92 Sir:Voltage 70S Sys: M0B5US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TL18205228



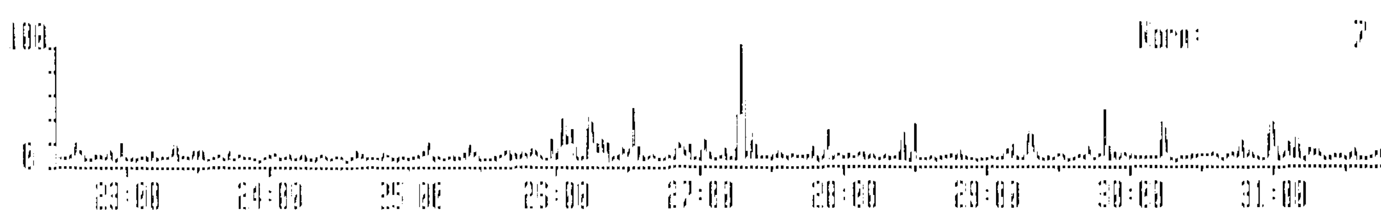
S921620 4-APR-92 Sir:Voltage 70S Sys: M0B5US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TL18205228



S921620 4-APR-92 Sir:Voltage 70S Sys: M0B5US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TL18205228

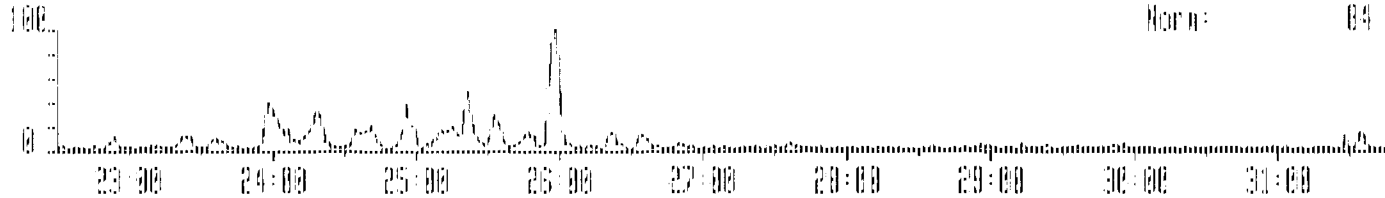


S921620 4-APR-92 Sir:Voltage 70S Sys: M0B5US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TL18205228

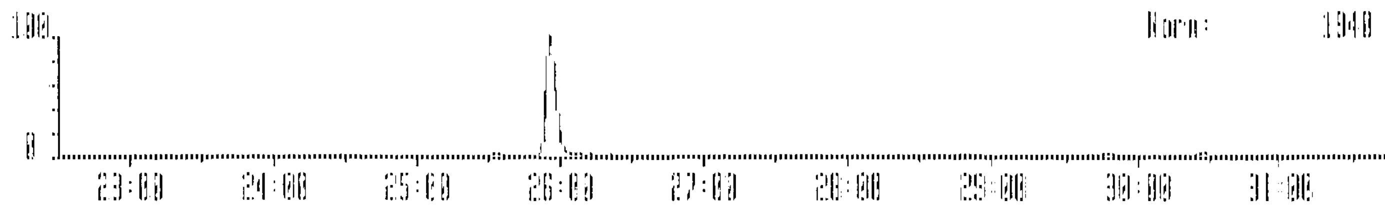


S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TLI4205228

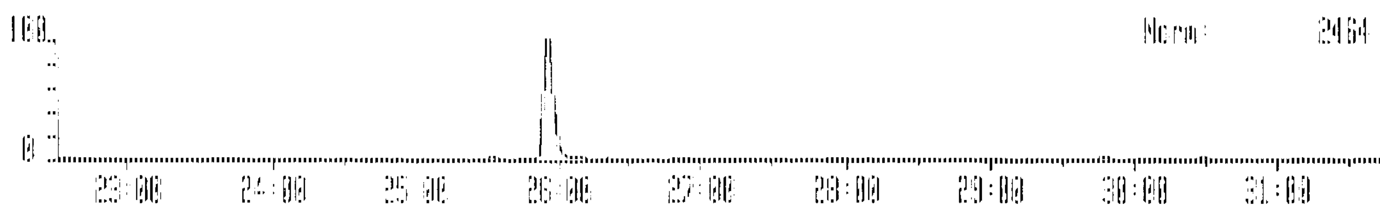
S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TLI4205228



S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TLI4205228

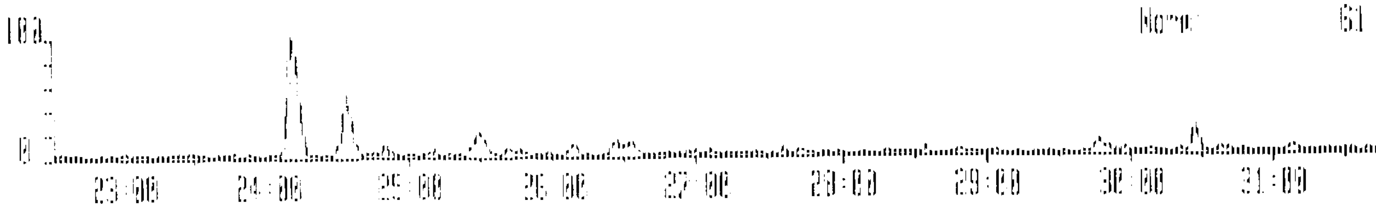


S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TLI4205228

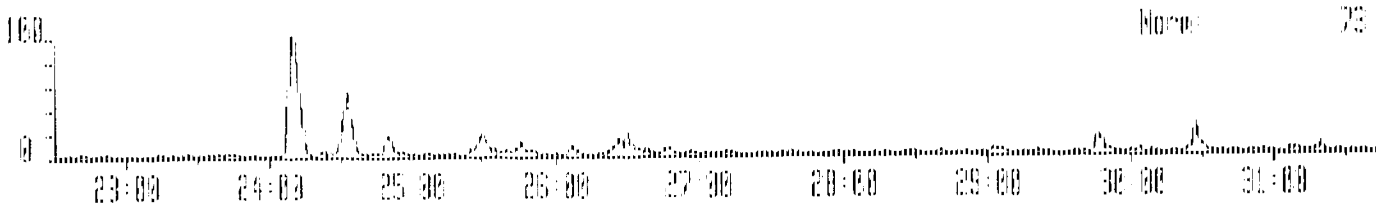


S921620 4-APR-92 Str:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TLI4205228

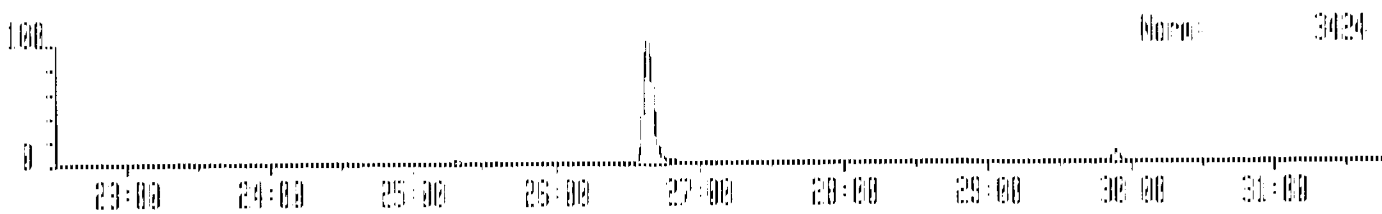
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 319.8965
Text:2727,2728,2730 TL1H20522A



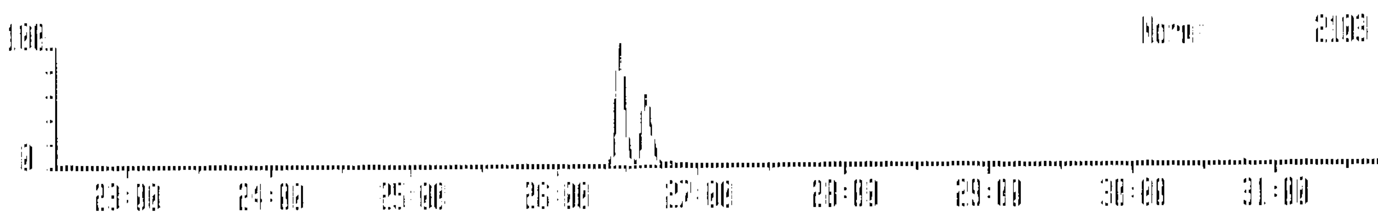
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 321.8936
Text:2727,2728,2730 TL1H20522A



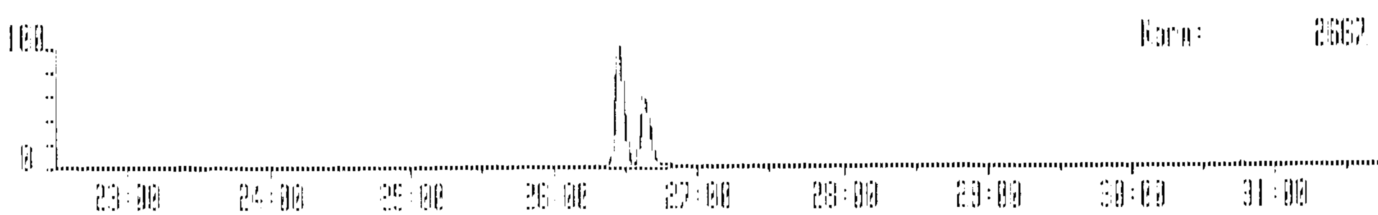
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 327.8847
Text:2727,2728,2730 TL1H20522A



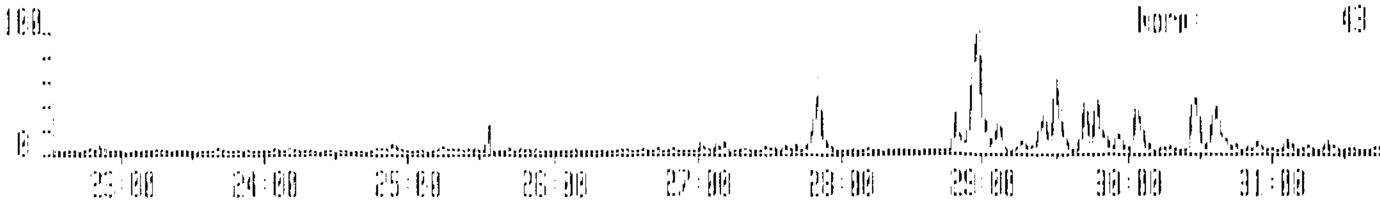
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 331.9368
Text:2727,2728,2730 TL1H20522A



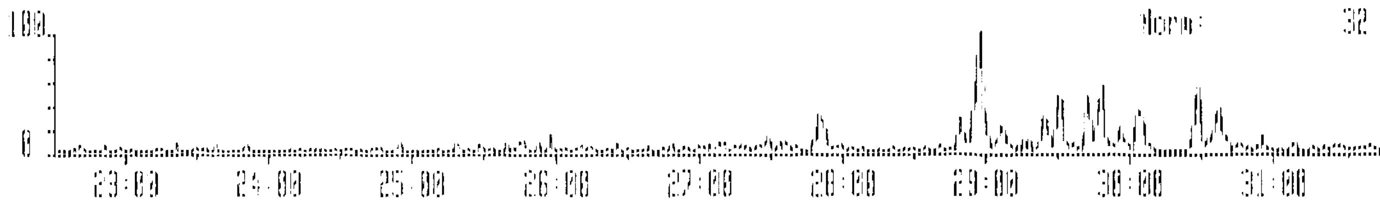
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 333.9338
Text:2727,2728,2730 TL1H20522A



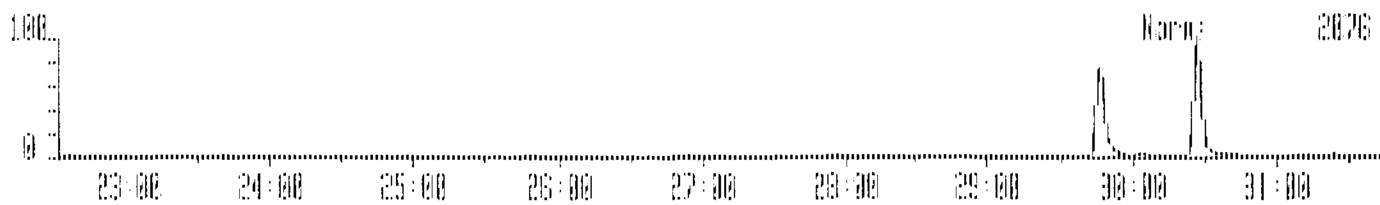
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 339.8597
Text:2727,2728,2730 TL1#20522A



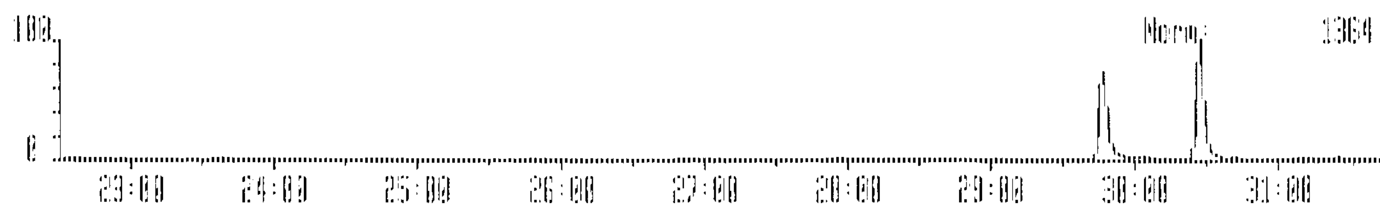
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 341.8567
Text:2727,2728,2730 TL1#20522A



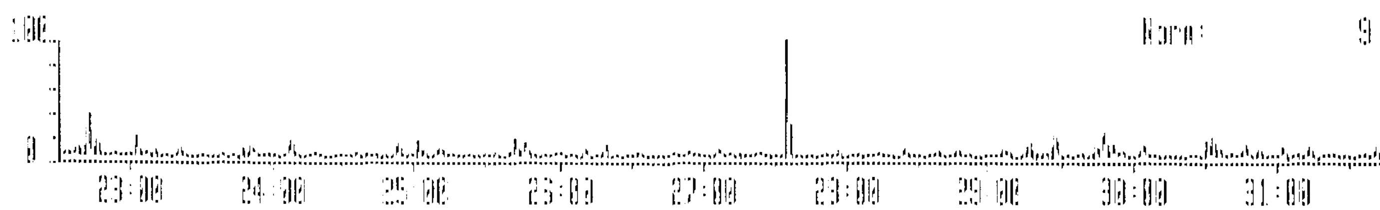
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 351.9000
Text:2727,2728,2730 TL1#20522A



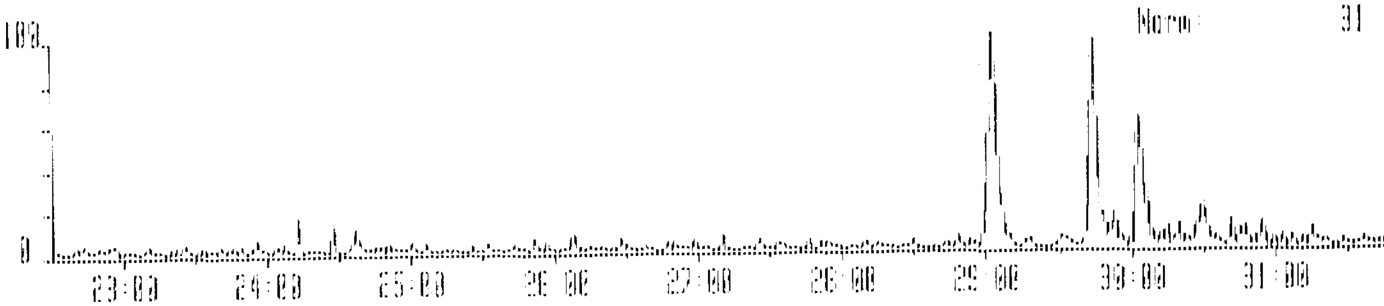
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 353.8970
Text:2727,2728,2730 TL1#20522A



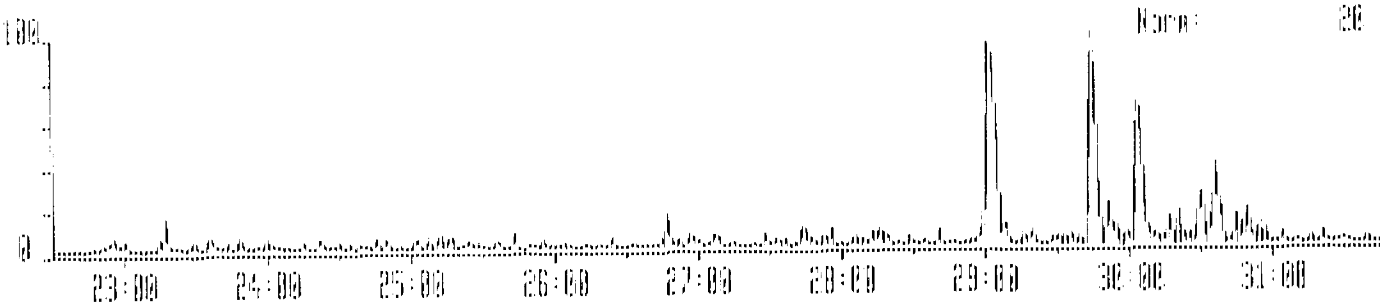
S921620 4-APR-92 Str:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 2 Mass 409.7974
Text:2727,2728,2730 TL1#20522A



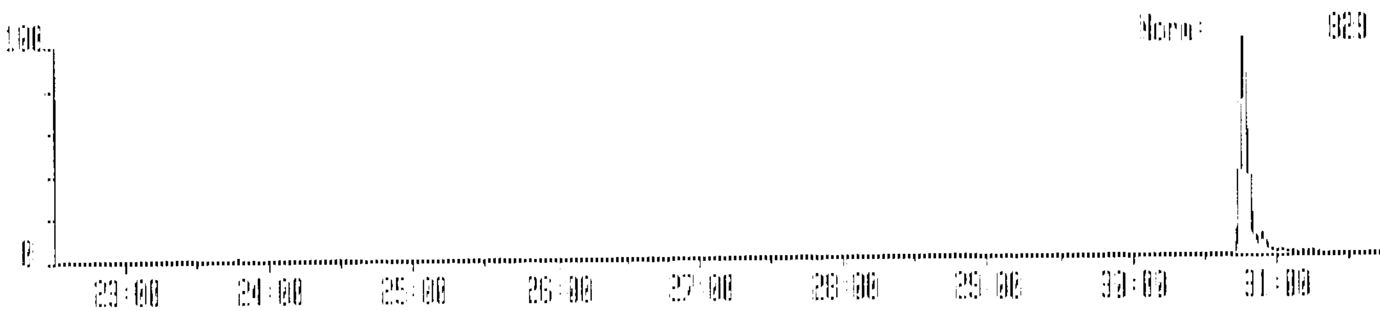
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 355.8546
Text:2727,2728,2730 TL1H205229



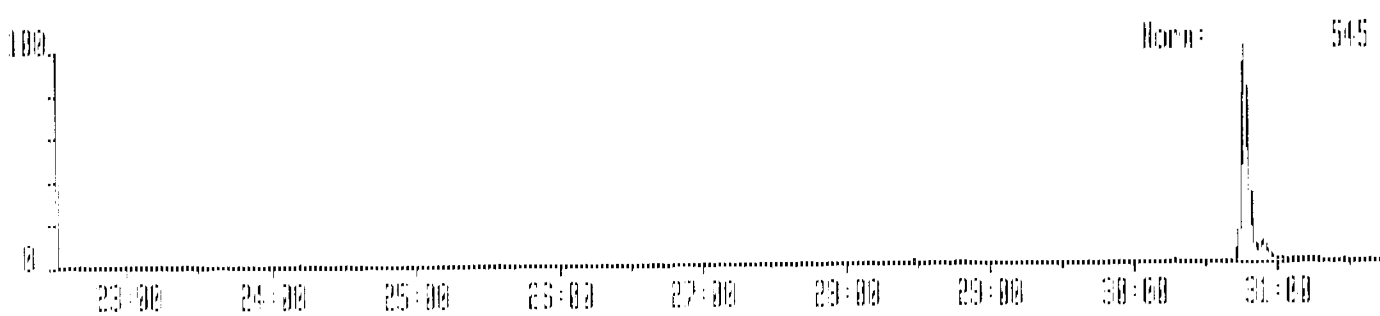
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 357.8516
Text:2727,2728,2730 TL1H205229



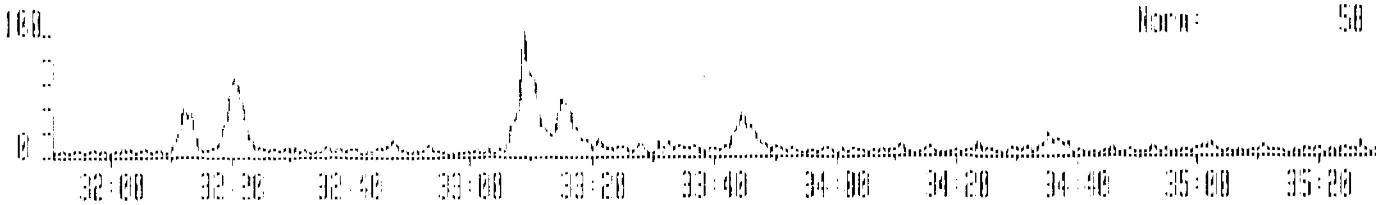
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 367.8949
Text:2727,2728,2730 TL1H205229



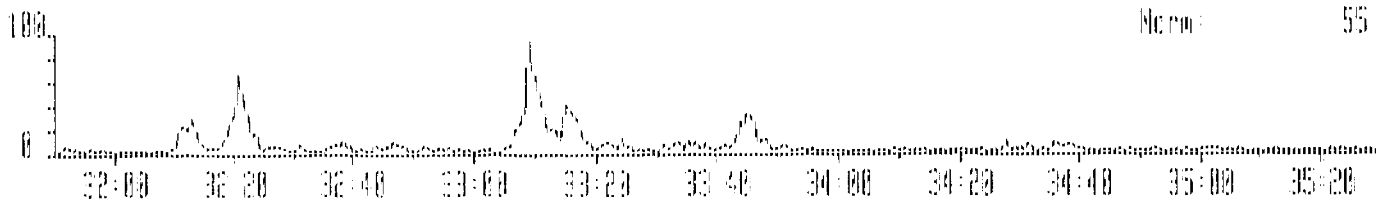
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 369.8919
Text:2727,2728,2730 TL1H205229



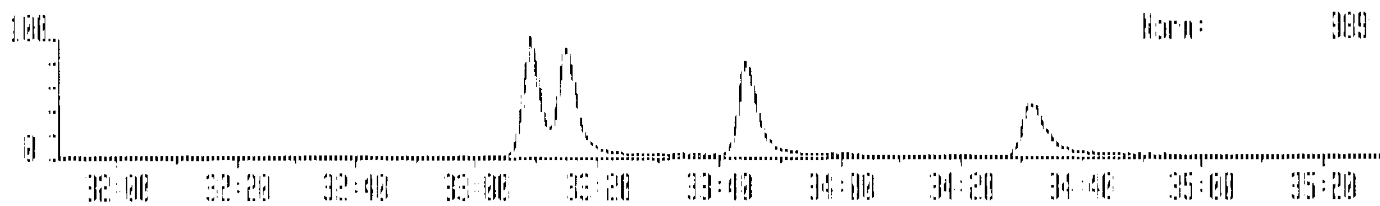
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 373.8208
Text:2727,2728,2730 TL1020522A



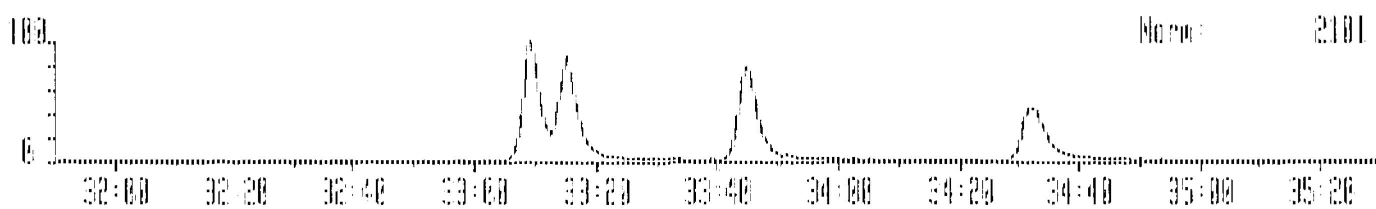
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 375.8178
Text:2727,2728,2730 TL1020522A



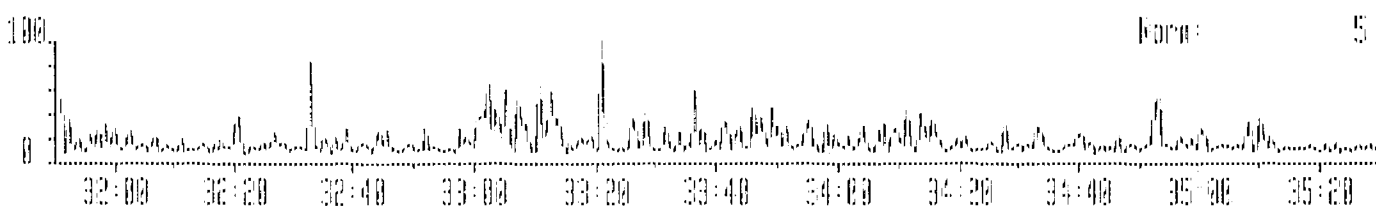
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 383.8639
Text:2727,2728,2730 TL1020522A



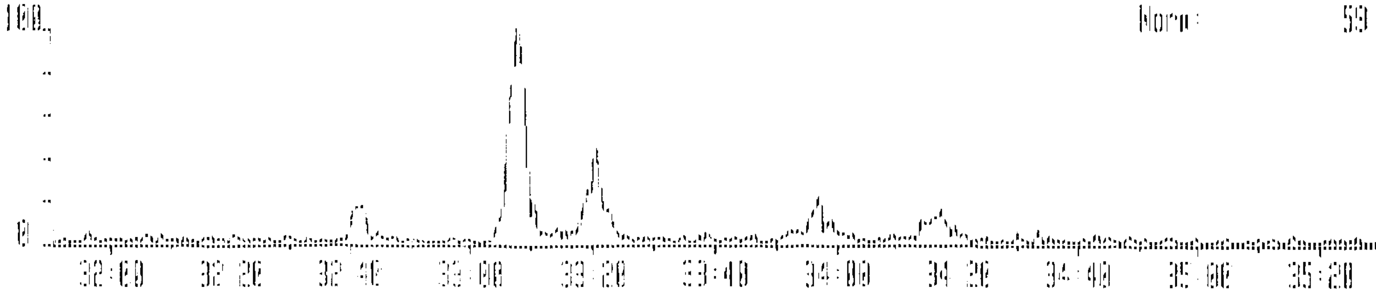
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 385.8610
Text:2727,2728,2730 TL1020522A



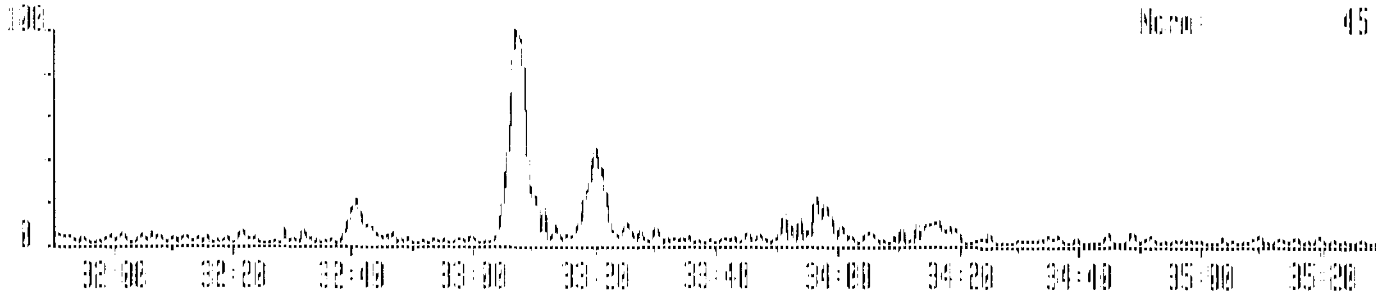
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 445.7555
Text:2727,2728,2730 TL1020522A



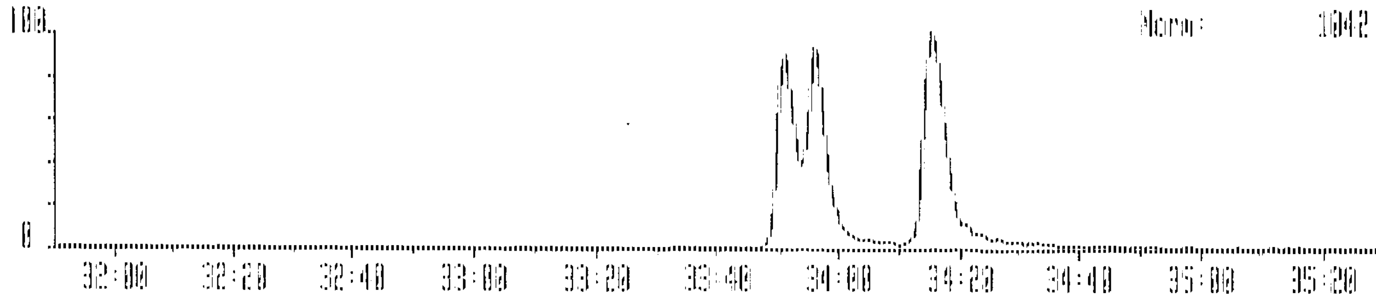
S921620 4-APR-92 Sir:Voltage 70S Sys:NDB5US
Sample 1 Injection 1 Group 3 Mass 389.8156
Text:2727,2728,2730 TLI#20522A



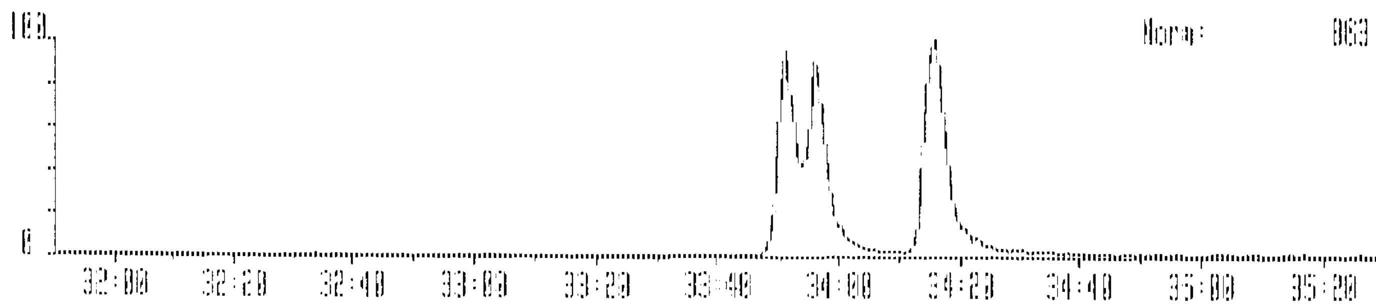
S921620 4-APR-92 Sir:Voltage 70S Sys:NDB5US
Sample 1 Injection 1 Group 3 Mass 391.8127
Text:2727,2728,2730 TLI#20522A



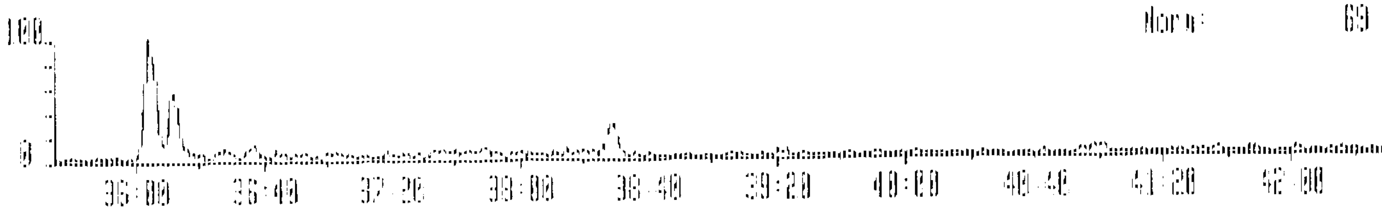
S921620 4-APR-92 Sir:Voltage 70S Sys:NDB5US
Sample 1 Injection 1 Group 3 Mass 401.8558
Text:2727,2728,2730 TLI#20522A



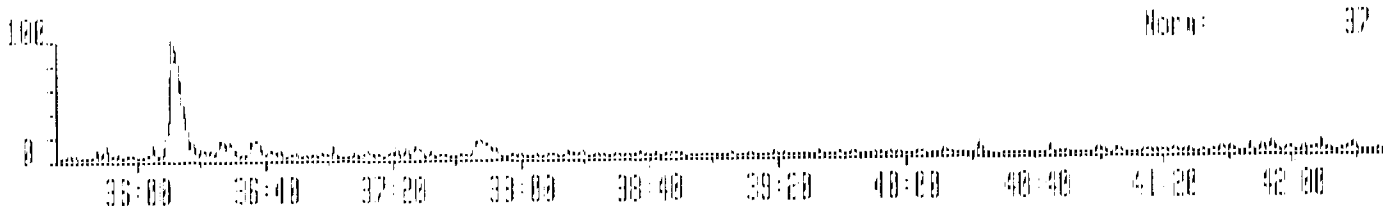
S921620 4-APR-92 Sir:Voltage 70S Sys:NDB5US
Sample 1 Injection 1 Group 3 Mass 403.8529
Text:2727,2728,2730 TLI#20522A



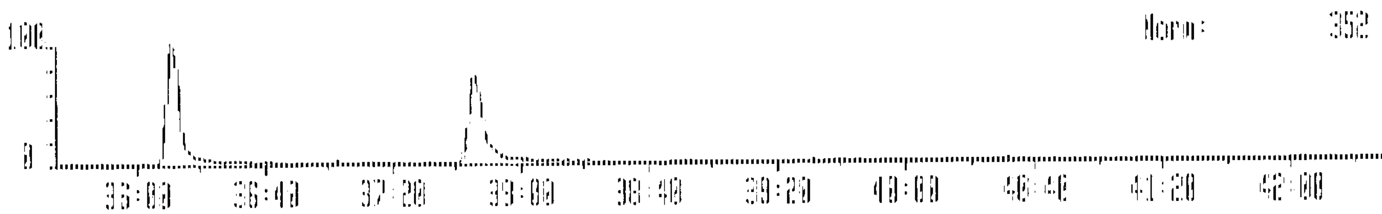
S921620 4-APR-92 Str Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 407.7818
Text:2727,2728,2730 TLI#20522A



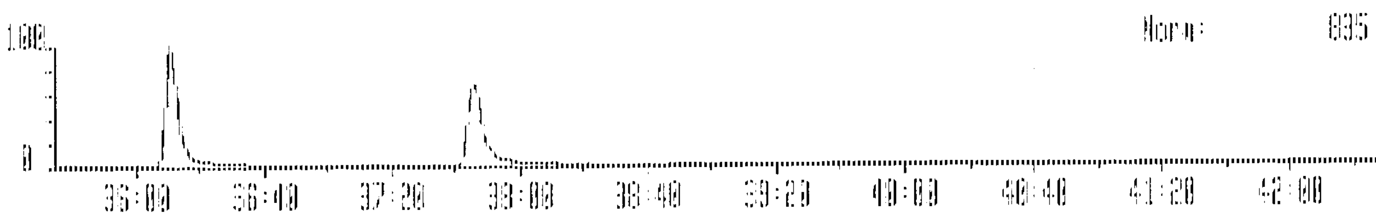
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 409.7789
Text:2727,2728,2730 TLI#20522A



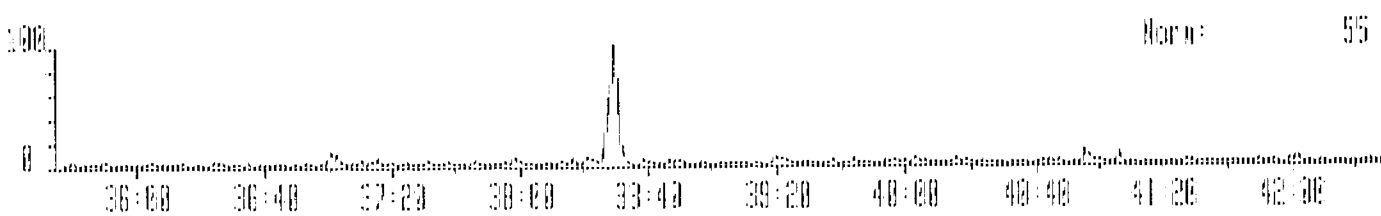
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 417.8253
Text:2727,2728,2730 TLI#20522A



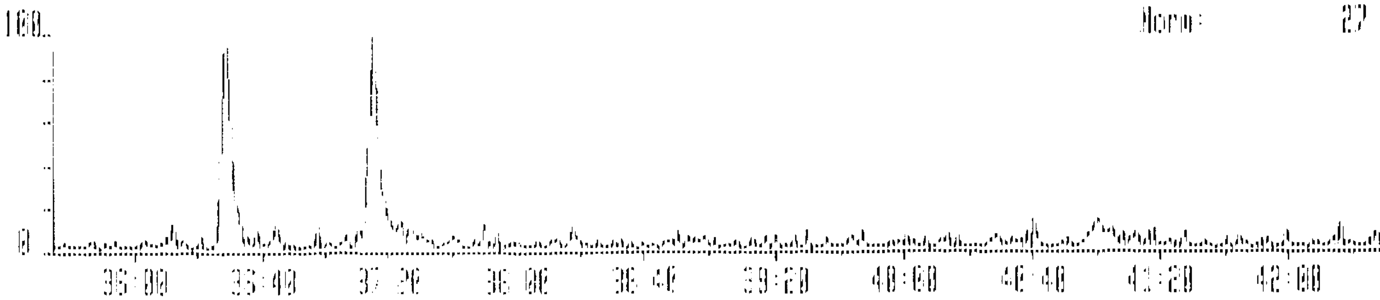
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 419.8220
Text:2727,2728,2730 TLI#20522A



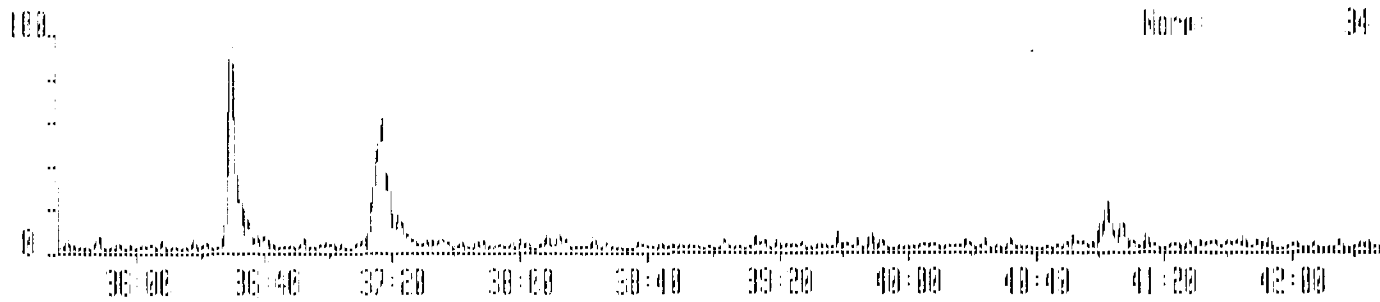
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 4 Mass 479.7165
Text:2727,2728,2730 TLI#20522A



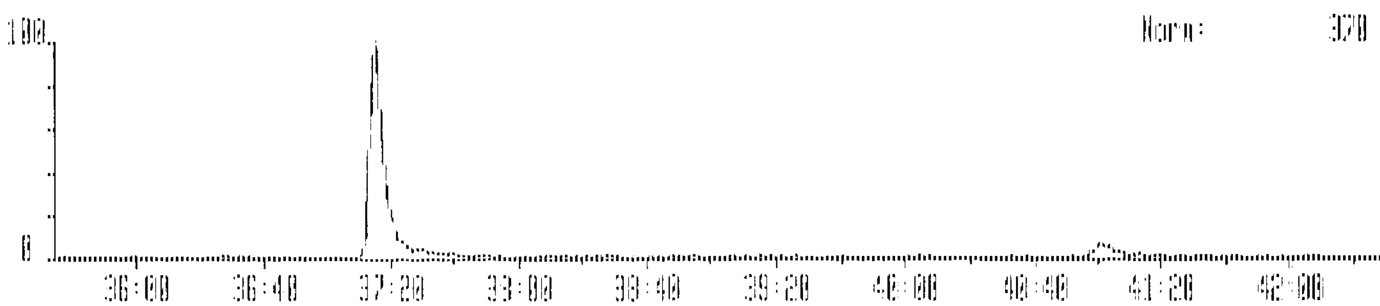
S921620 4-APR-92 Sir Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 423.7766
Text:2727,2728,2730 TL1420522A



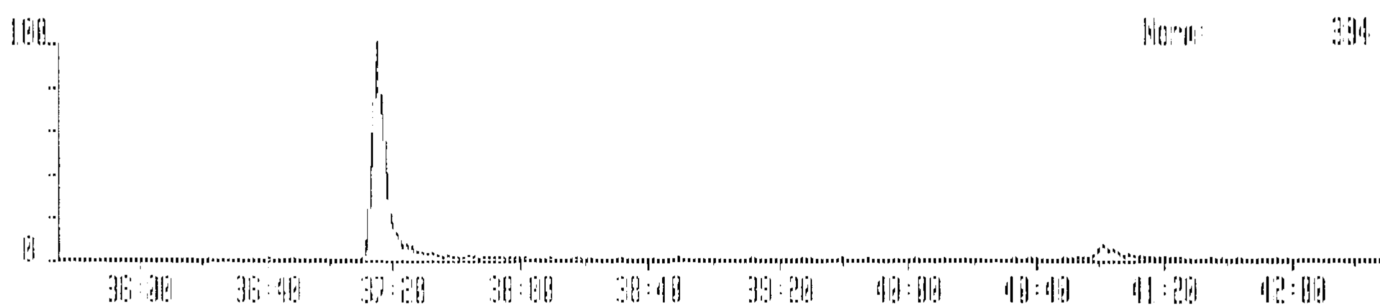
S921620 4-APR-92 Sir Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 425.7737
Text:2727,2728,2730 TL1420522A



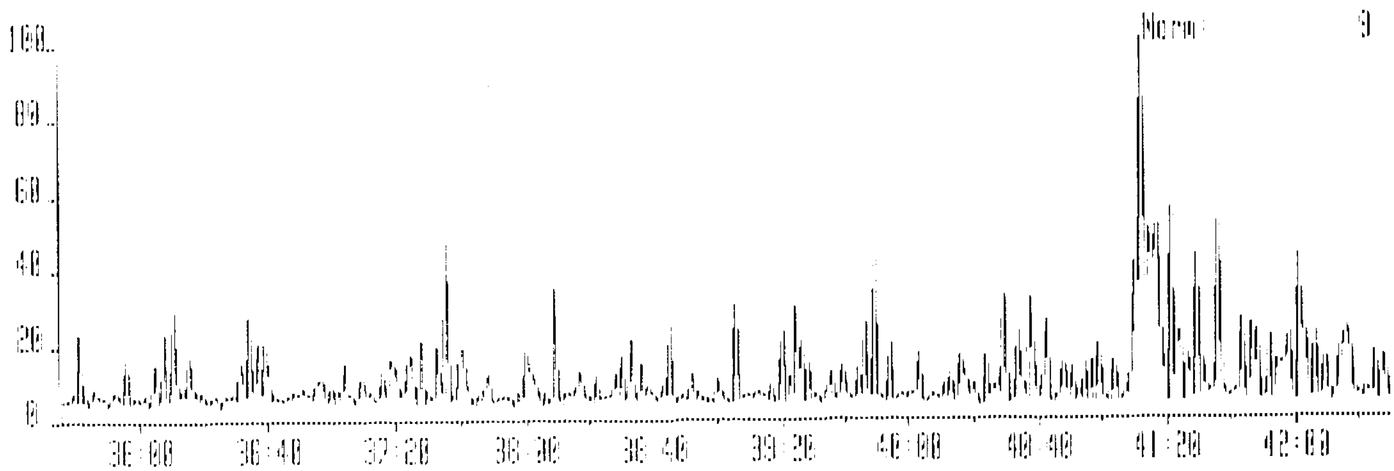
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 435.8169
Text:2727,2728,2730 TL1420522A



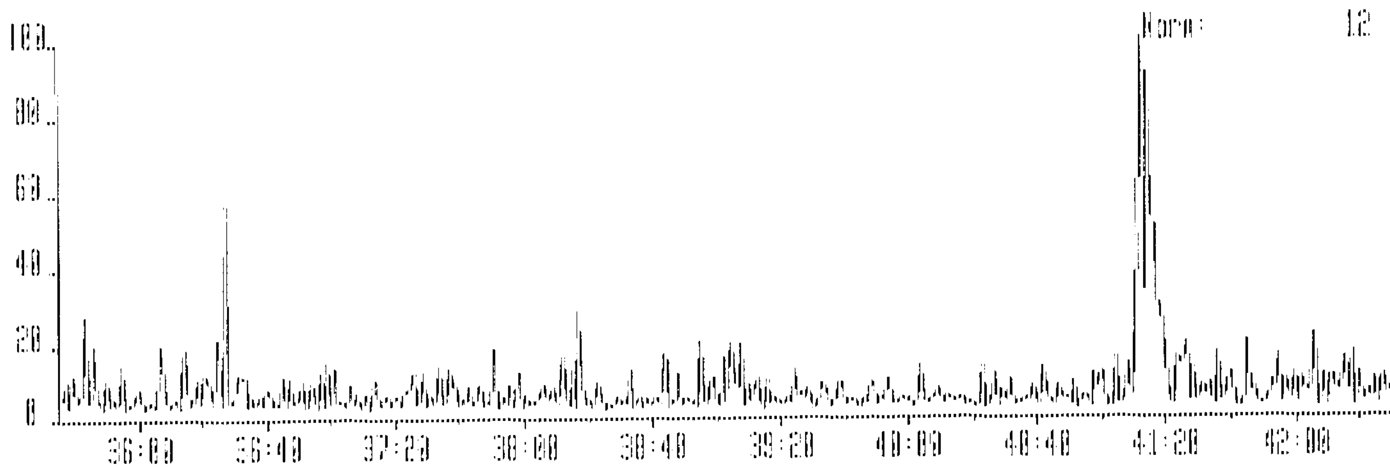
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 437.8140
Text:2727,2728,2730 TL1420522A



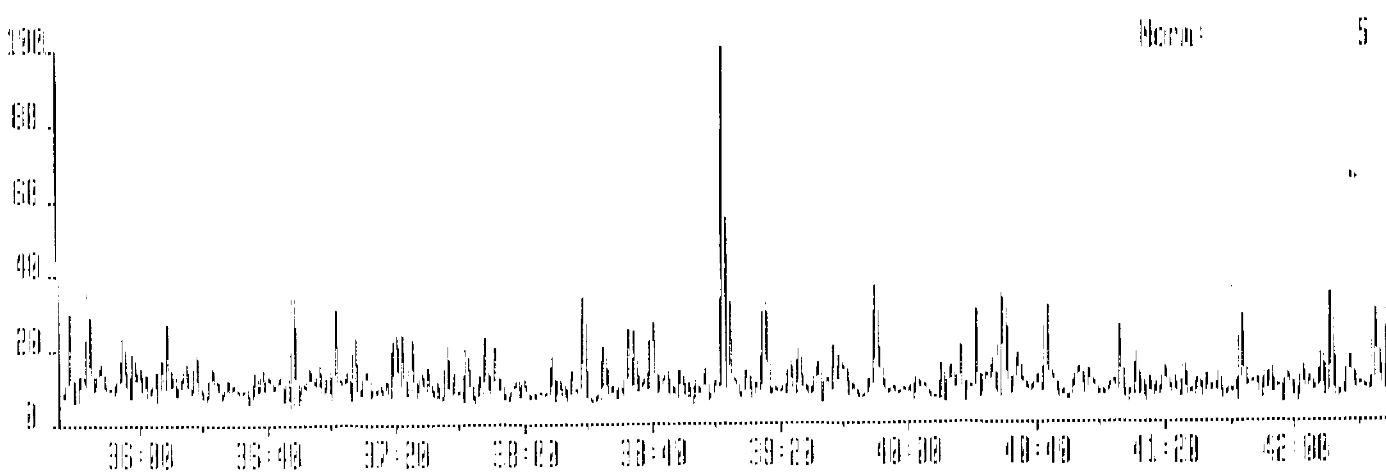
S921620 4-APR-92 Sir Voltage 705 Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1020522A



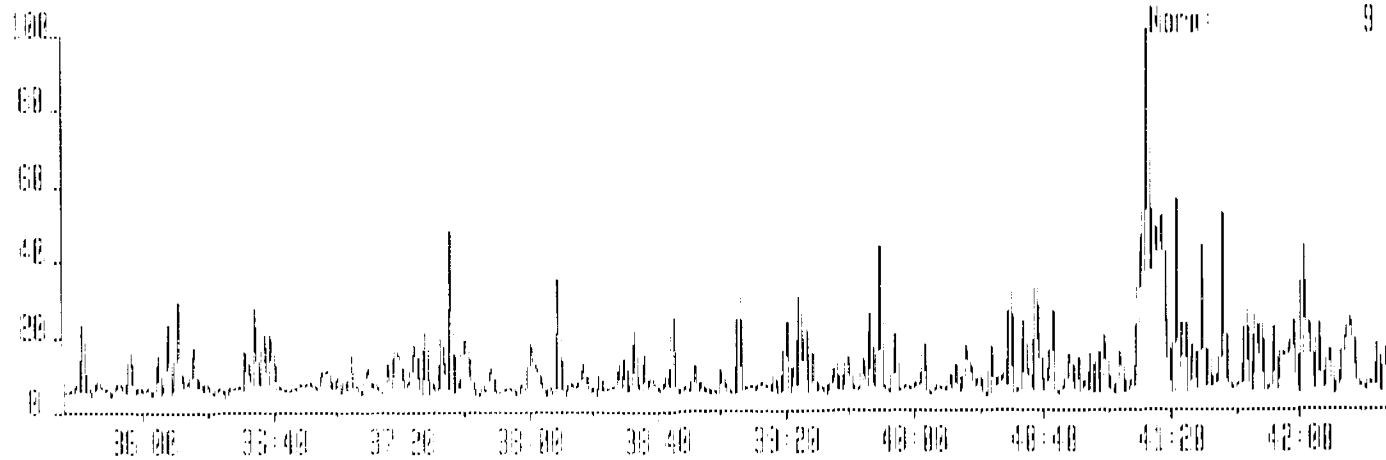
S921620 4-APR-92 Sir Voltage 705 Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1020522A



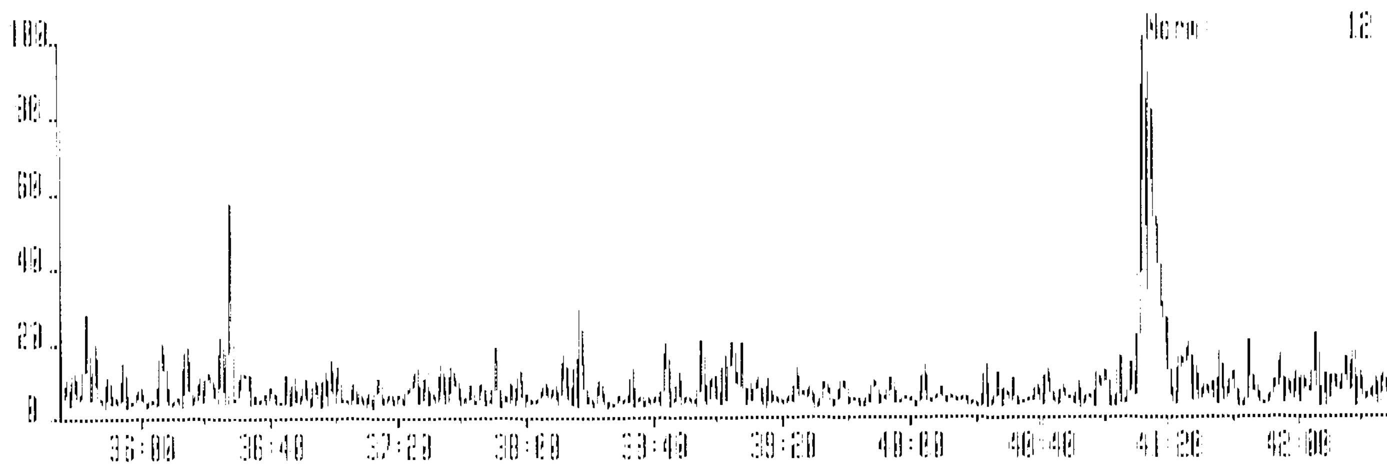
S921620 4-APR-92 Sir:Voltage 705 Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1420522A



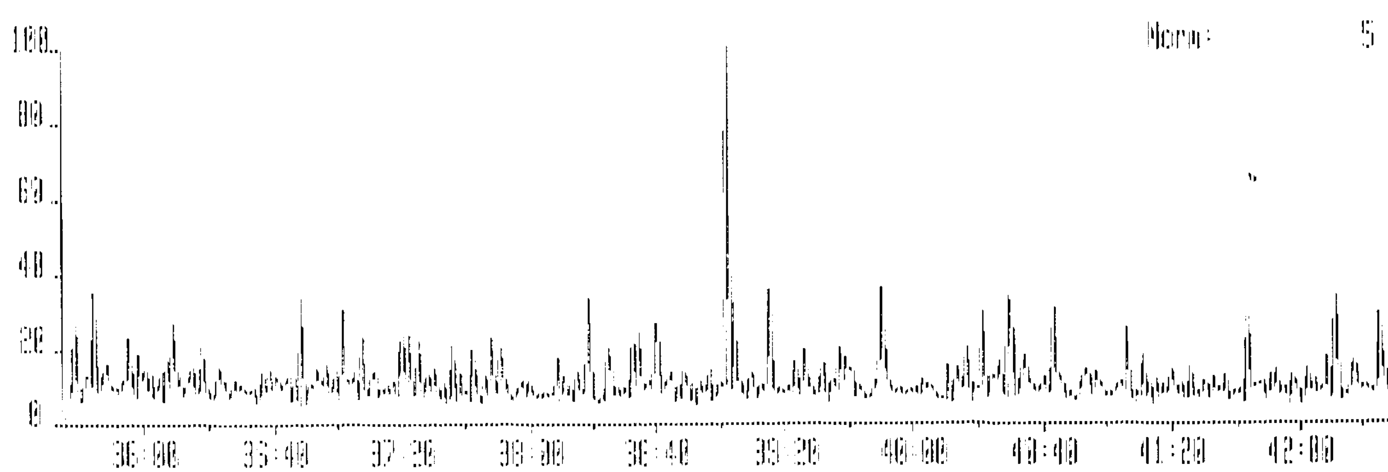
S921620 4-APR-92 Sir Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1B205228



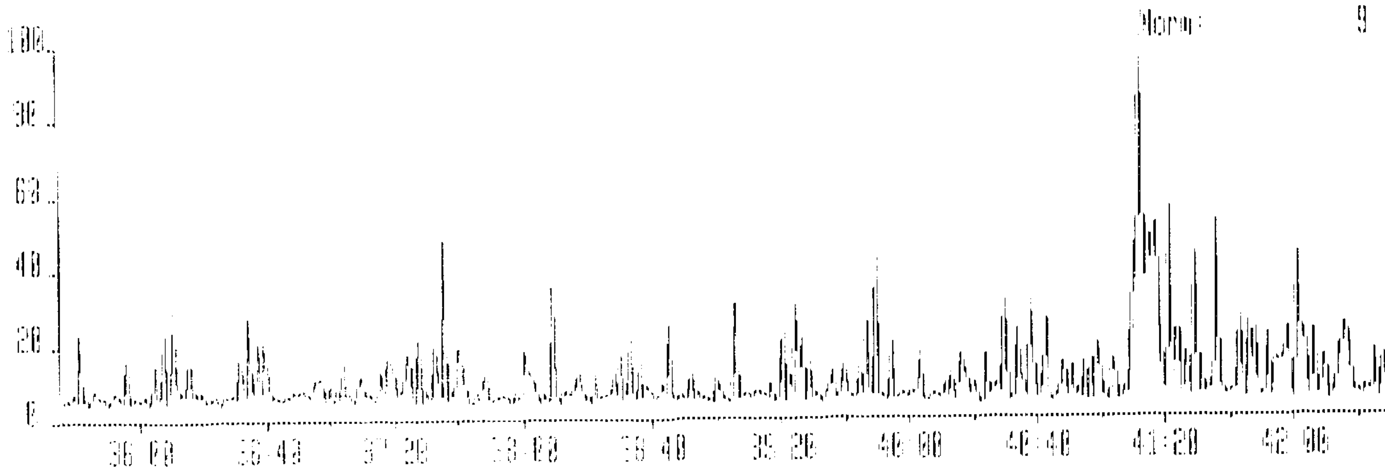
S921620 4-APR-92 Sir Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1B205228



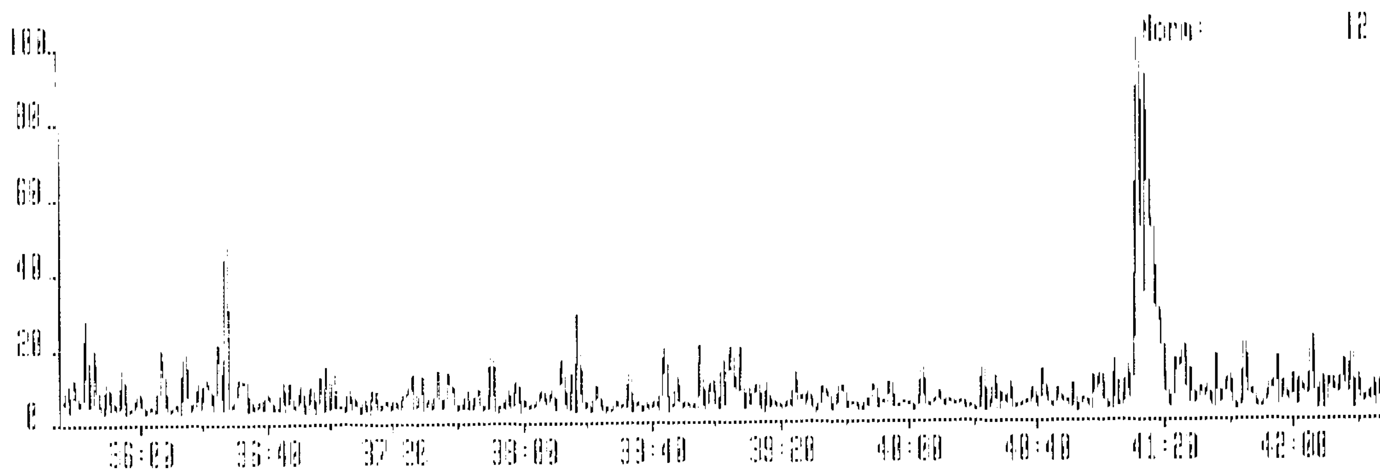
S921620 4-APR-92 Sir Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1B205228



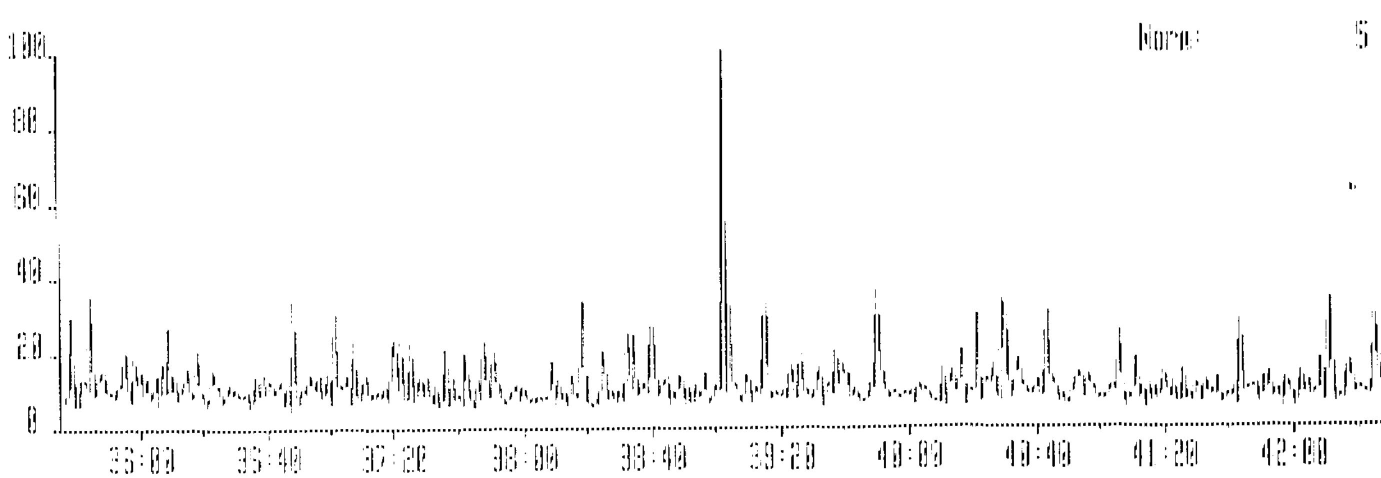
S921620   4-APR-92   Sir Voltage 705   Sys: M0850S
Sample 1   Injection 1   Group 4   Mass 441.7428
Text:2727,2728,2730 TLI0205228



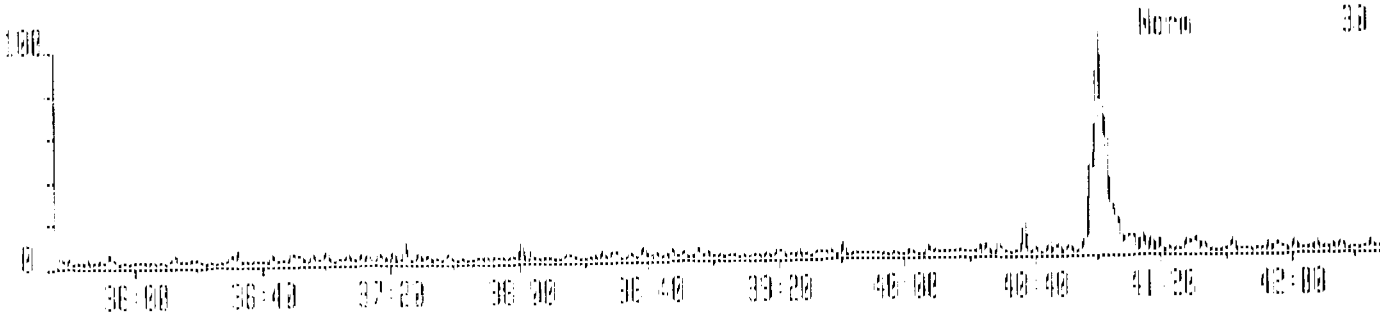
S921620   4-APR-92   Sir Voltage 705   Sys: M0850S
Sample 1   Injection 1   Group 4   Mass 443.7399
Text:2727,2728,2730 TLI0205228



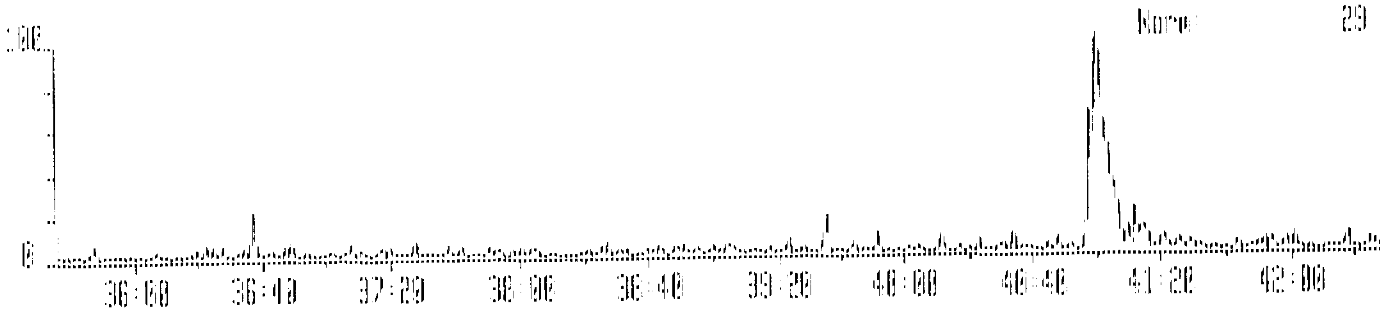
S921620   4-APR-92   Sir:Voltage 705   Sys: M0850S
Sample 1   Injection 1   Group 4   Mass 513.6775
Text:2727,2728,2730 TLI0205228



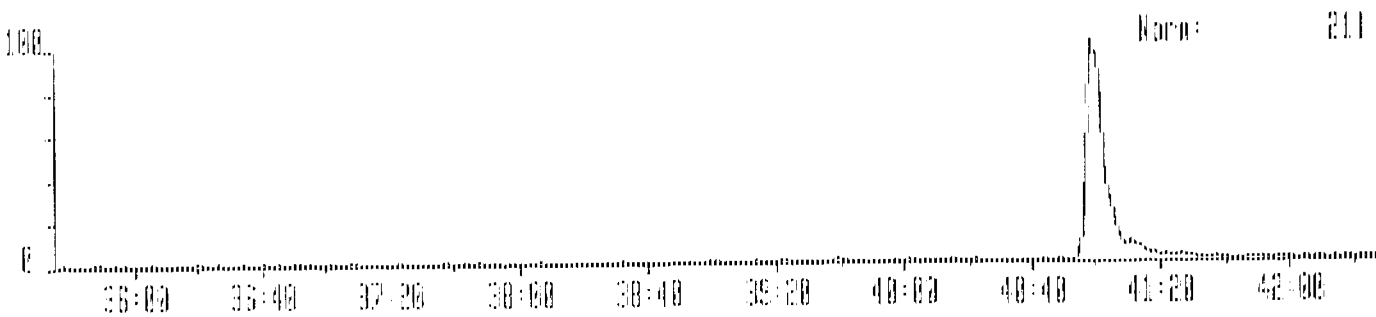
S921620 4-APR-92 Sir:Voltage 70S Sys: NOE5US
Sample 1 Injection 1 Group 4 Mass 457.7377
Text:2727,2728,2730 TL1N205228



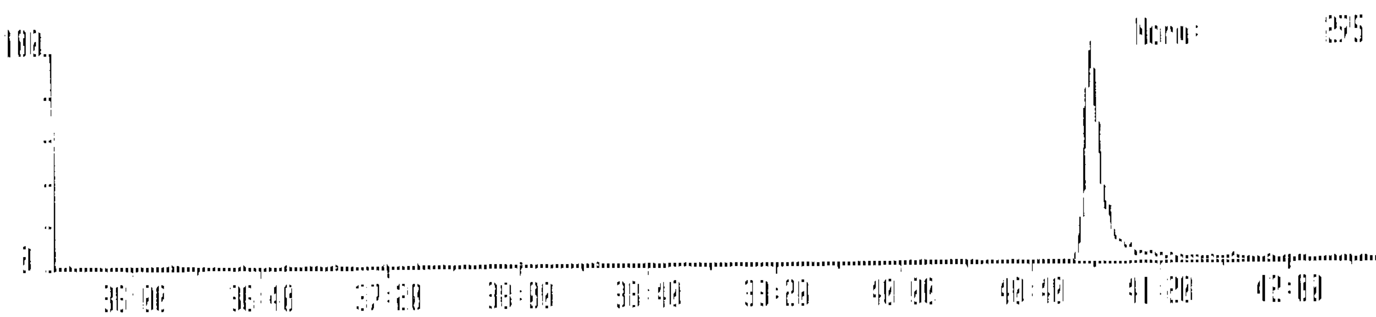
S921620 4-APR-92 Sir:Voltage 70S Sys: NOE5US
Sample 1 Injection 1 Group 4 Mass 459.7348
Text:2727,2728,2730 TL1N205228



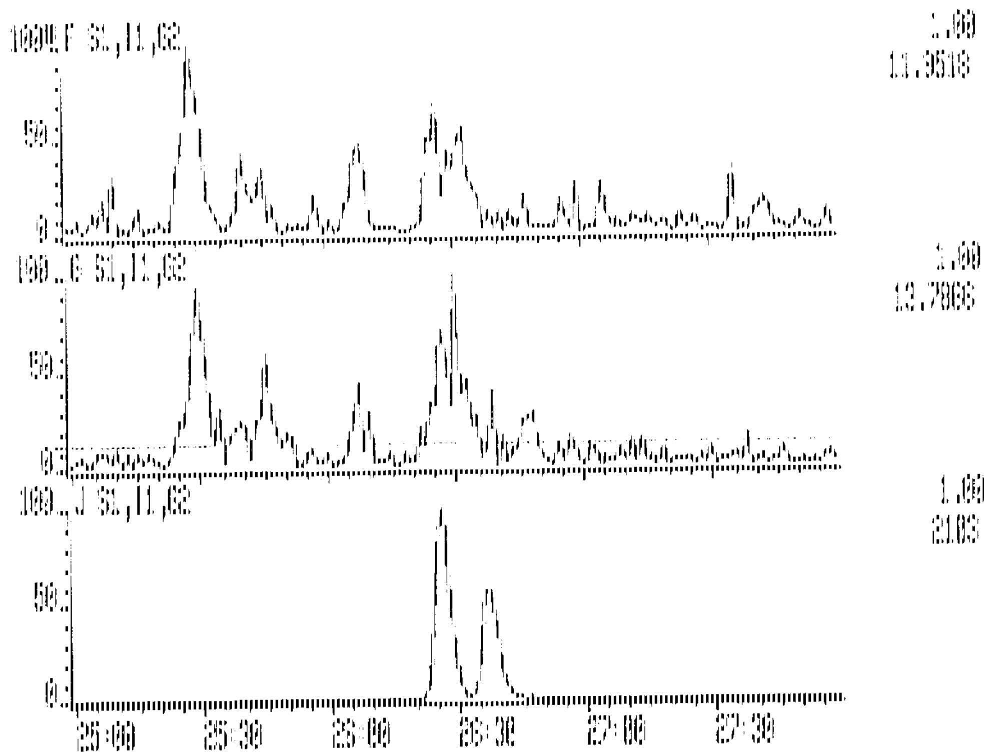
S921620 4-APR-92 Sir:Voltage 70S Sys: NOE5US
Sample 1 Injection 1 Group 4 Mass 469.7779
Text:2727,2728,2730 TL1N205228



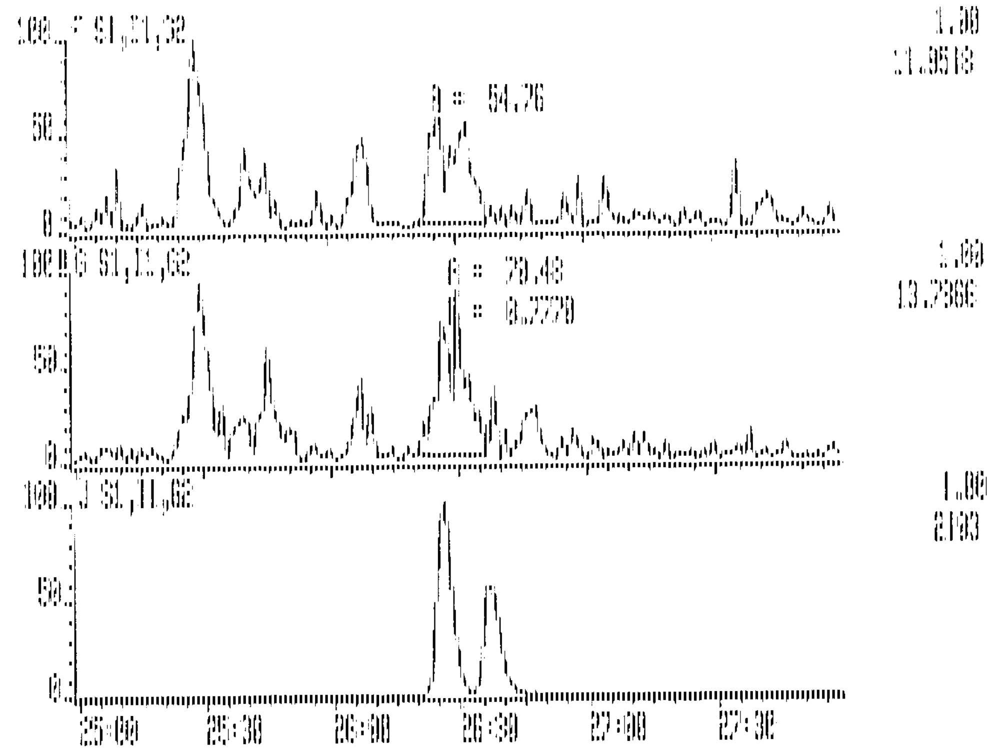
S921620 4-APR-92 Sir:Voltage 70S Sys: NOE5US
Sample 1 Injection 1 Group 4 Mass 471.7750
Text:2727,2728,2730 TL14205230



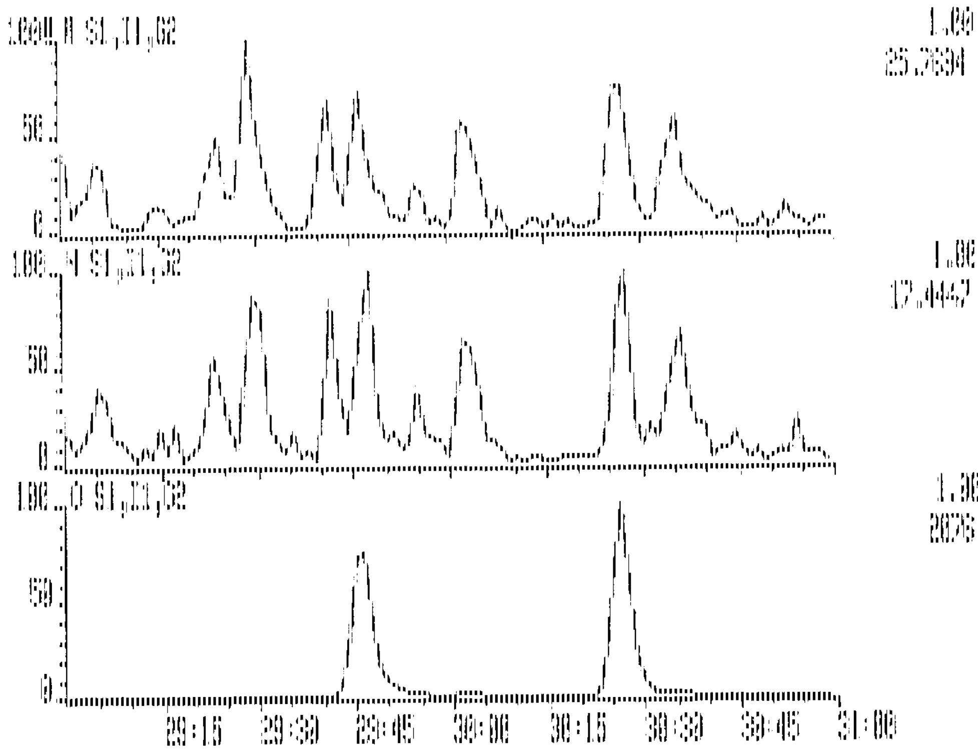
S921520 4-APR-92 14:25 2:05 (EI-) Sys:NOBSUS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL102052-2A



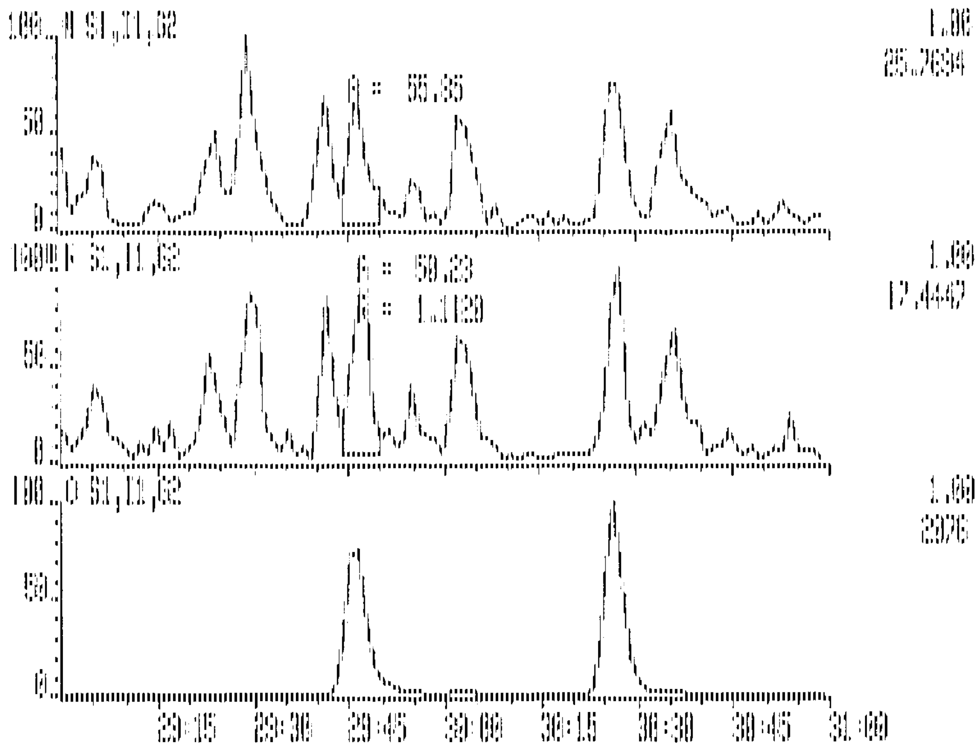
S921620 4-APR-92 14 25 70S (EI+) Sys:NOE5US
GR 2 T: 319.8965 G: 321.8936 F: 327.8847 I: 339.9792 J: 331.9368
Text:2727,2728,2730 T.30205228



S921620 4-APR-92 14:25 70S (EI+) Sys:HD8SUG
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TLH20522A



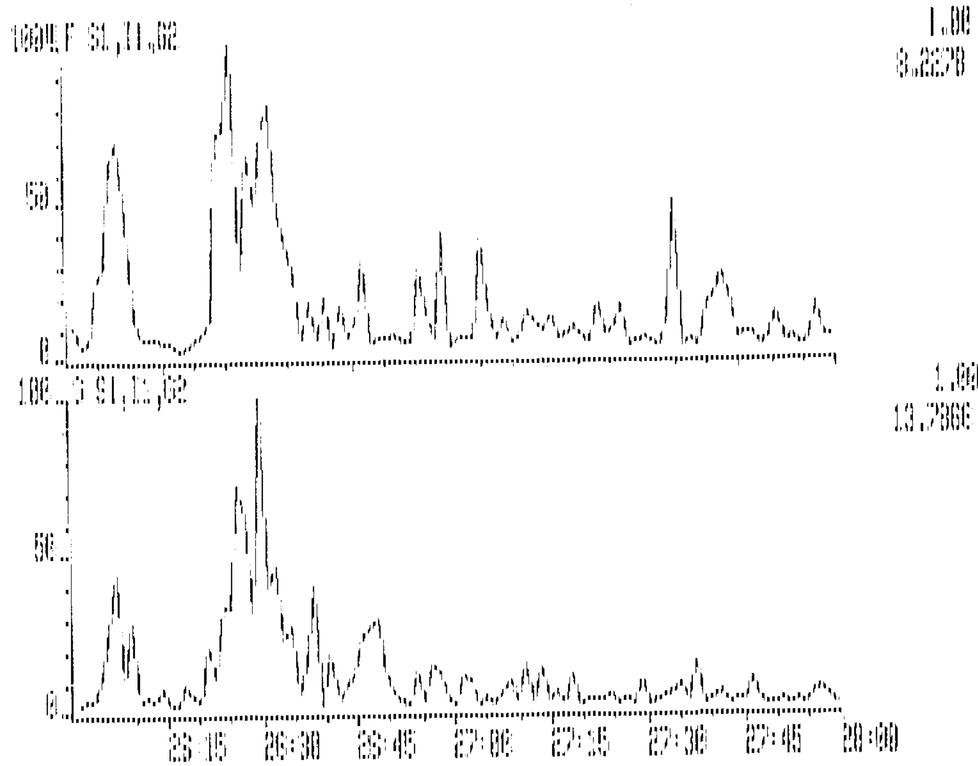
S921620   4-APR-92 14:25 709   (EI+)   Sys:NOBSUS
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TL1HB2052ZA



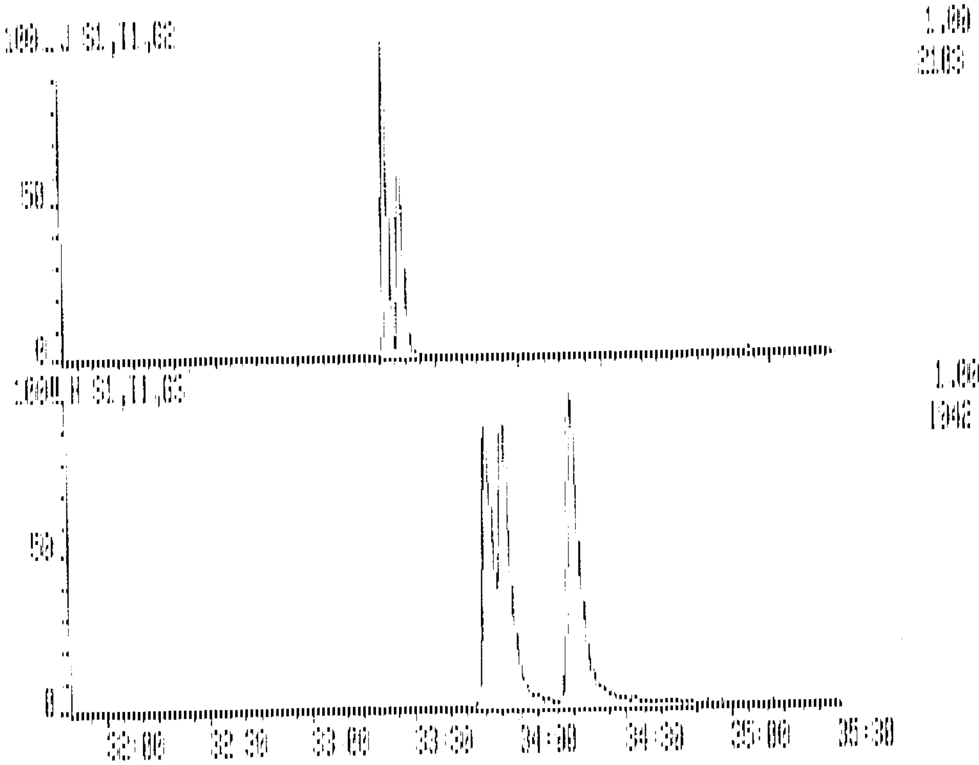
S921620 4-APR-92 14:25 70S (EI+) Sys:NC85US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1020522A

Verified by ICP(?): 4-4-92

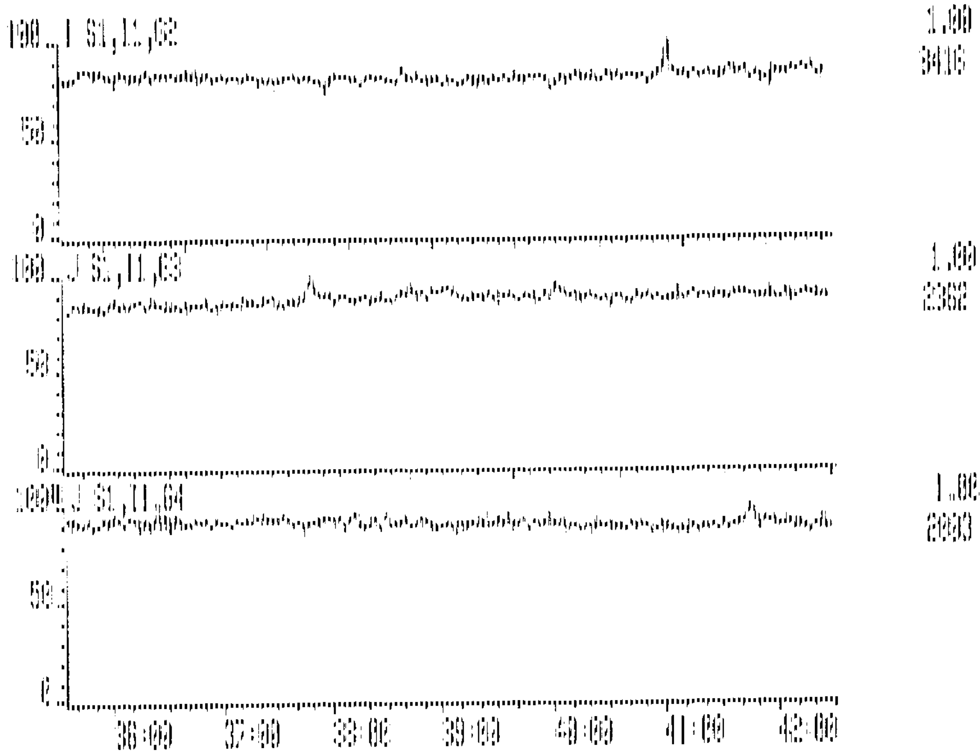
Verified by Gnt. QC(?):



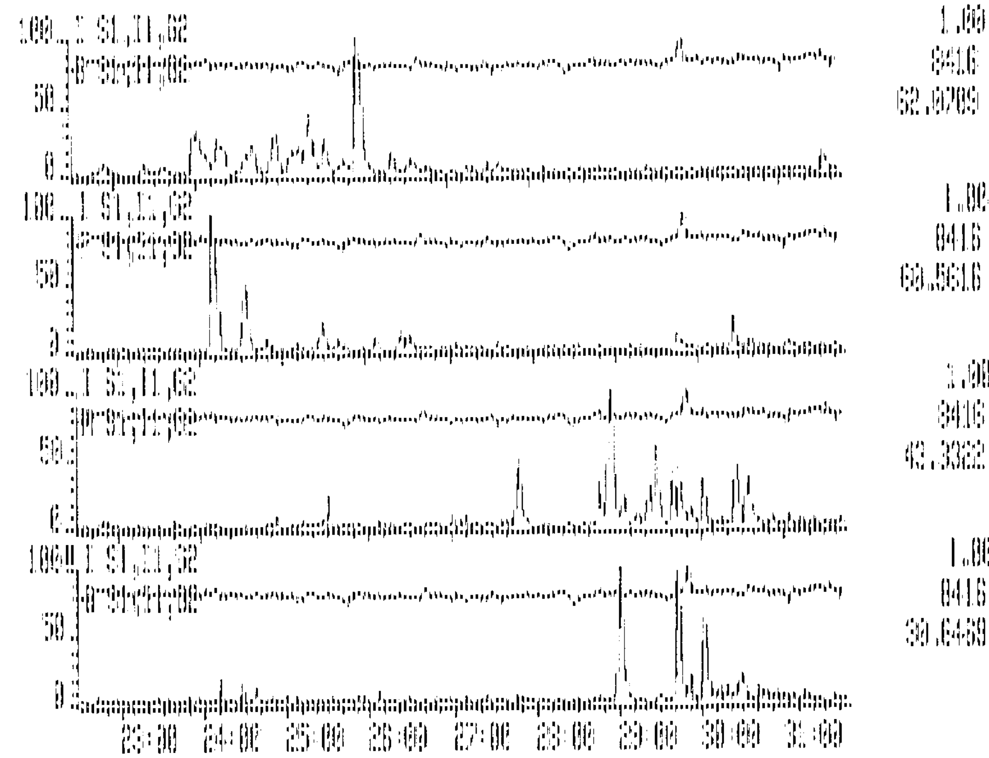
S921620 4-APR-92 14:25 70S (EI+) Sys:HDB5US
GR. 3 F: 391.0127 G: 392.9760 H: 401.0558 I: 403.8529 J: 430.9729
Text:2727,2728,2730 TLT4205229



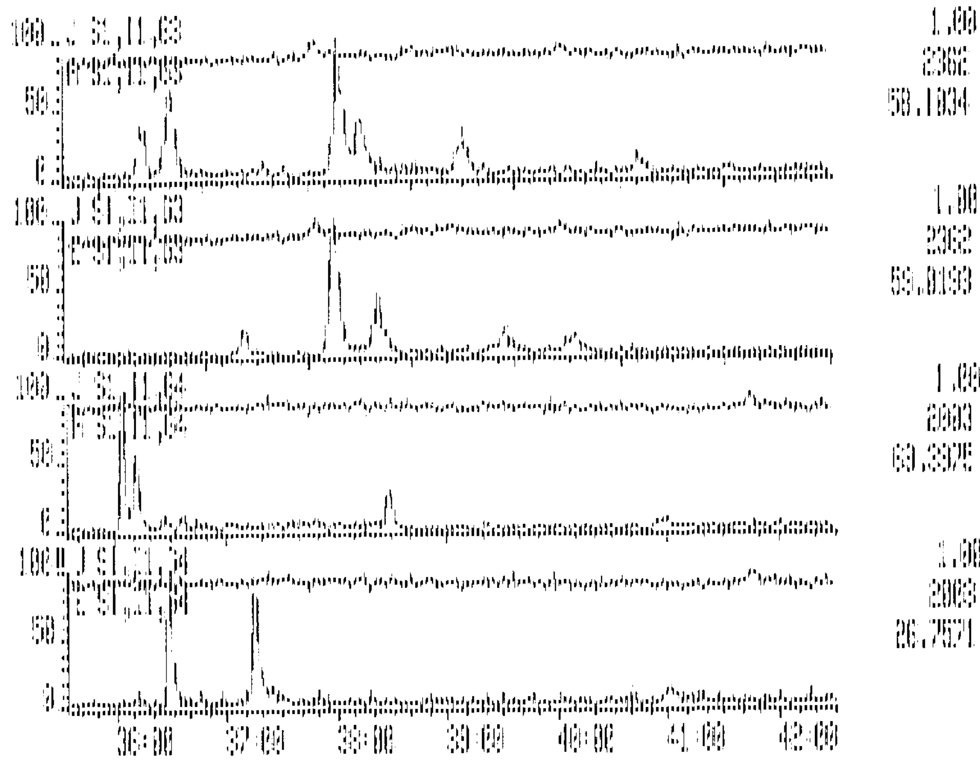
S921620 4-APR-92 14:25 70S (EI+) Sys:N0B5US
GR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TL1I20522P



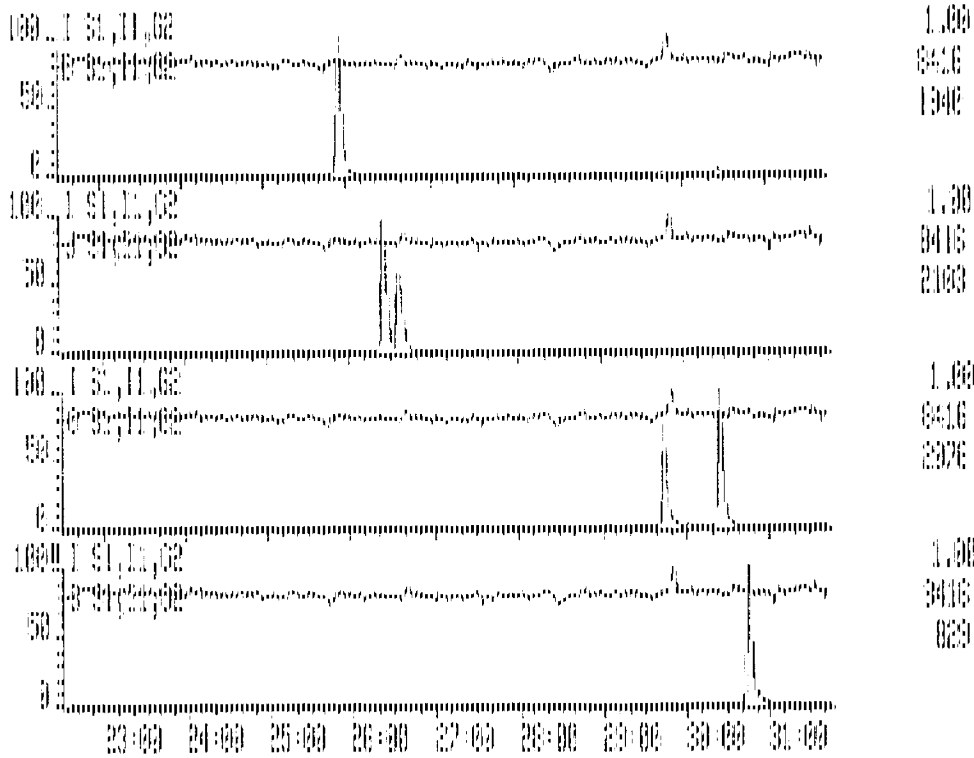
S921620 4-APR-92 14:25 70S (1:4) Sys:NOB5LG
GR 2 F: 315.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1B205226



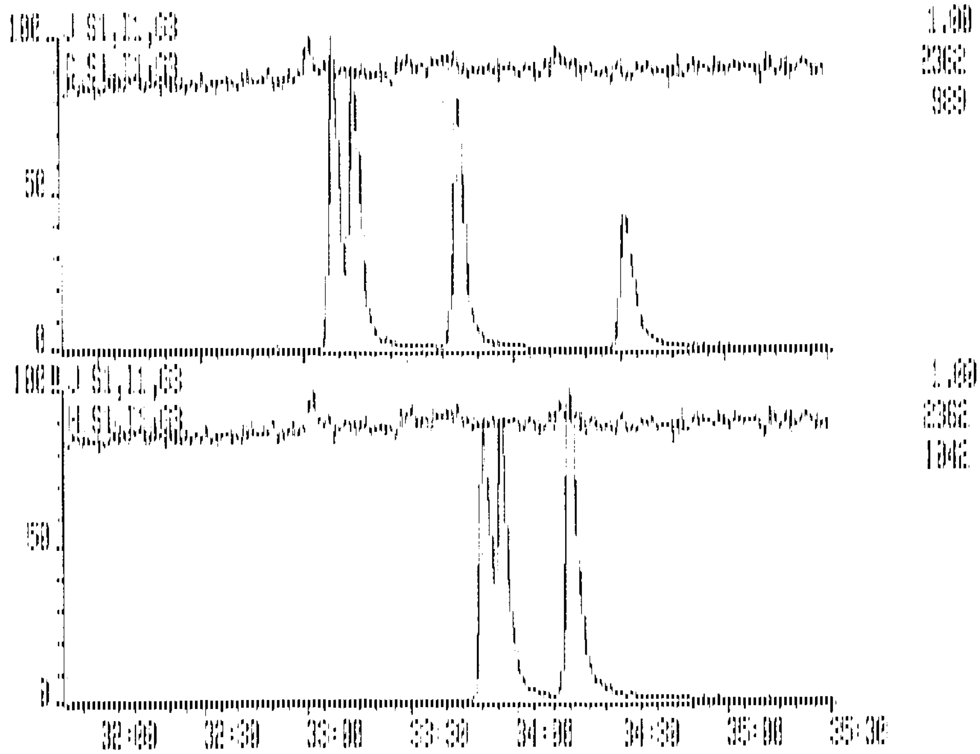
S921520 4-APR-92 14:25 70S (EI+) Sys NOBSUS
GR 4 F: 425.7737 G: 430.9729 H: 435.8369 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TL1182052A



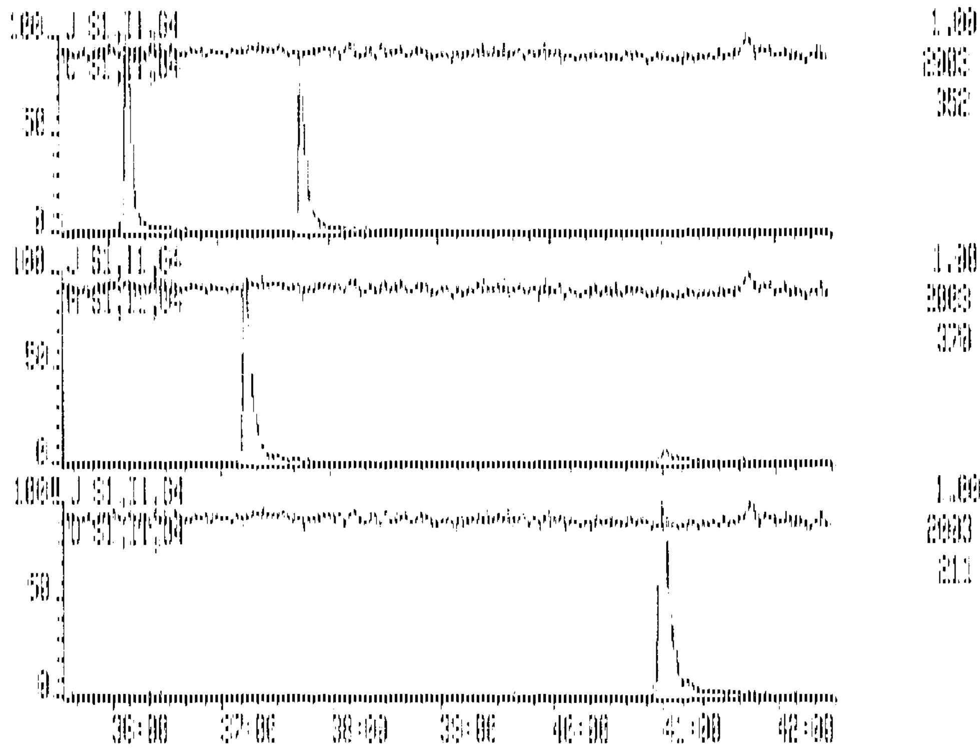
S921620 4-APR-92 14:25 706 (EI+) Sys:NOE5JS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9363
Text:2727,2728,2730 TL1420522A



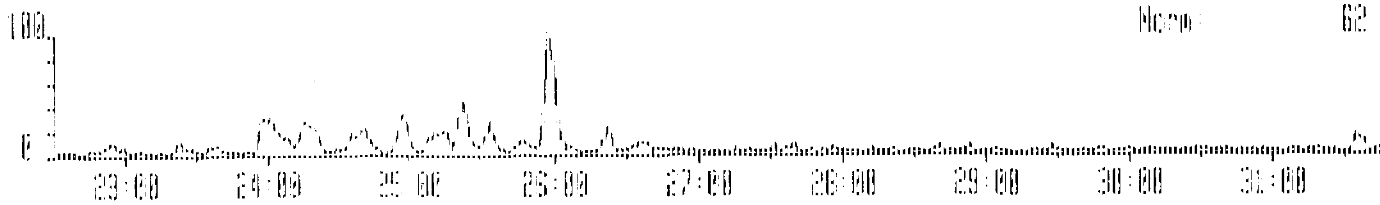
S921620   4-APR-92 14:25 70S   (EI+)   Sys:NOD5US
GR 3 F: 391.3127 G: 392.9760 H: 401.8558 I: 403.8529 J: 430.9729
Text:2727,2728,2730 T:1020522A



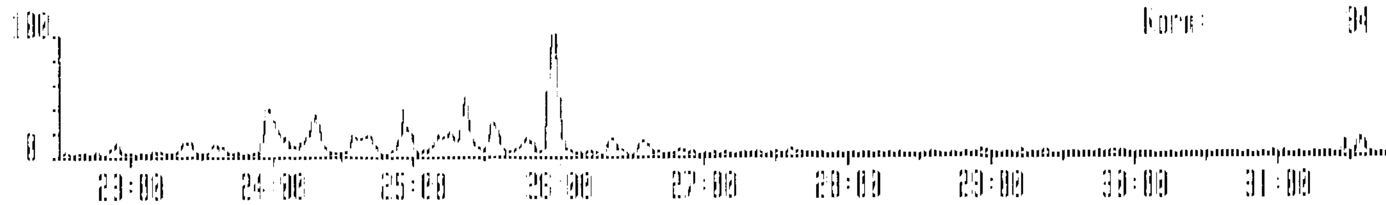
S921520 4-APR-92 14:25 705 (EI+) Sys:HDB5JS
SR 4 F: 425.7737 D: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2727,2726,2730 TLH20522A



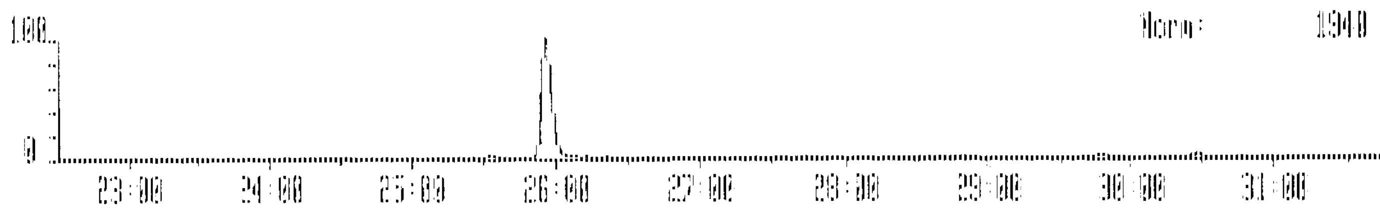
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TL1820522A



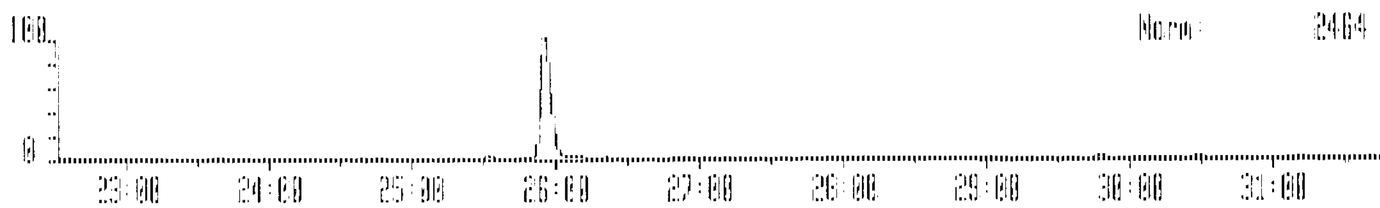
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TL1820522A



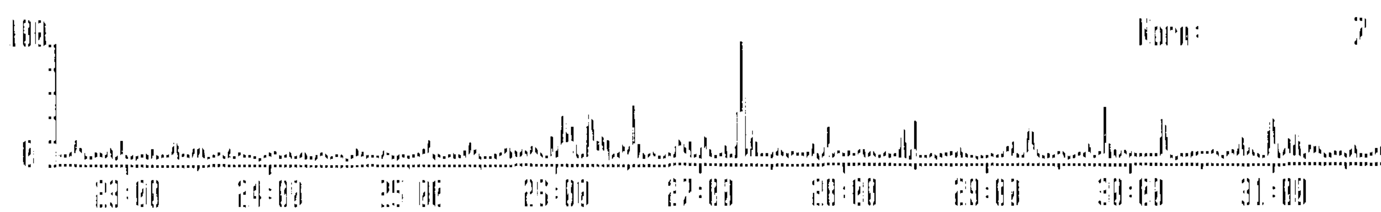
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TL1820522A



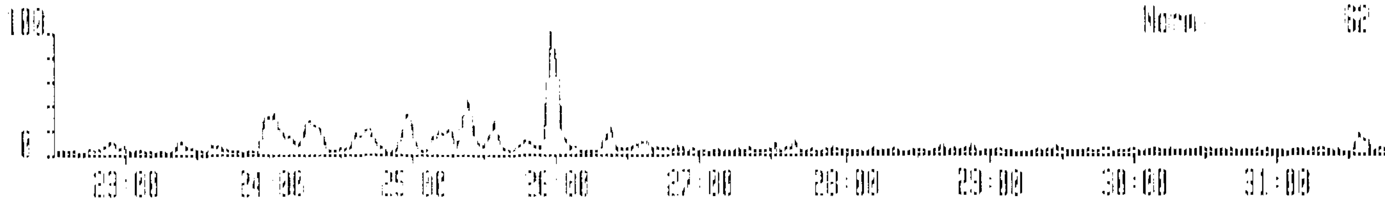
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TL1820522A



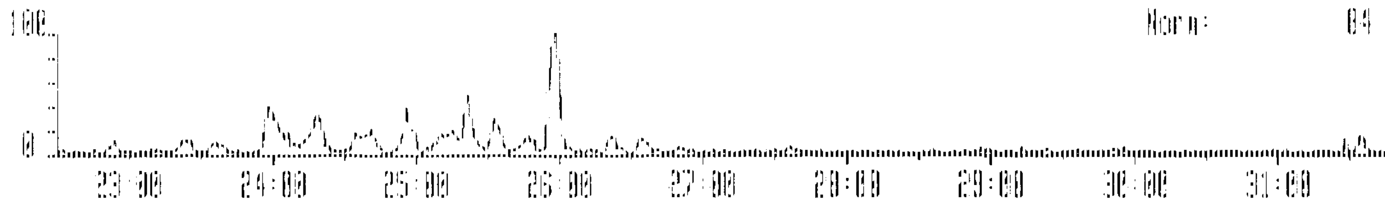
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TL1820522A



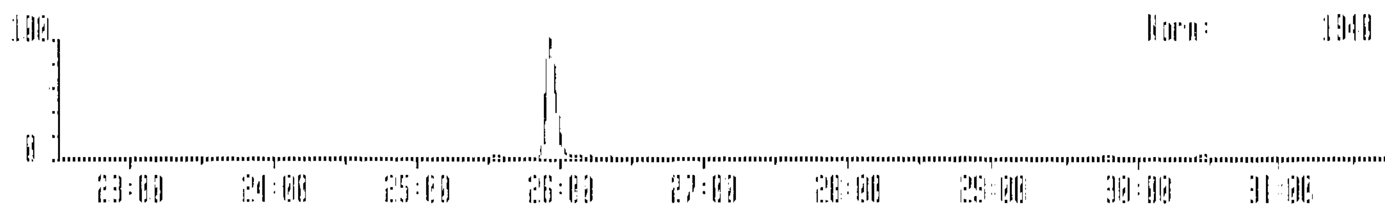
S921620 4-APR-92 Sir:Voltage 70S Sys: ND05US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TLI4205228



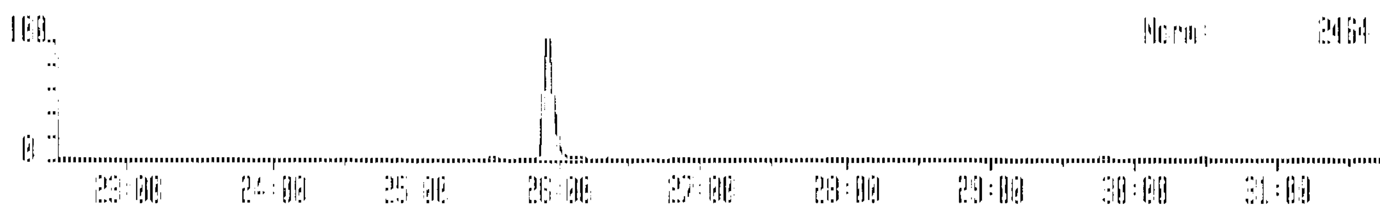
S921620 4-APR-92 Sir:Voltage 70S Sys: ND05US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TLI4205228



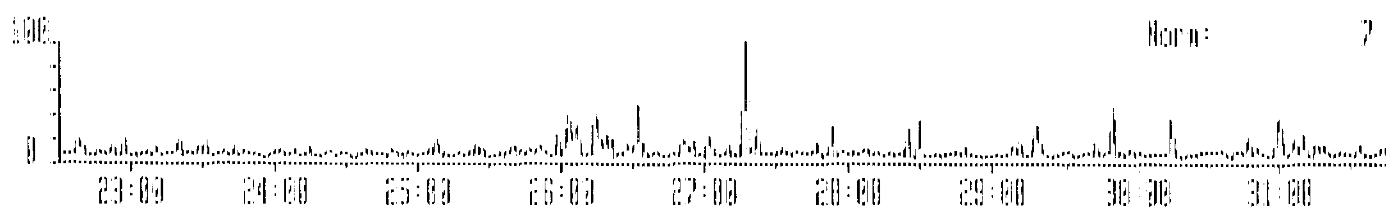
S921620 4-APR-92 Sir:Voltage 70S Sys: ND05US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TLI4205228



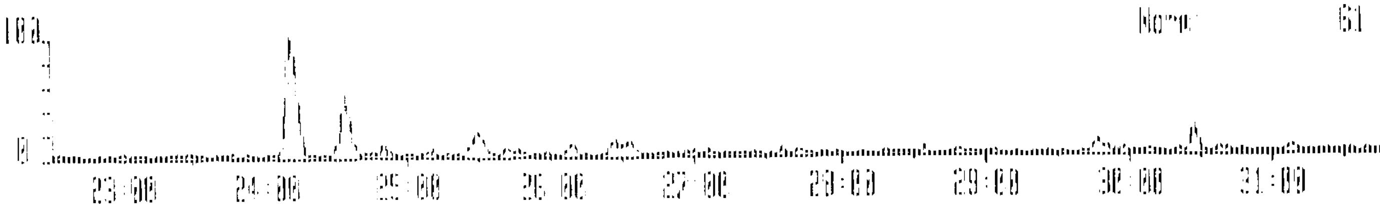
S921620 4-APR-92 Sir:Voltage 70S Sys: ND05US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TLI4205228



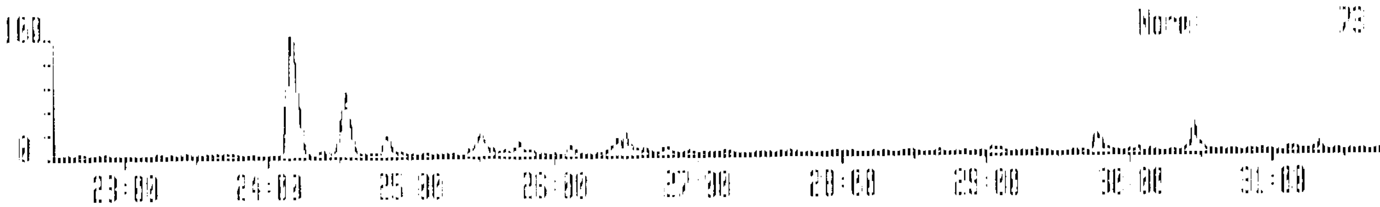
S921620 4-APR-92 Sir:Voltage 70S Sys: ND05US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TLI4205228



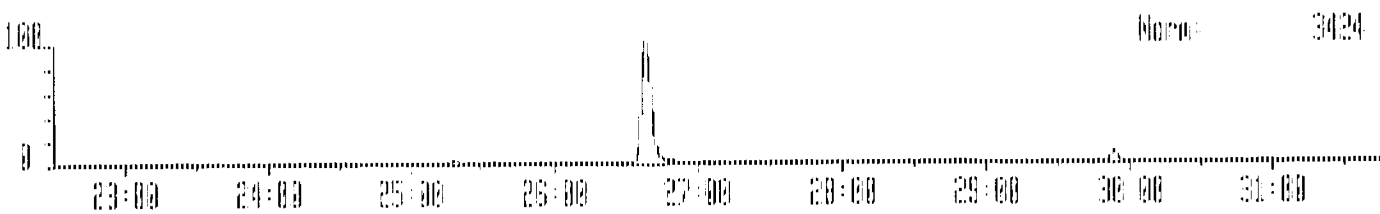
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 319.8965
Text:2727,2728,2730 TL1H205228



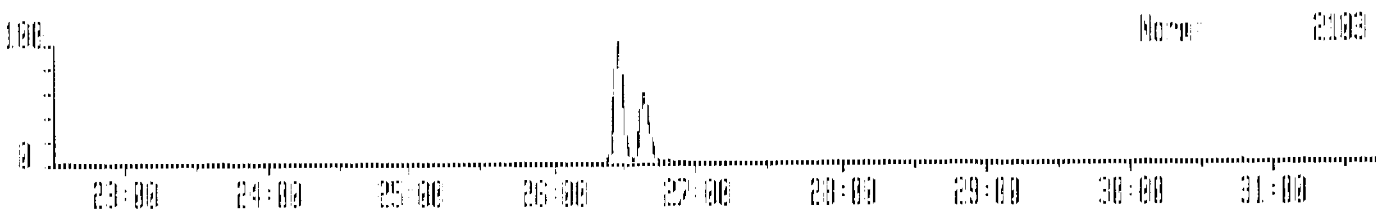
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 321.8935
Text:2727,2728,2730 TL1H205228



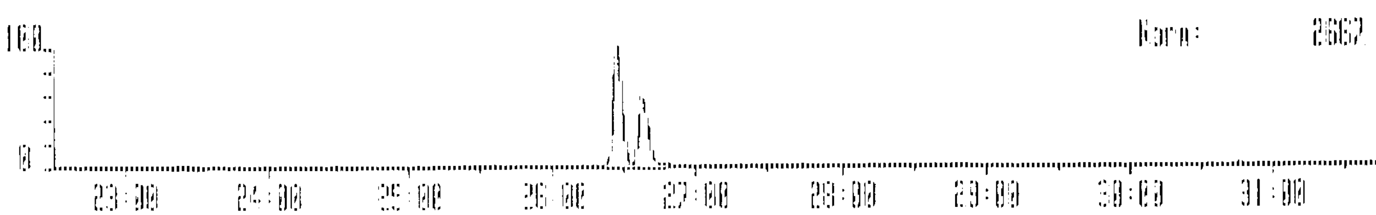
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 327.8847
Text:2727,2728,2730 TL1H205228



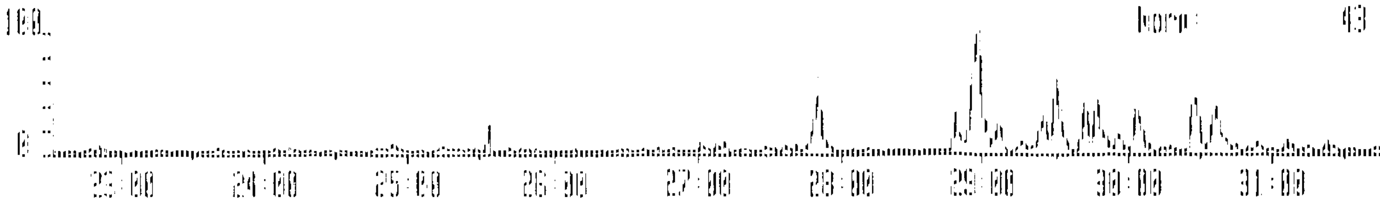
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 331.9368
Text:2727,2728,2730 TL1H205228



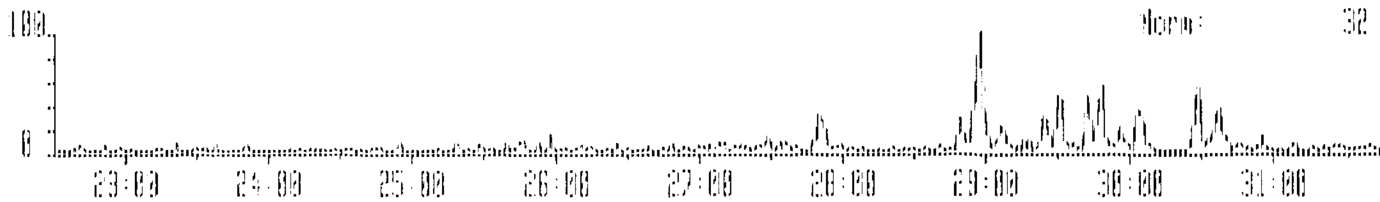
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 333.9338
Text:2727,2728,2730 TL1H205228



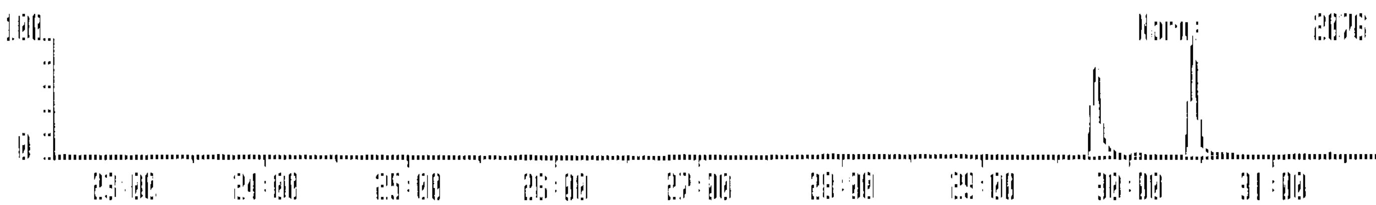
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 339.8597
Text:2727,2728,2730 TL1#20522A



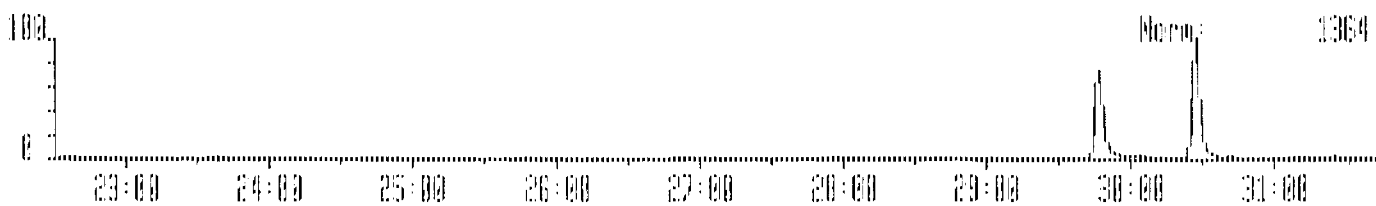
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 341.8567
Text:2727,2728,2730 TL1#20522A



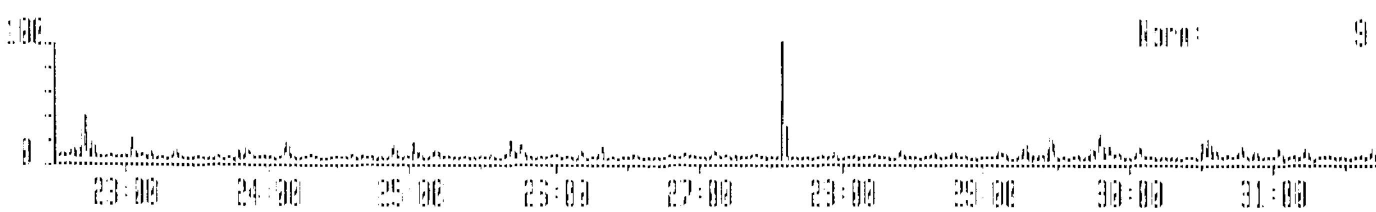
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 351.9000
Text:2727,2728,2730 TL1#20522A



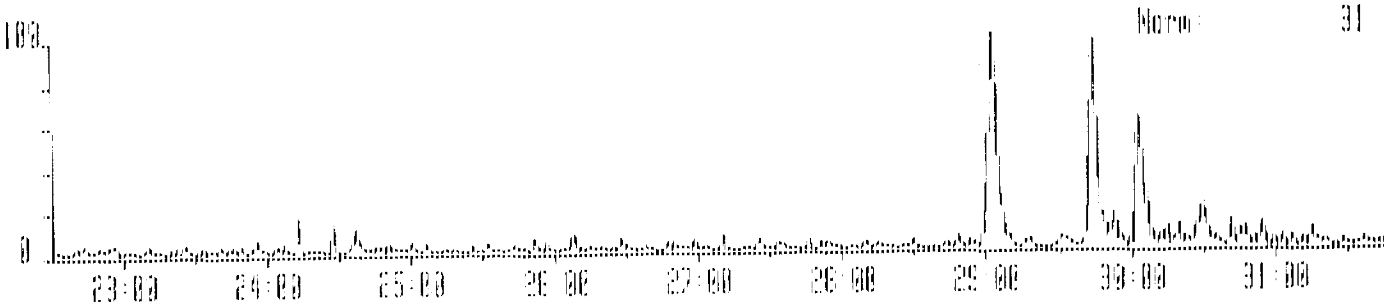
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 353.8970
Text:2727,2728,2730 TL1#20522A



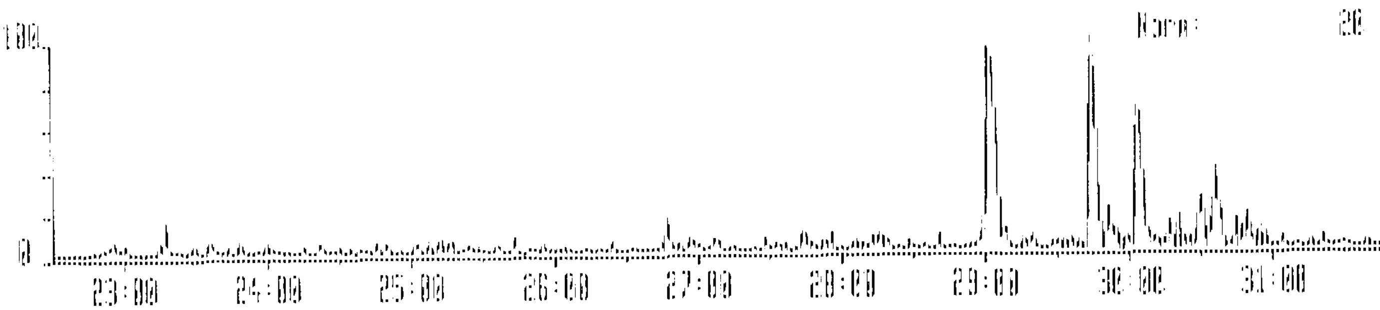
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 409.7974
Text:2727,2728,2730 TL1#20522A



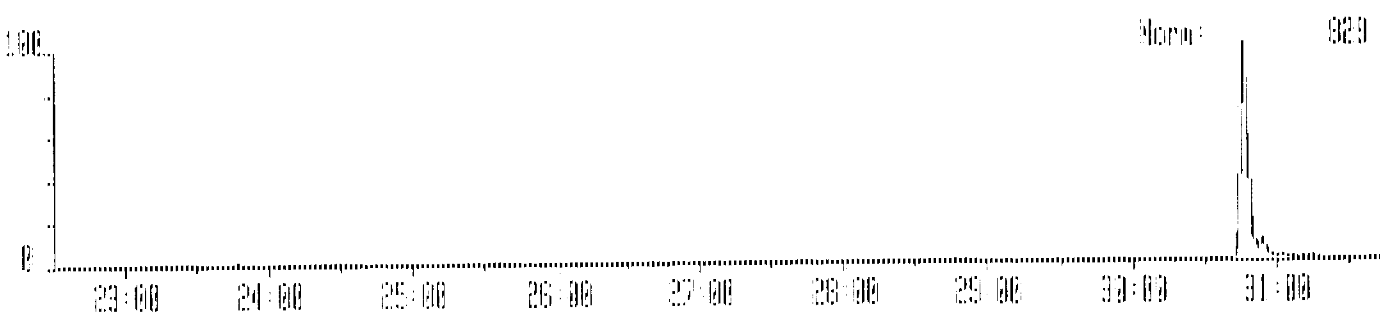
S921620 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 2 Mass 355.8546
Text:2727,2728,2730 TLIH205229



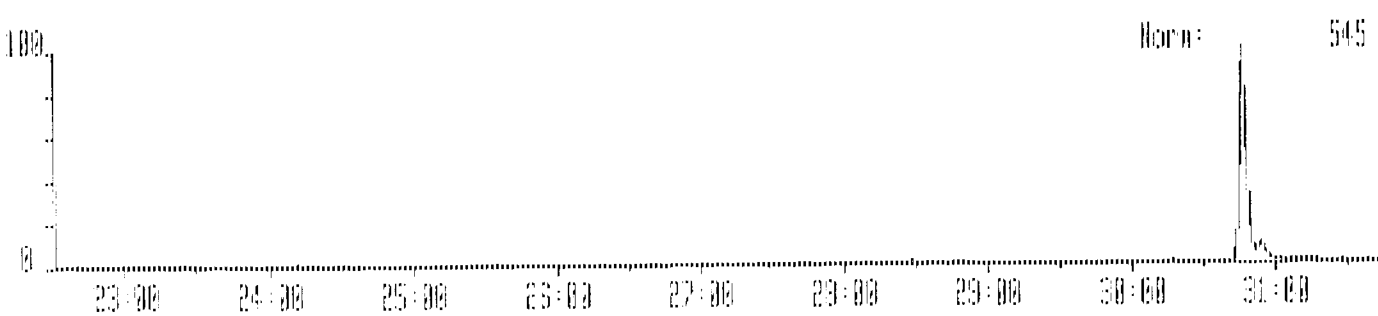
S921620 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 2 Mass 357.8516
Text:2727,2728,2730 TLIH205229



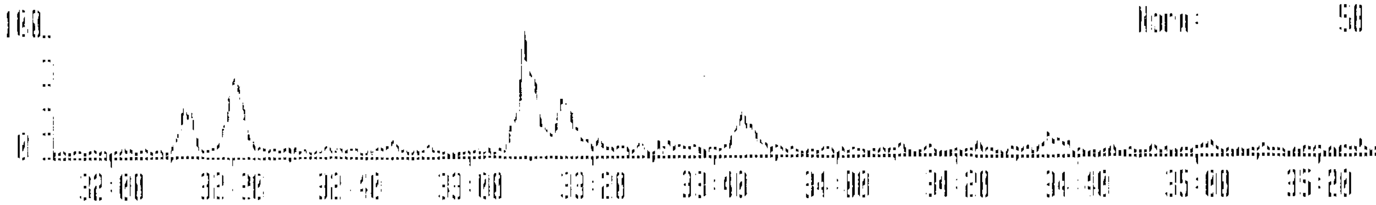
S921620 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 2 Mass 367.8949
Text:2727,2728,2730 TLIH205229



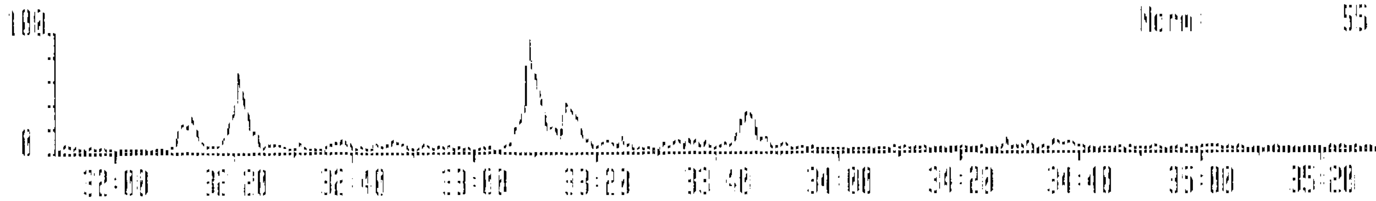
S921620 4-APR-92 Sir:Voltage 70S Sys: MDB5US
Sample 1 Injection 1 Group 2 Mass 369.8919
Text:2727,2728,2730 TLIH205229



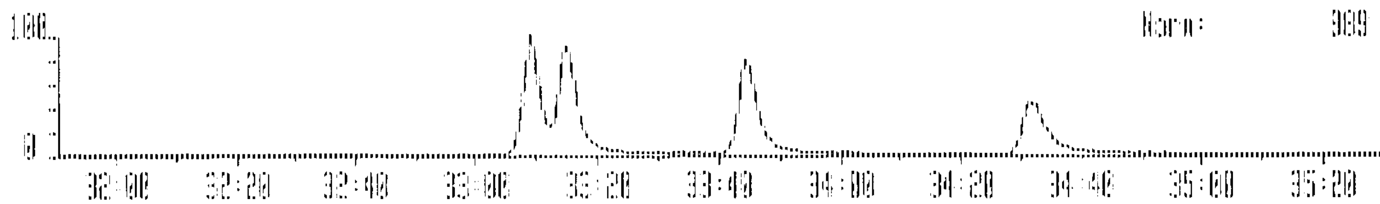
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 3 Mass 373.3208
Text:2727,2728,2730 TL1020522A



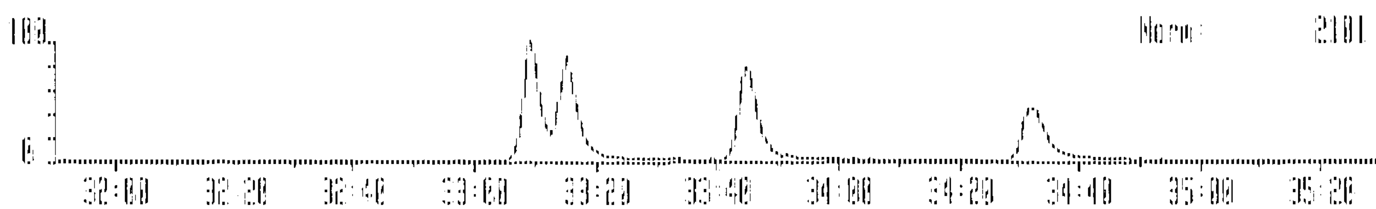
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 3 Mass 375.8178
Text:2727,2728,2730 TL1020522A



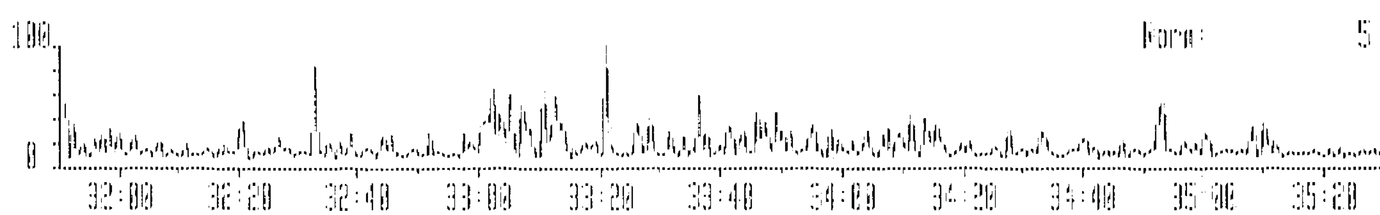
S921620 4-APR-92 Sir:Voltage 70S Sys: ND35US
Sample 1 Injection 1 Group 3 Mass 383.6639
Text:2727,2728,2730 TL1020522A



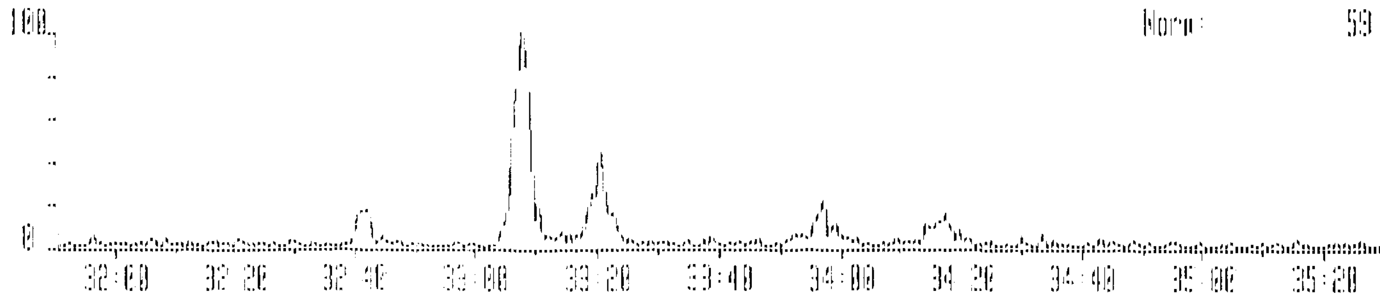
S921620 4-APR-92 Sir:Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 3 Mass 395.8610
Text:2727,2728,2730 TL1020522A



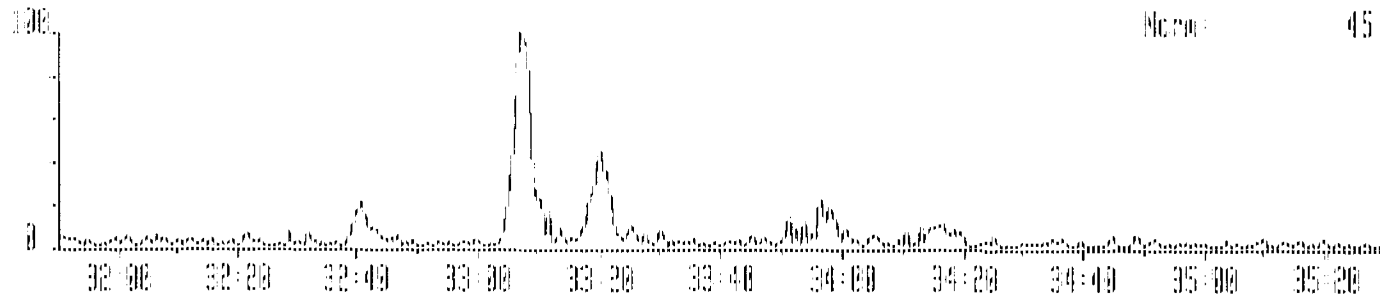
S921620 4-APR-92 Sir:Voltage 70S Sys: ND35US
Sample 1 Injection 1 Group 3 Mass 445.7555
Text:2727,2728,2730 TL1020522A



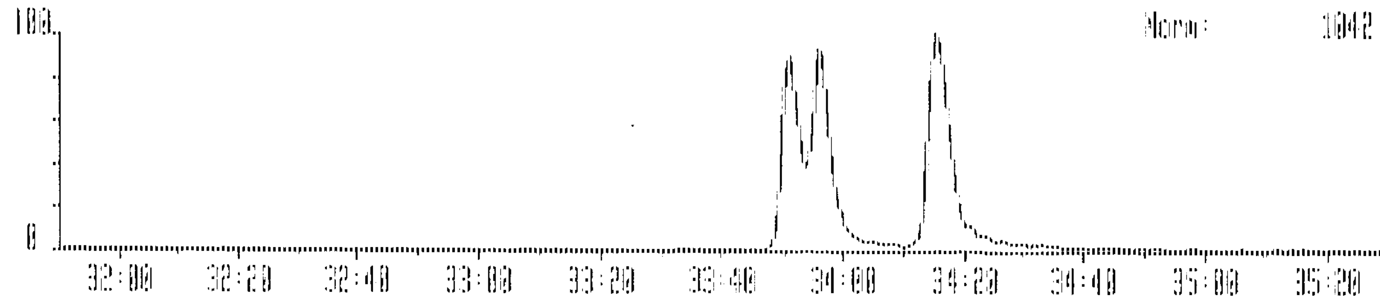
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 389.8156
Text:2727,2728,2730 TL1#20522A



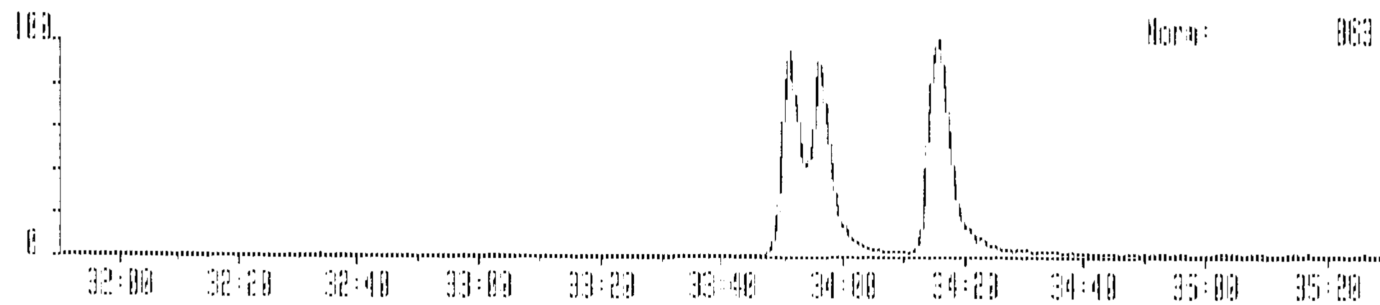
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 391.8127
Text:2727,2728,2730 TL1#20522A



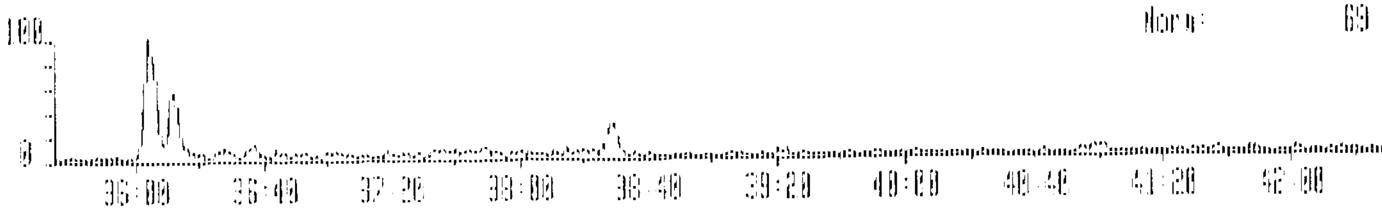
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 401.8558
Text:2727,2728,2730 TL1#20522A



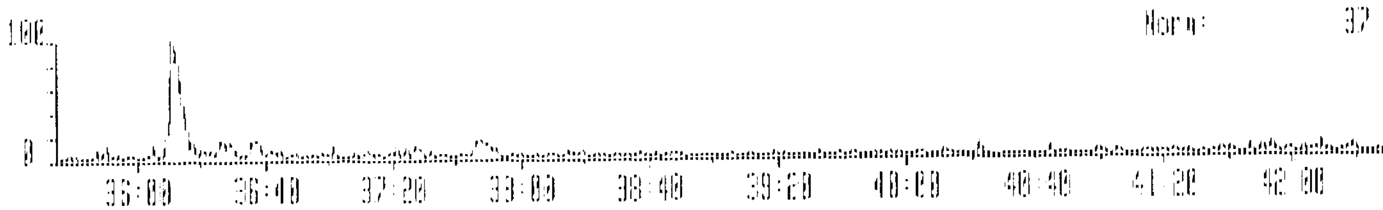
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 403.8529
Text:2727,2728,2730 TL1#20522A



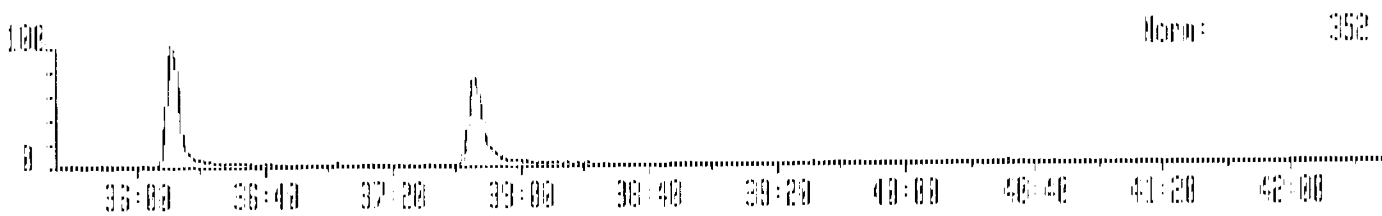
S921620 4-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 407.7810
Text:2727,2728,2730 TLI#20522A



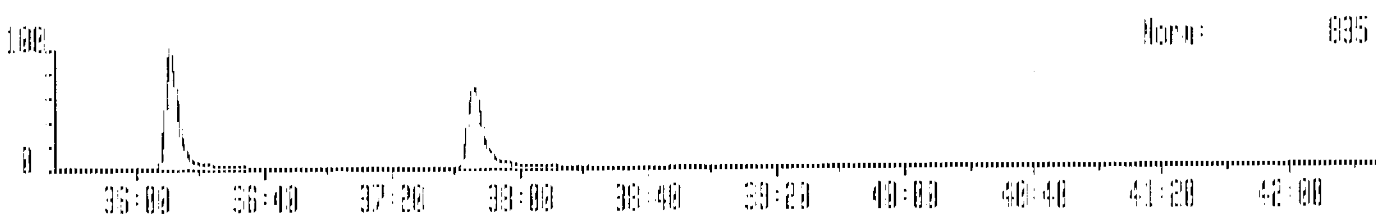
S921620 4-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 409.7785
Text:2727,2728,2730 TLI#20522A



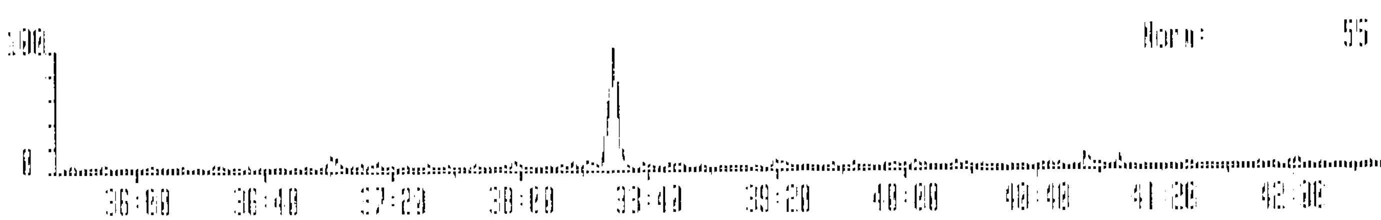
S921620 4-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 417.8253
Text:2727,2728,2730 TLI#20522A



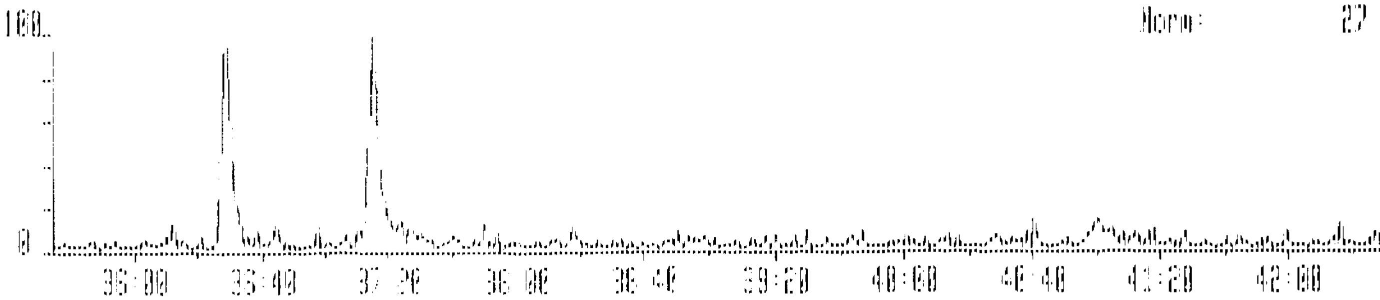
S921620 4-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 419.8220
Text:2727,2728,2730 TLI#20522A



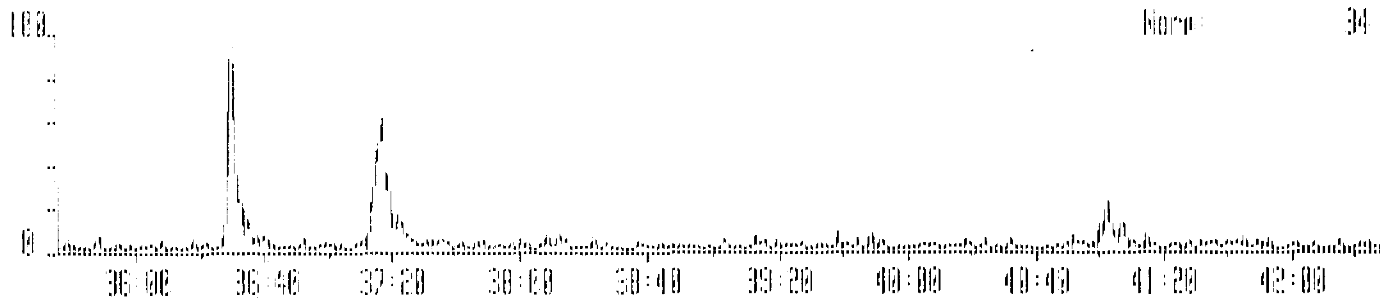
S921620 4-APR-92 Str Voltage 70S Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 479.7165
Text:2727,2728,2730 TLI#20522A



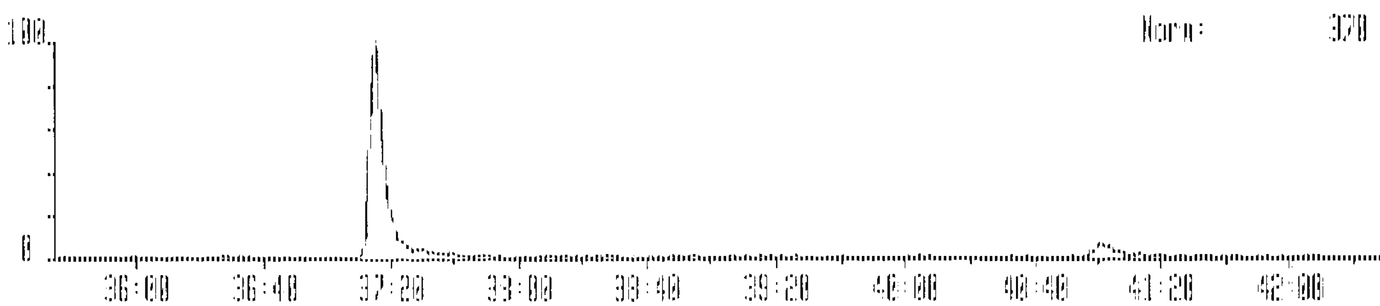
S921620 4-APR-92 Str Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 423.7766
Text:2727,2728,2730 TL1A20522A



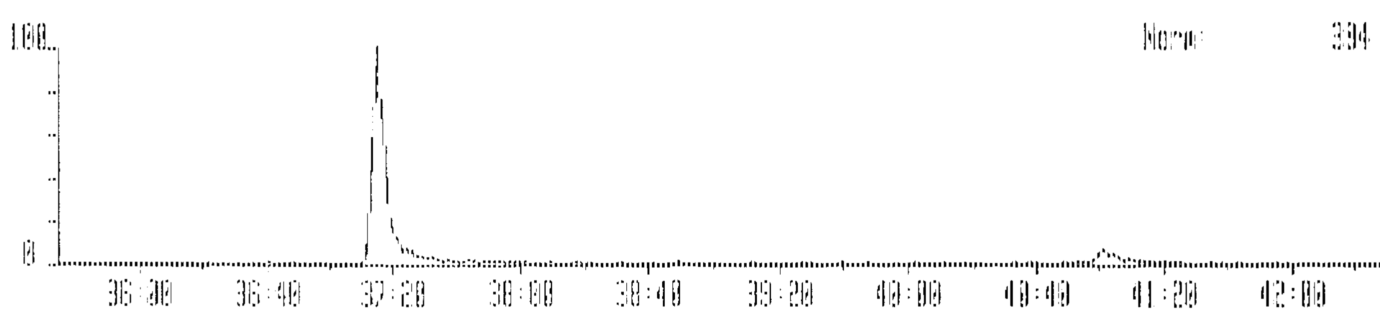
S921620 4-APR-92 Str Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 425.7737
Text:2727,2728,2730 TL1A20522A



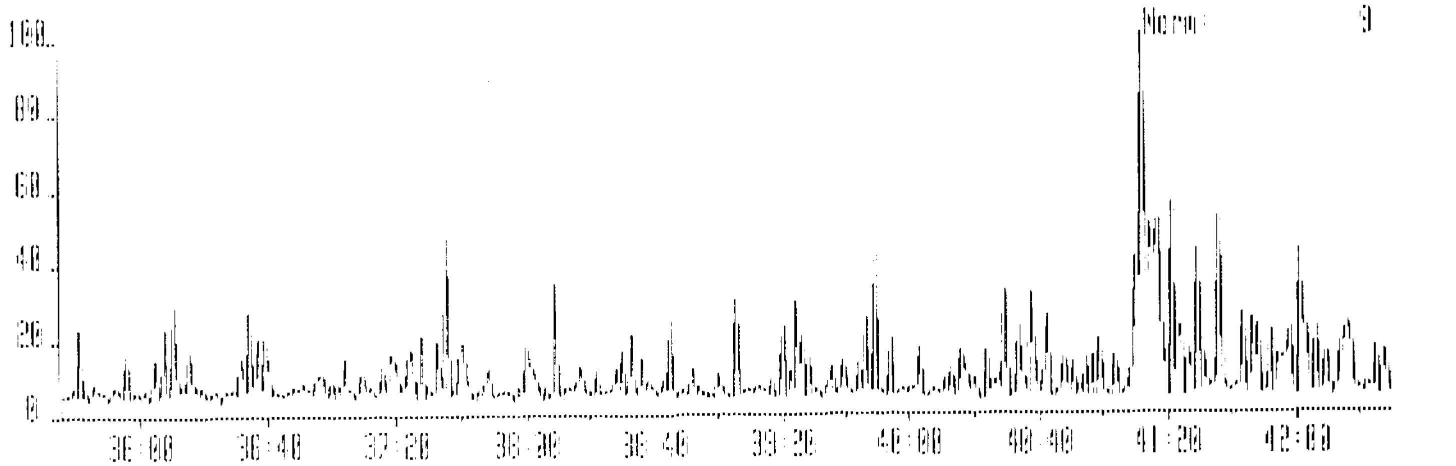
S921620 4-APR-92 Str Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 435.8169
Text:2727,2728,2730 TL1A20522A



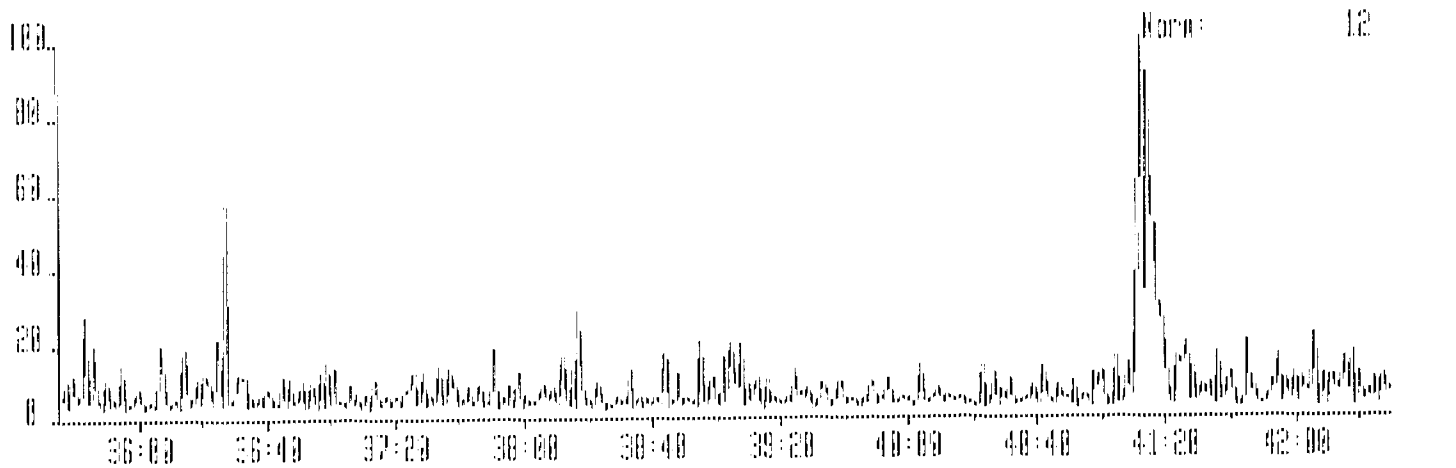
S921620 4-APR-92 Str Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 437.8140
Text:2727,2728,2730 TL1A20522A



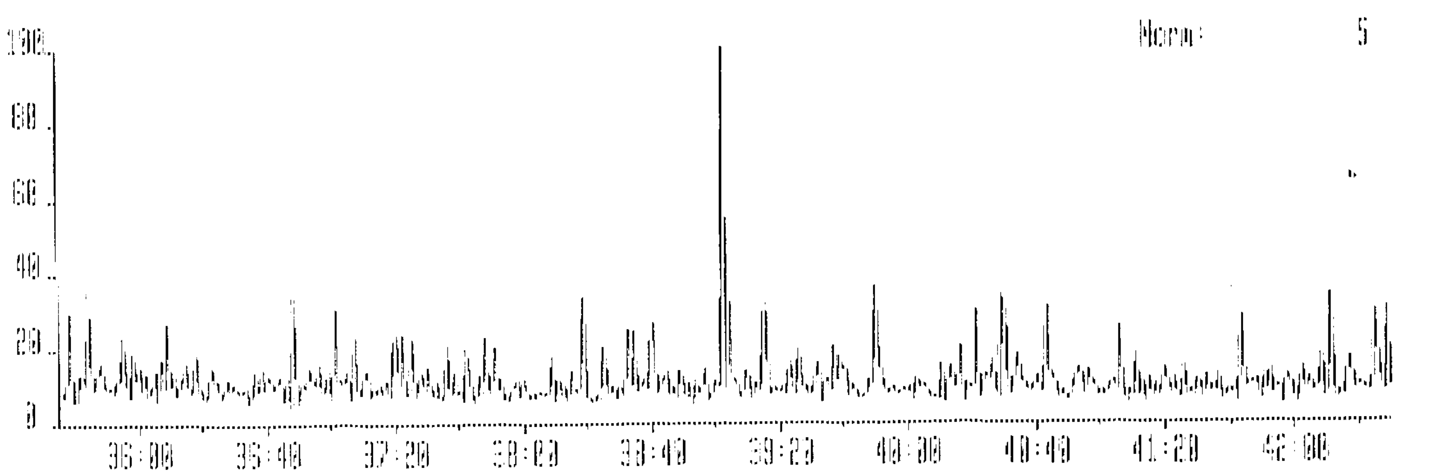
S921620 4-APR-92 Str:Voltage 705 Sys: NO35US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1#205228



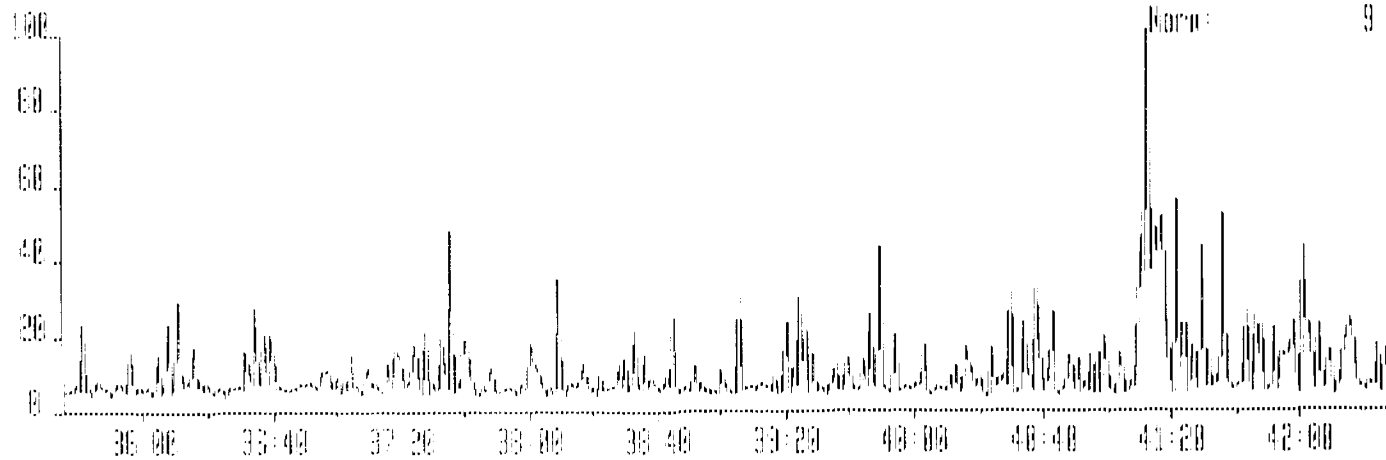
S921620 4-APR-92 Str:Voltage 705 Sys: NO35US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1#205228



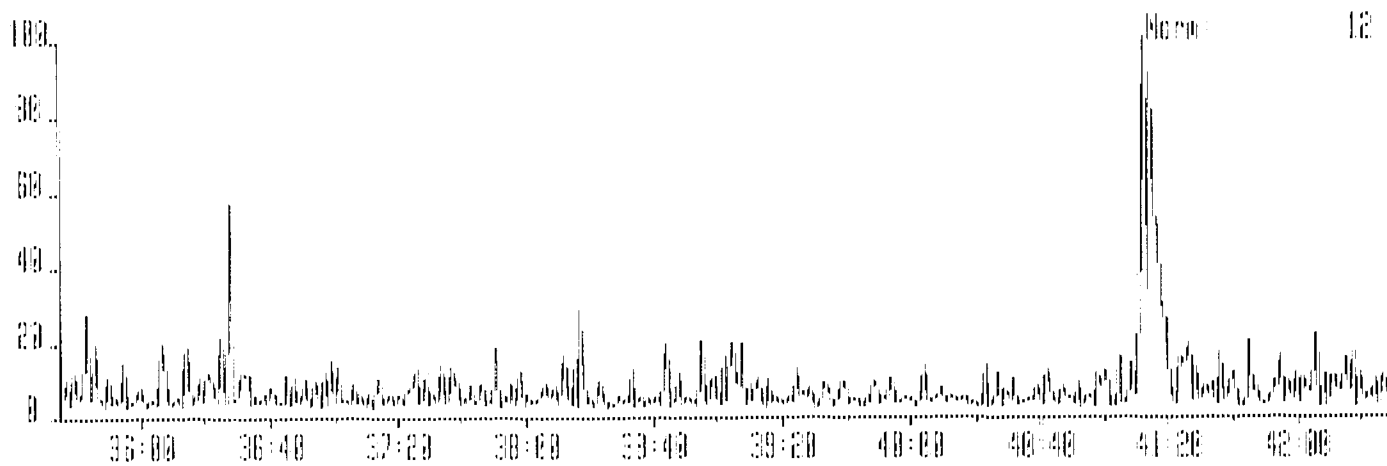
S921620 4-APR-92 Str:Voltage 705 Sys: NO35US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1#205228



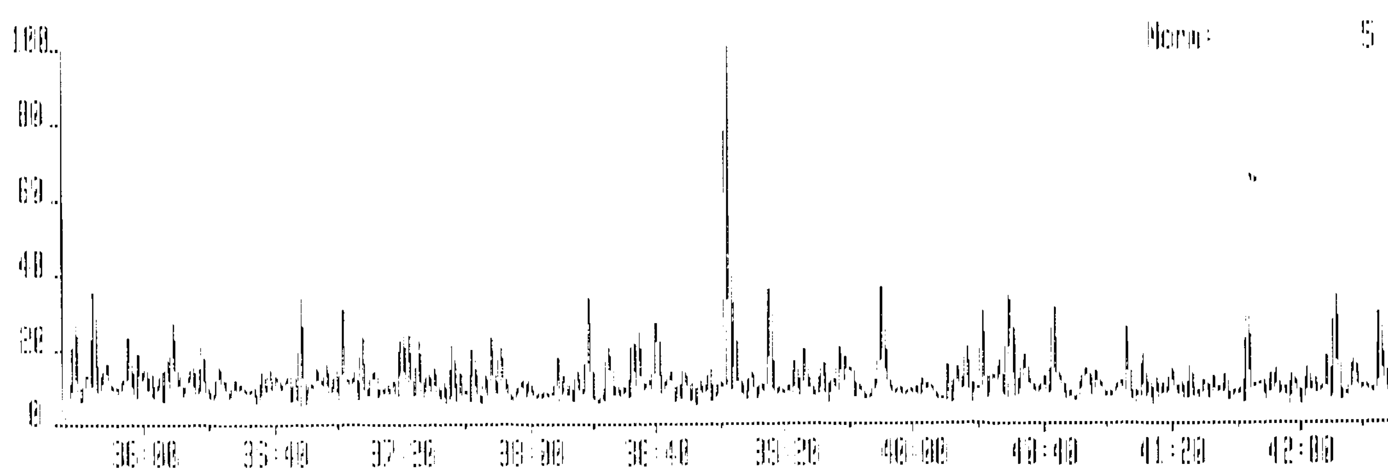
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1H205220



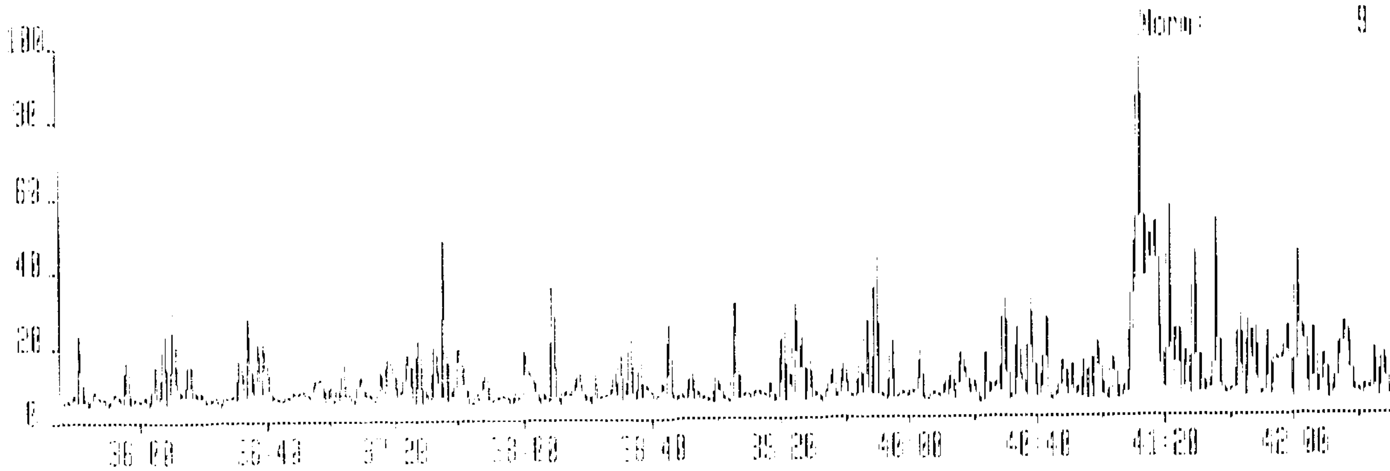
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1H205220



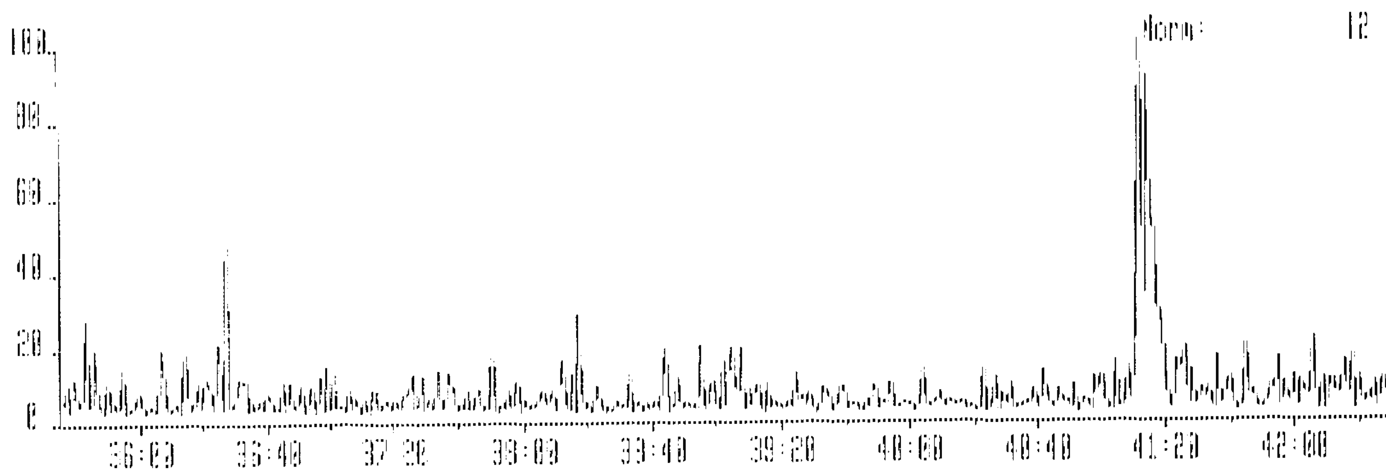
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1H205220



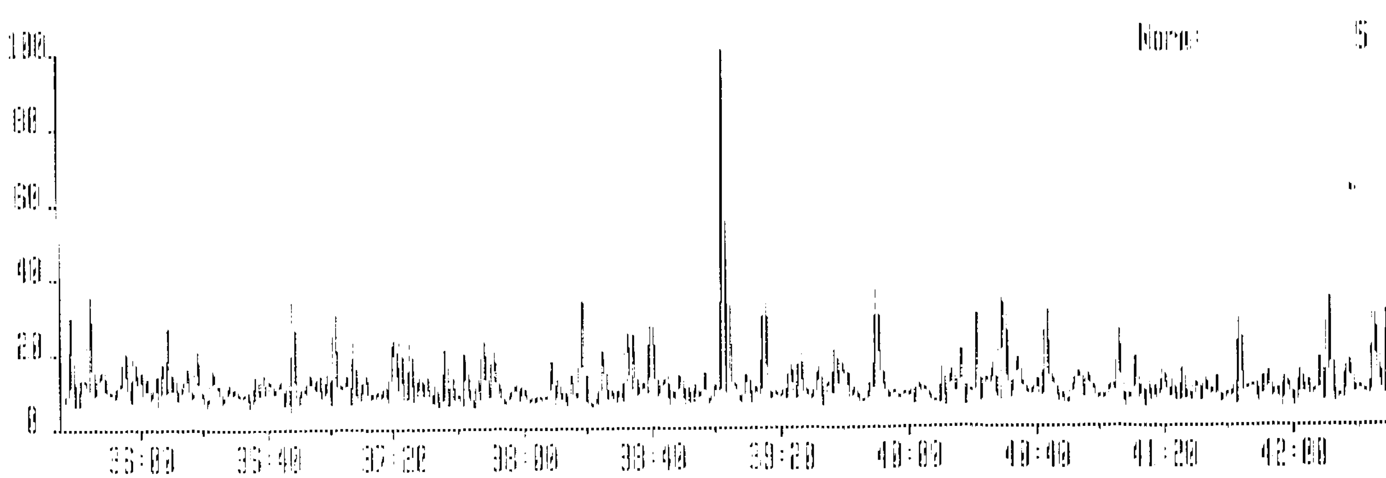
S921620 4-APR-92 Sir Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1B205228



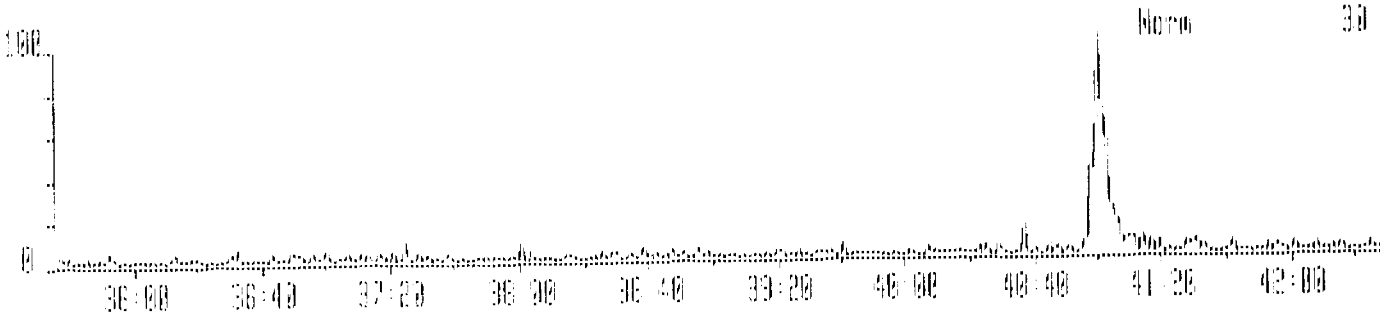
S921620 4-APR-92 Sir Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1B205228



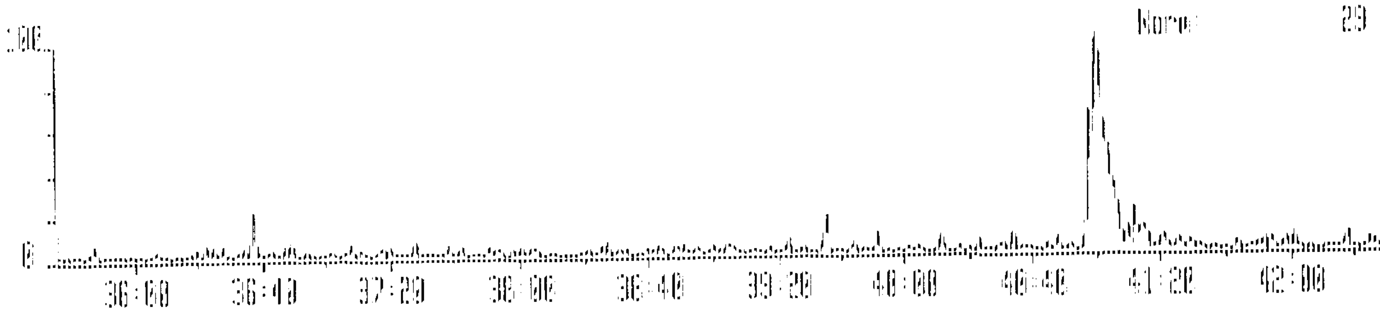
S921620 4-APR-92 Sir Voltage 705 Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1B205228



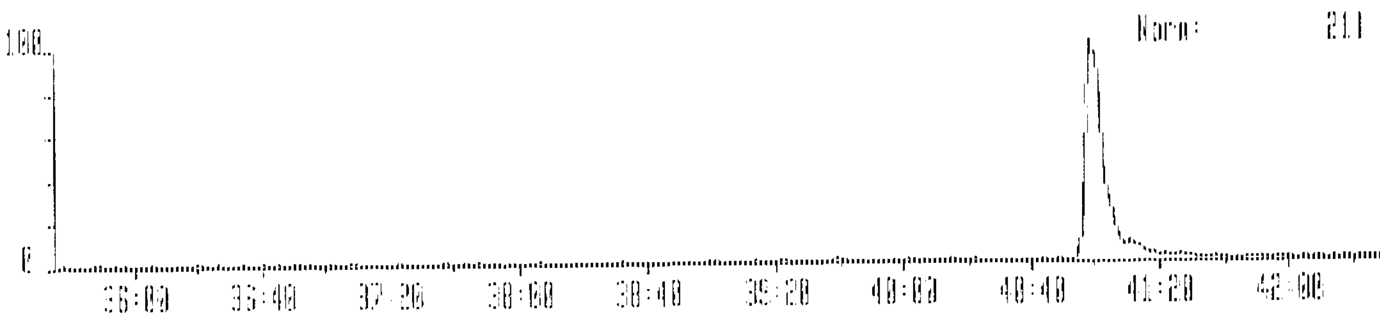
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 457.7377
Text:2727,2728,2730 TL1H205220



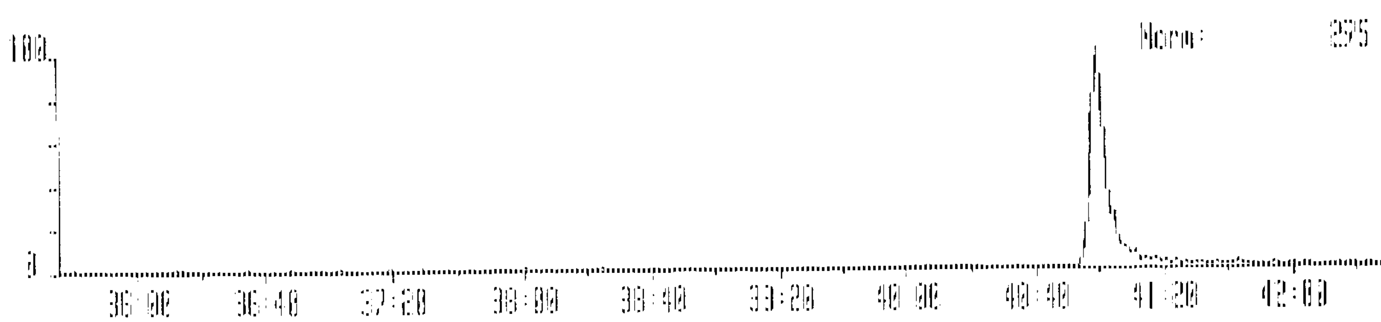
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 459.7348
Text:2727,2728,2730 TL1H205220



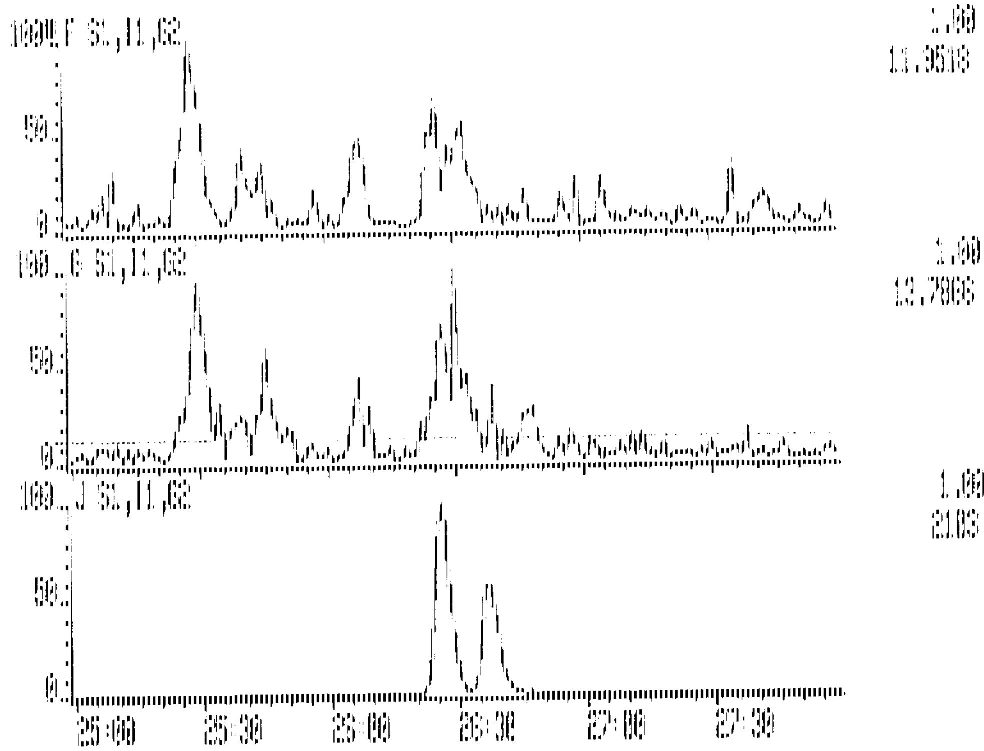
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 469.7779
Text:2727,2728,2730 TL1H205220



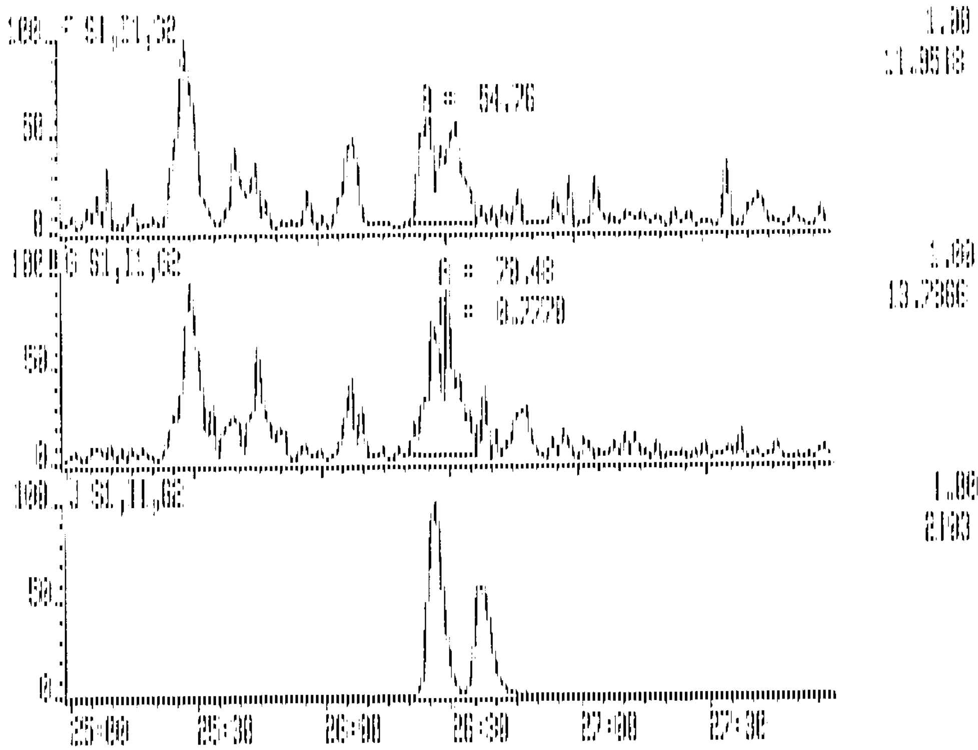
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 471.7750
Text:2727,2728,2730 TL1H205220



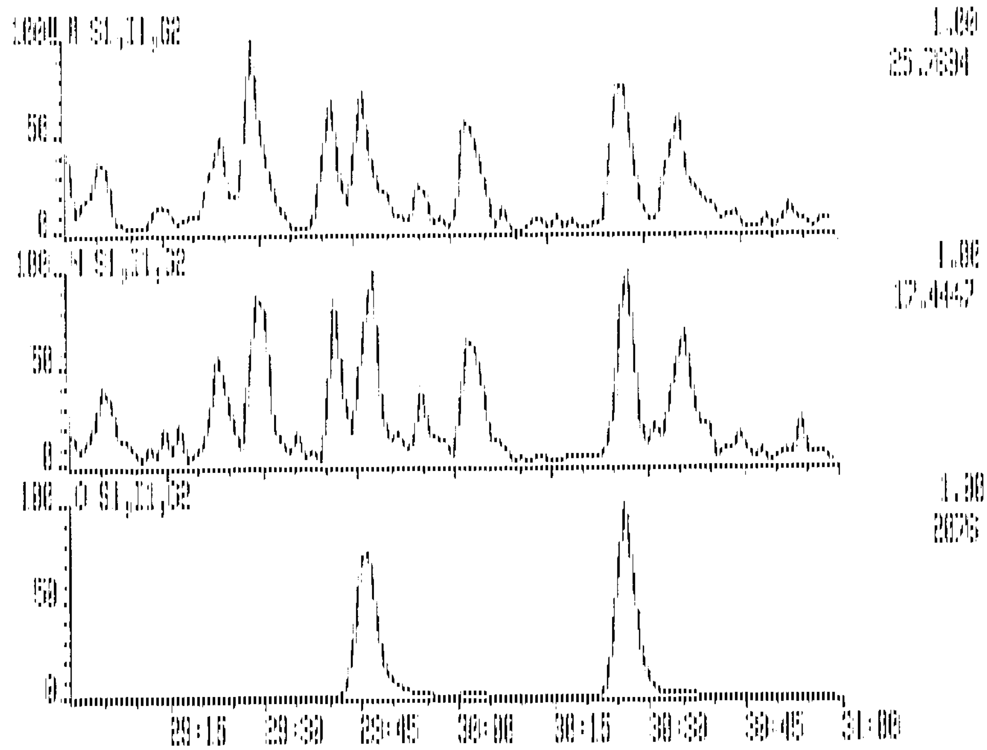
3921520 4-APR-92 14:25 70S (EI-) Sys:NOB5LS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1020522A



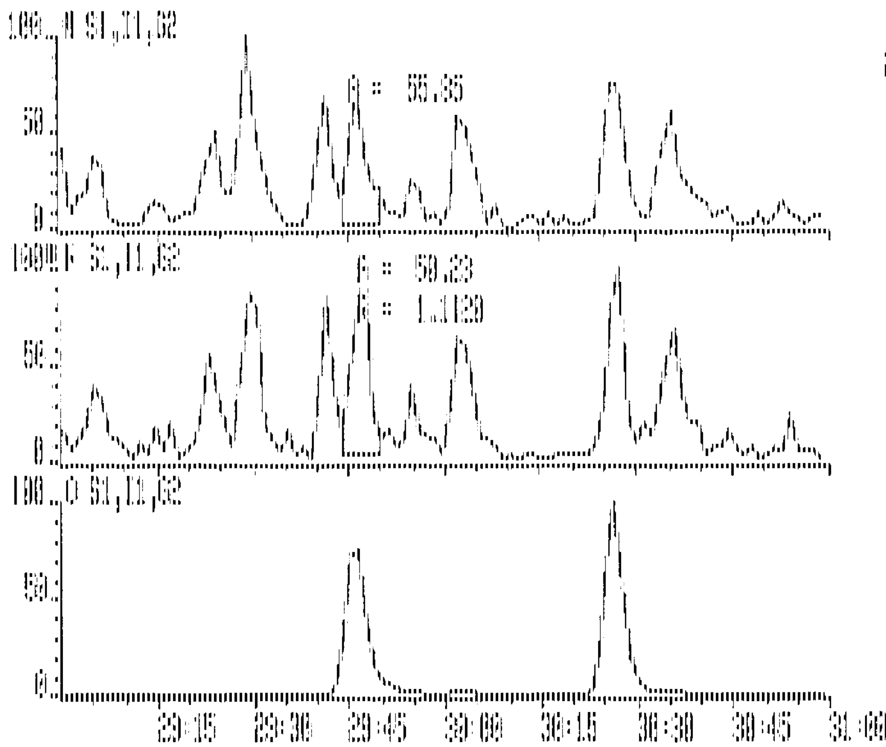
S921620 4-APR-92 14 25 70S (EI+) Sys:NDE5US
GR 2 I: 319.8965 G: 321.8936 F: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 T.30205228



S921620 4-APR-92 14:25 70S (EI+) Sys:NOB5US
GR 2 L: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TLM20522A



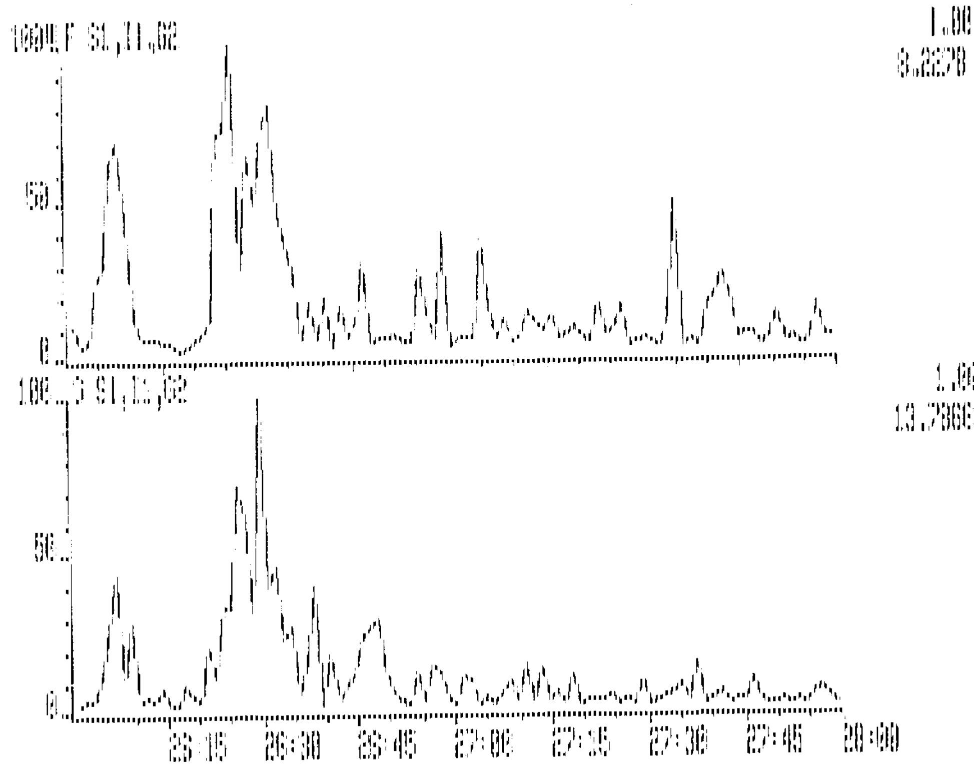
S921620 4-APR-92 14:25 70S (EI+) Sys:N0B5L6
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TL1A2052A



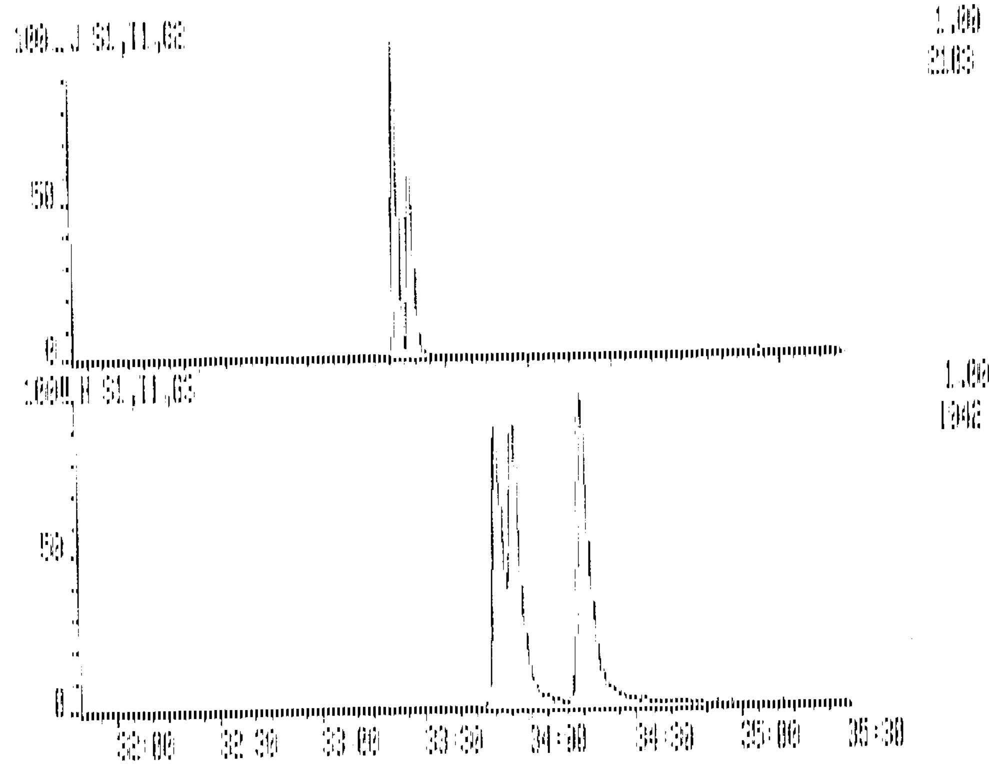
S921620   4-APR-92 14:25 70S   (EI+)   Sys:HD85US
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1020522A

Verified by [illegible] 4-4-92

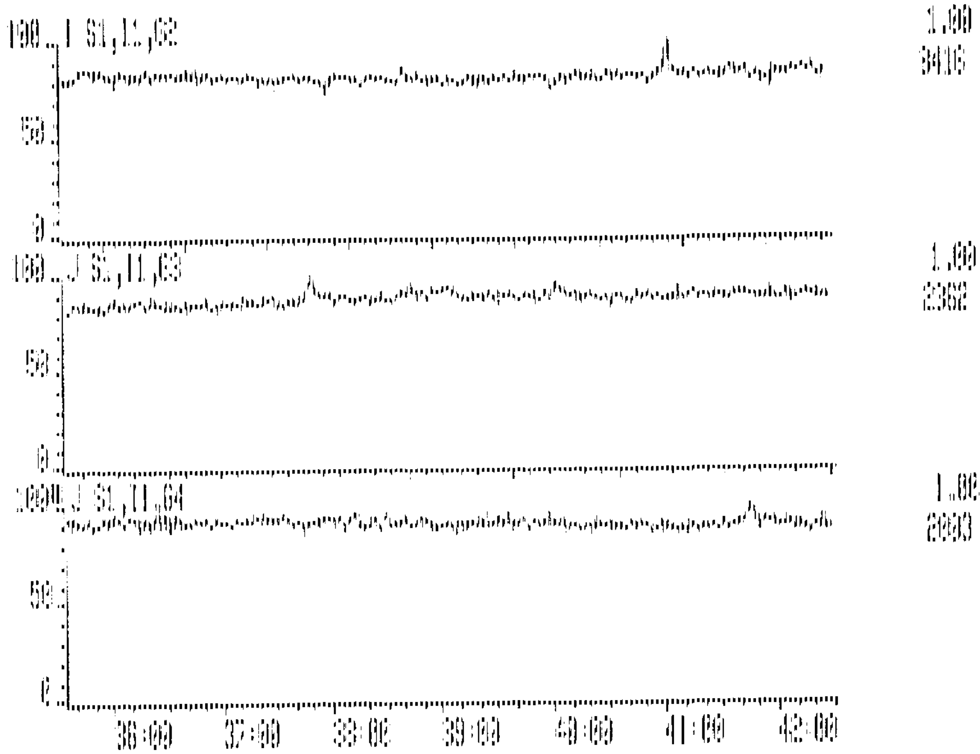
Verified by Unit QC:



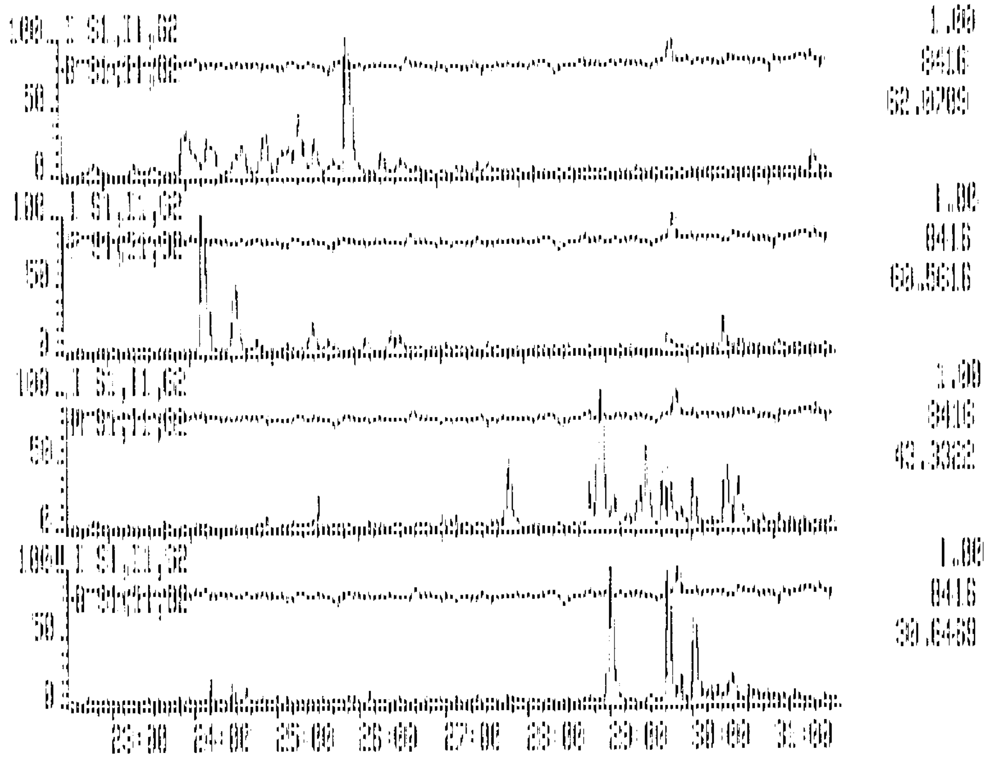
S921620   4-APR-92 14:25 70S   (EI+)   Sys:HDE5US
Gr. 3 F: 391.0127 G: 392.9760 H: 401.0558 I: 403.8525 J: 430.9729
Text:2727,2728,2730 TLT4205223



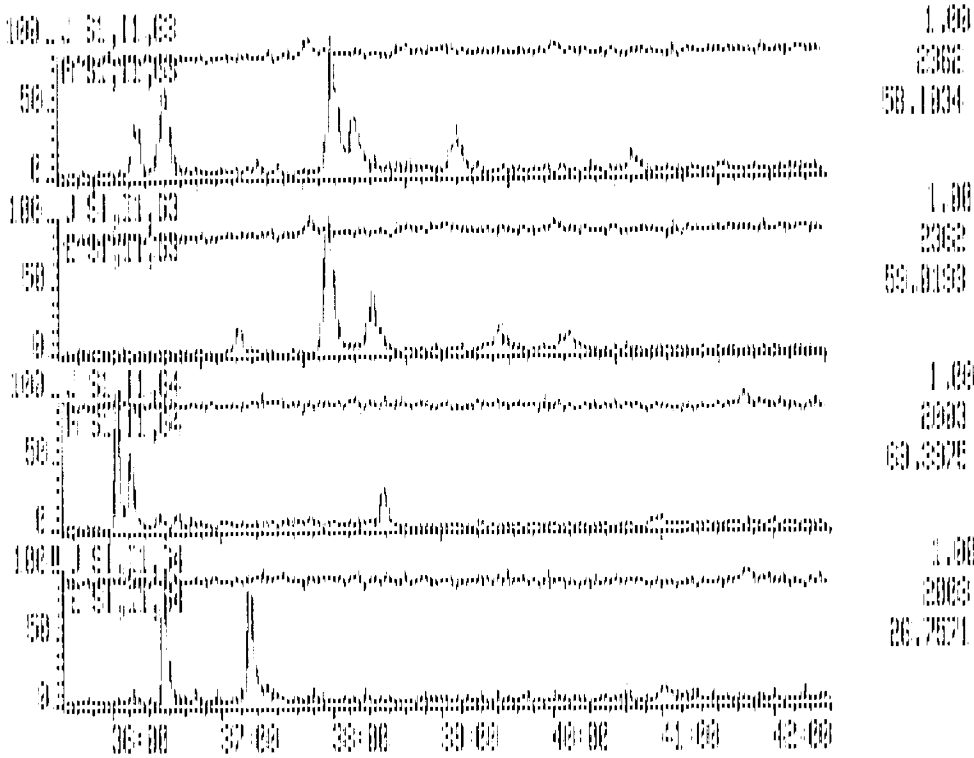
S921620   4-APR-92 14:25 705   (EI+)   Sys:NOBSUS
GR 4 F: 425.7737 G: 430.9729 H: 435.8169 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TLI120522P



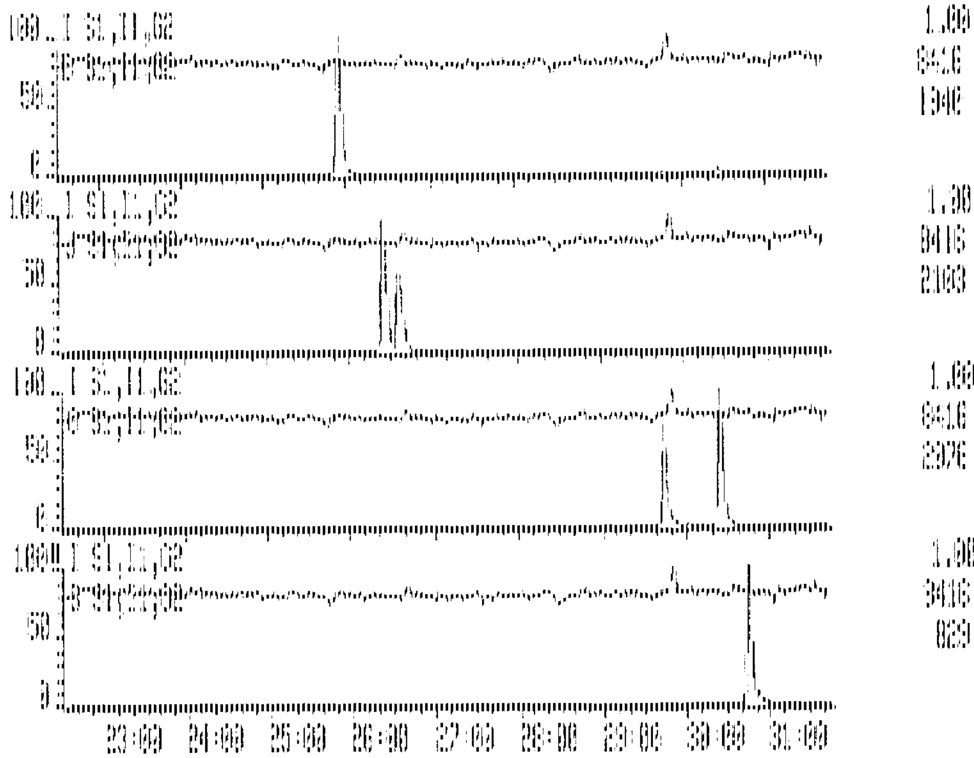
S921620 4-APR-92 14:25 70S (EI+) Sys:NOBSUS
GR 2 F: 315.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 T.LB20522B



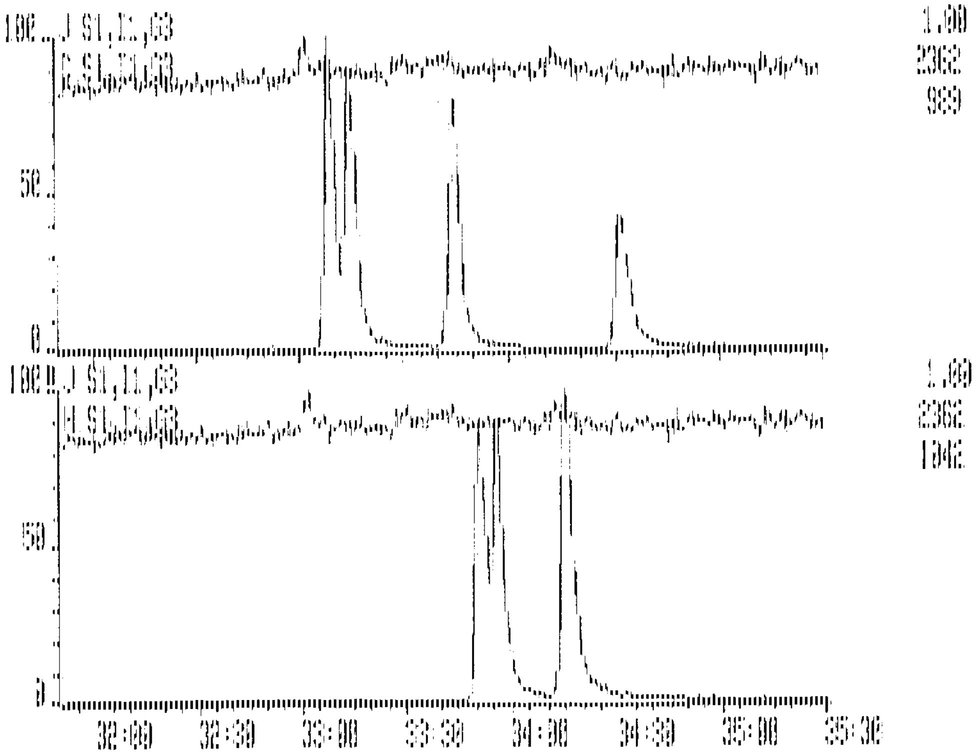
S921520 4-APR-92 14:25 70S (EI+) Sys NOBSUS
SIR 4 F: 425.7737 G: 430.9725 H: 435.8369 I: 437.8140 J: 442.9728
Text:2727,2728,2730 TL1120522A



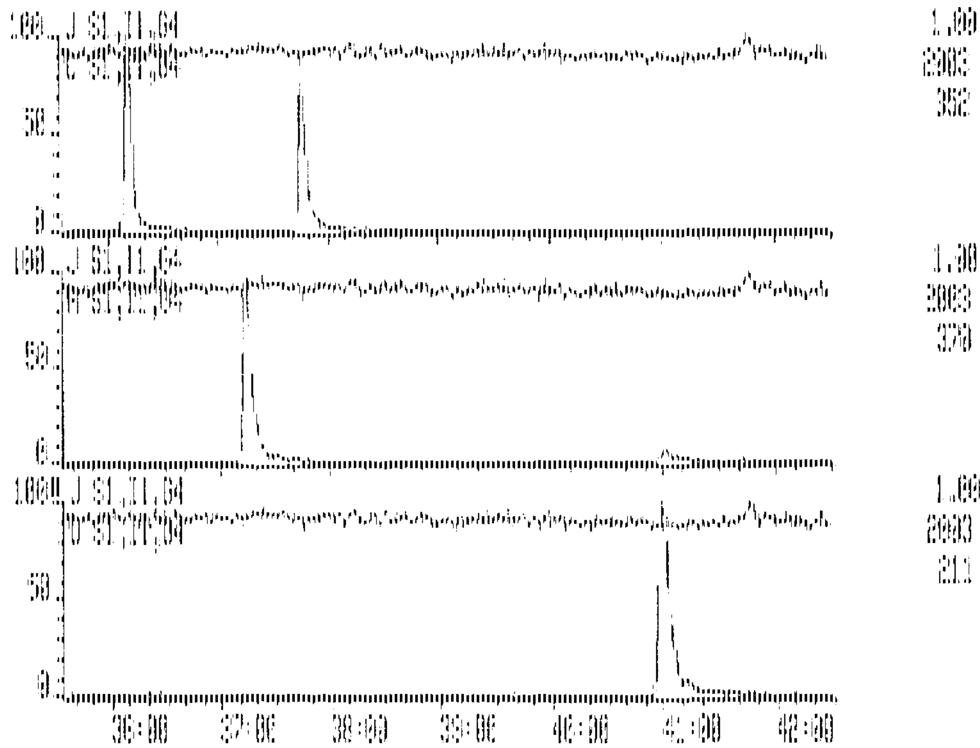
S921620 4-APR-92 14:25 706 (EI+) Sys:MDE5JS
GR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9363
Text:2727,2728,2730 TLM205220



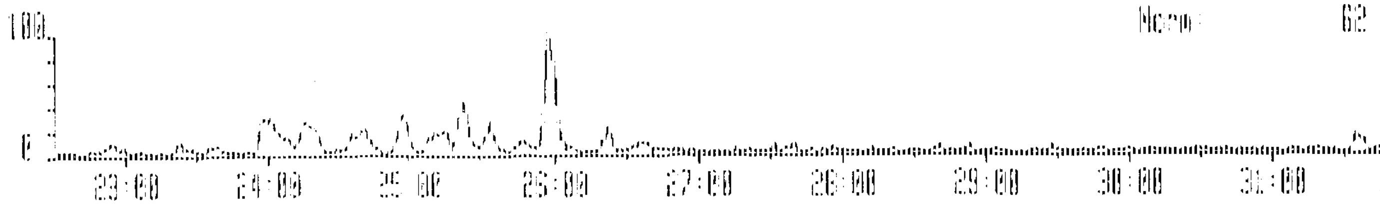
S921620 4-APR-92 14:25 70S (EI+) Sys:NOBSUS
GR 3 F: 391.3127 G: 392.9760 H: 401.8558 I: 403.8529 J: 430.9729
Text:2727,2729,2730 T.I1020229



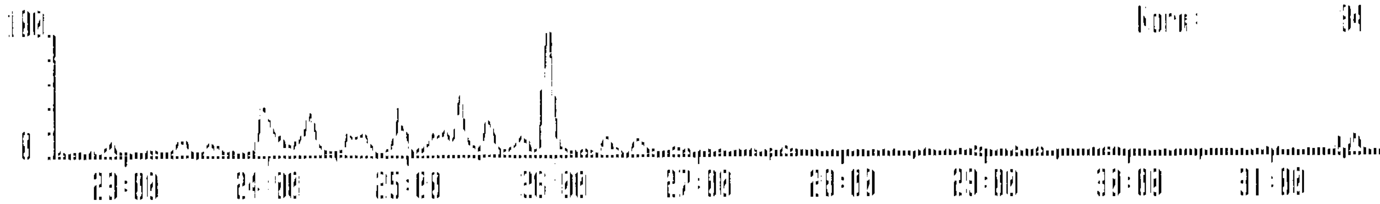
S921520 4-APR-92 14:25 70S (EI+) Sys:MDB5JS
SIR 4 F: 435.7732 G: 438.9729 H: 435.8169 I: 437.8140 J: 442.9788
Text: 2727,2726,2730 TLH20522A



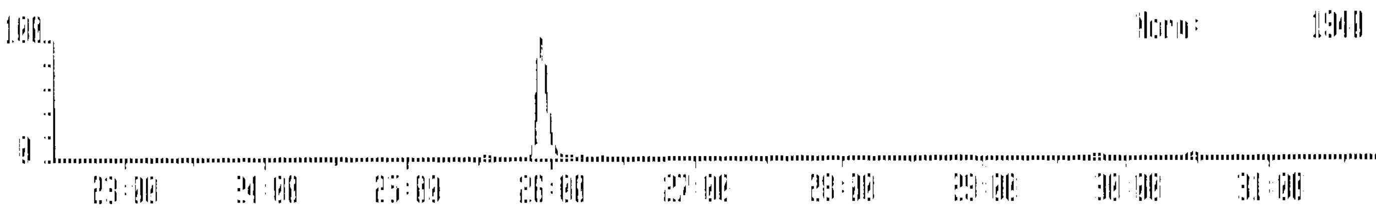
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TL1820522A



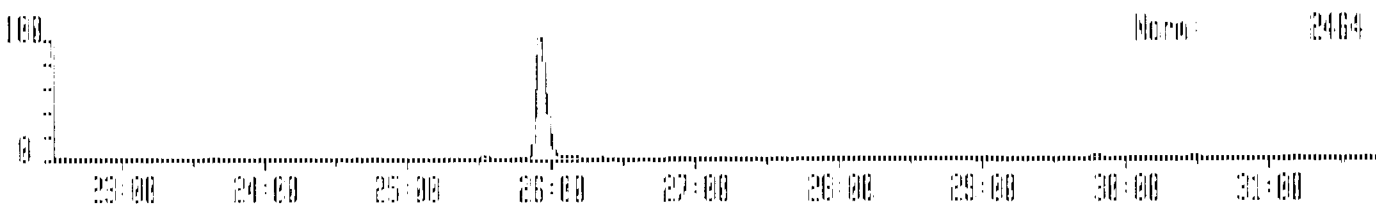
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TL1820522A



S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TL1820522A



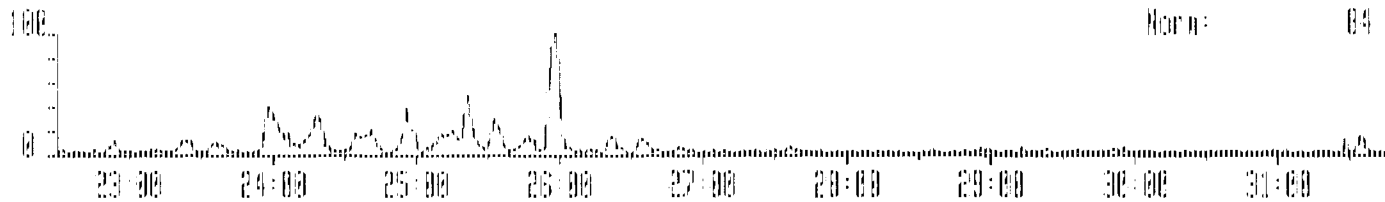
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TL1820522A



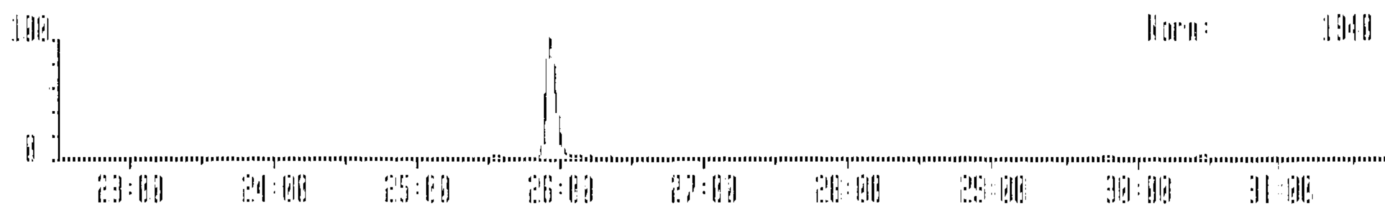
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TL1820522A

S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 303.9016
Text:2727,2728,2730 TL1420522A

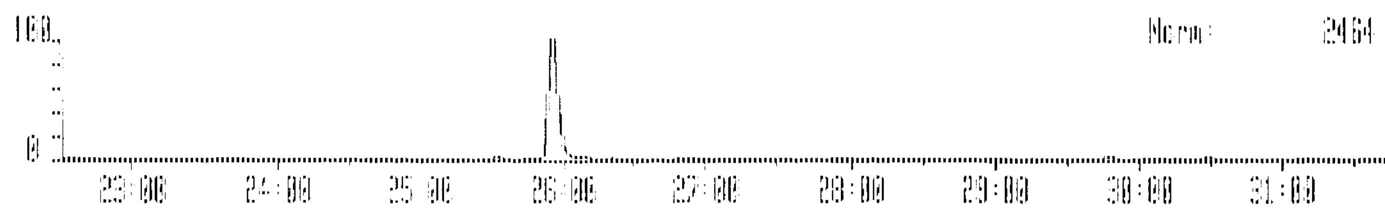
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 305.8987
Text:2727,2728,2730 TL1420522A



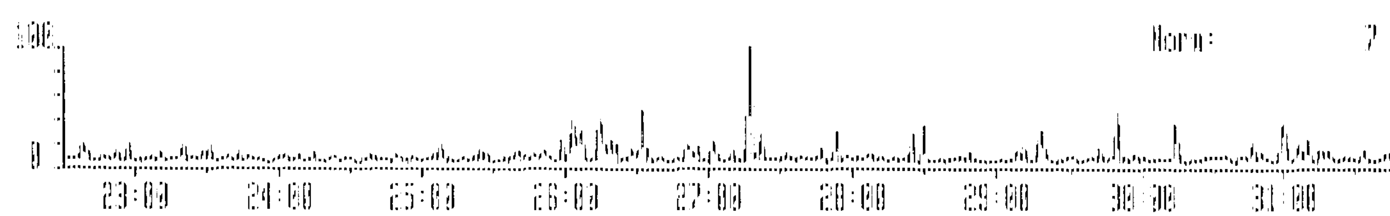
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 315.9419
Text:2727,2728,2730 TL1420522A



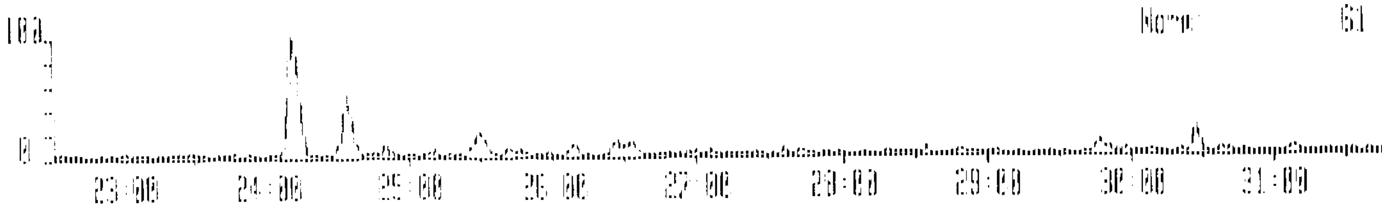
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 317.9389
Text:2727,2728,2730 TL1420522A



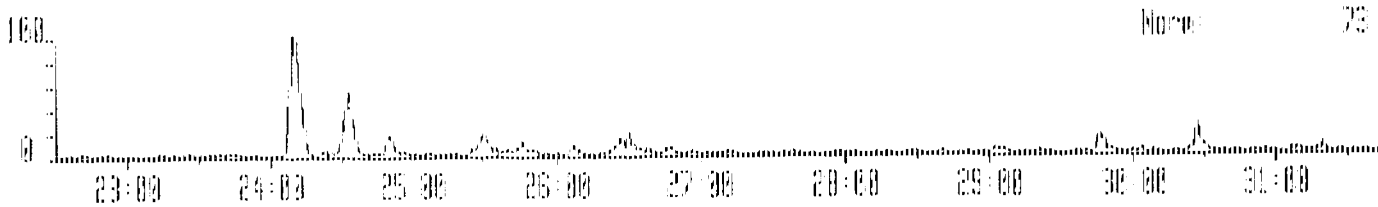
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 375.8364
Text:2727,2728,2730 TL1420522A



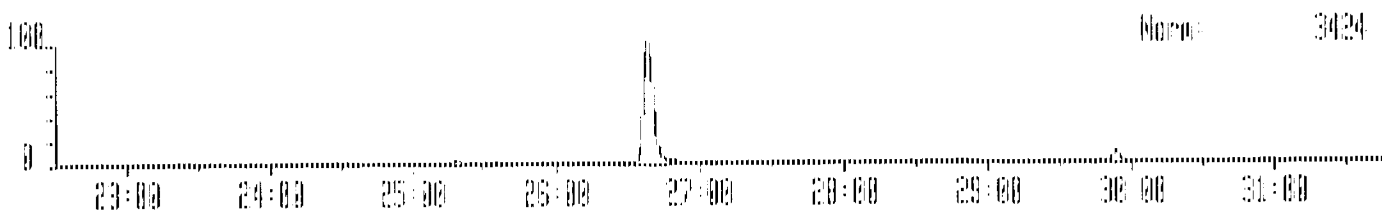
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 319.8965
Text:2727,2728,2730 TL1820522A



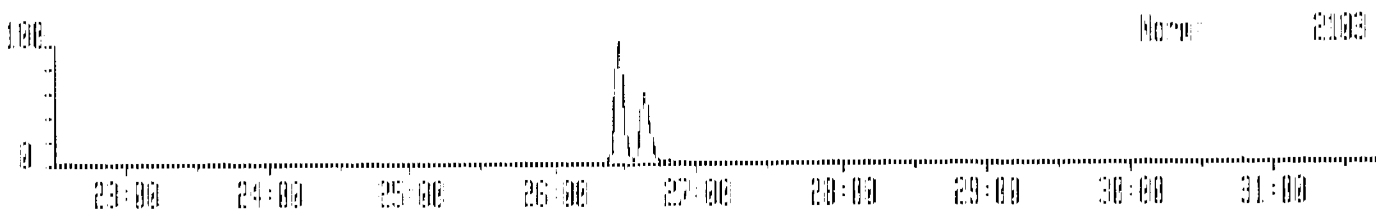
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 321.8936
Text:2727,2728,2730 TL1820522A



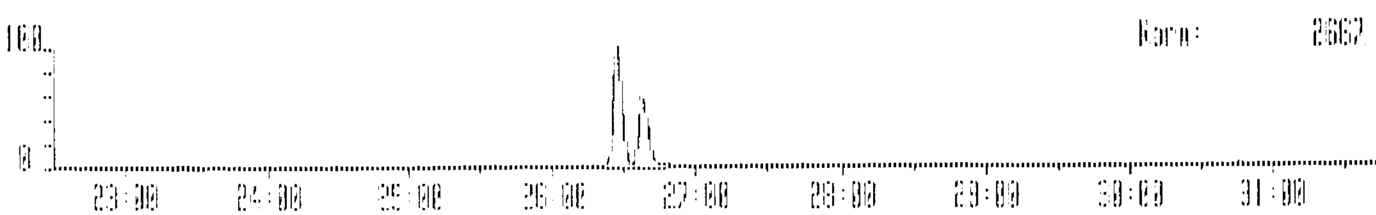
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 327.8847
Text:2727,2728,2730 TL1820522A



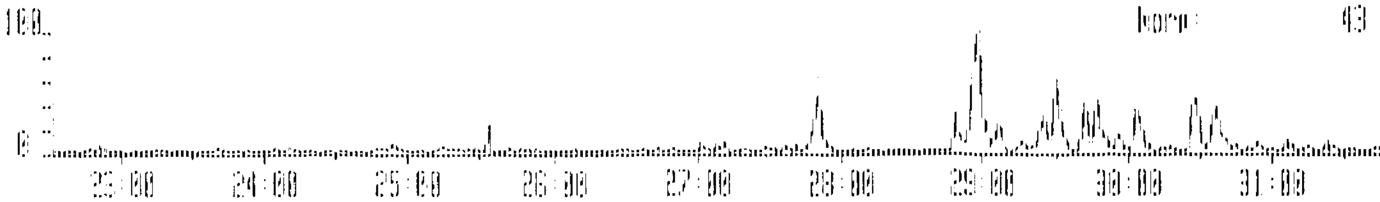
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 331.9368
Text:2727,2728,2730 TL1820522A



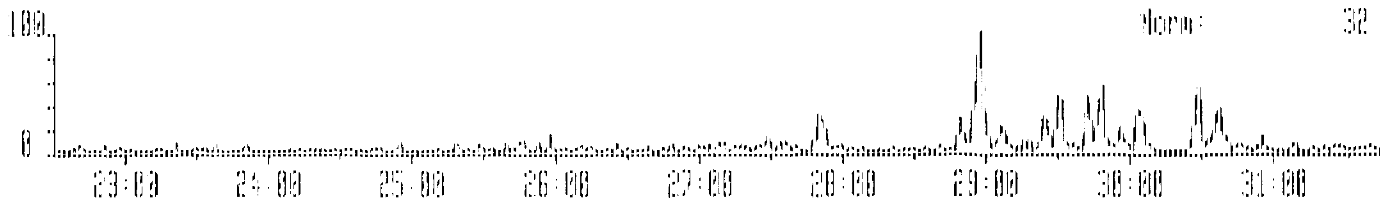
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 2 Mass 333.9339
Text:2727,2728,2730 TL1820522A



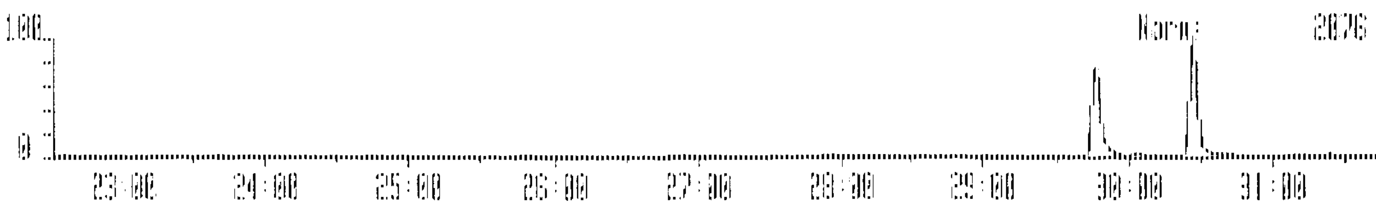
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 339.8597
Text:2727,2728,2730 TLI#20522A



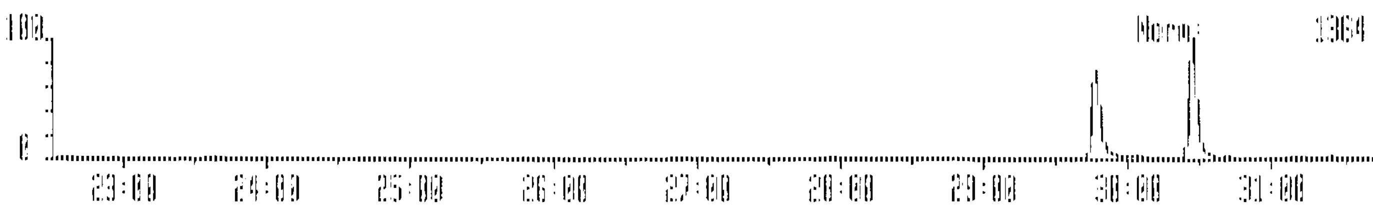
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 341.8567
Text:2727,2728,2730 TLI#20522A



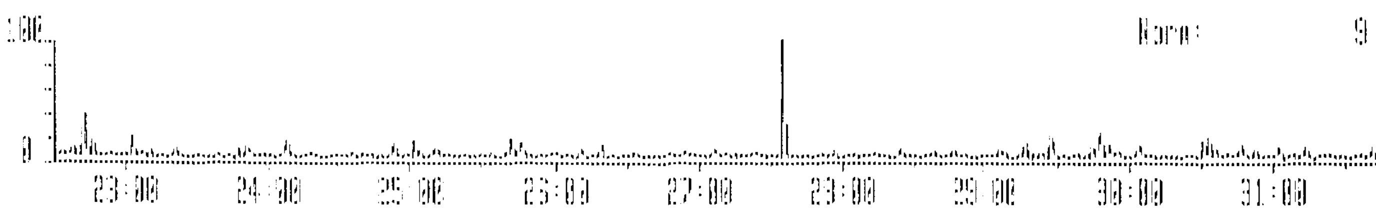
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 351.9000
Text:2727,2728,2730 TLI#20522A



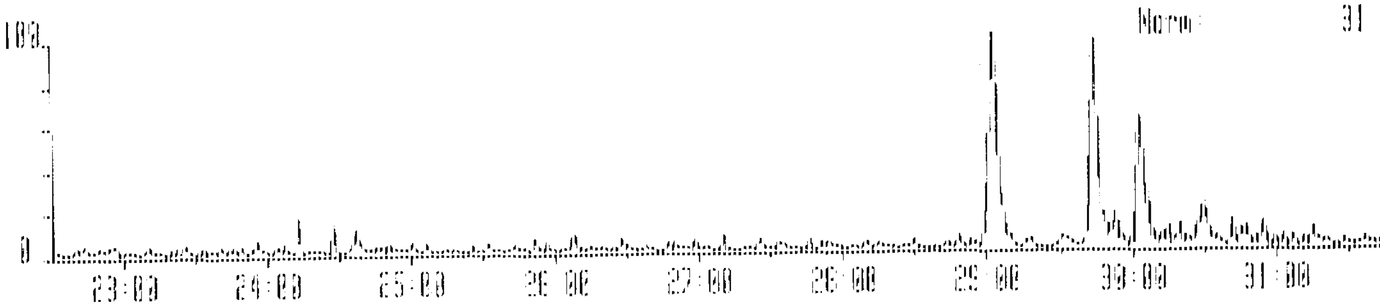
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 353.8970
Text:2727,2728,2730 TLI#20522A



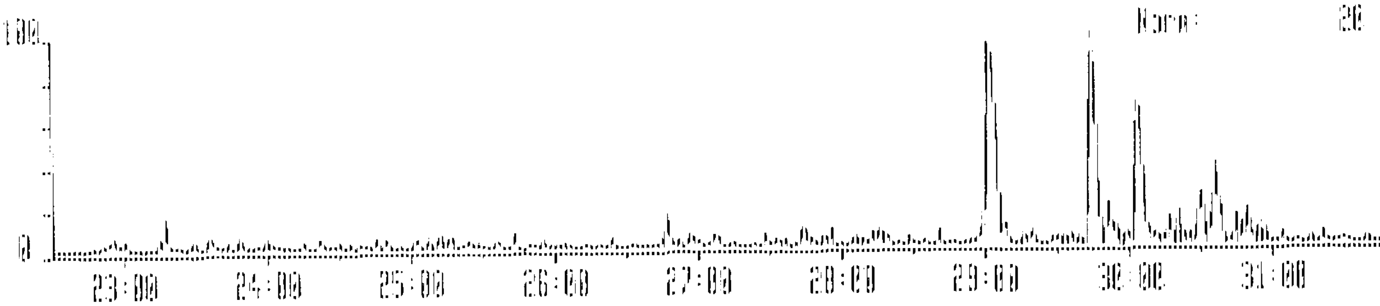
S921620 4-APR-92 Str:Voltage 70S Sys: N0B5US
Sample 1 Injection 1 Group 2 Mass 409.7974
Text:2727,2728,2730 TLI#20522A



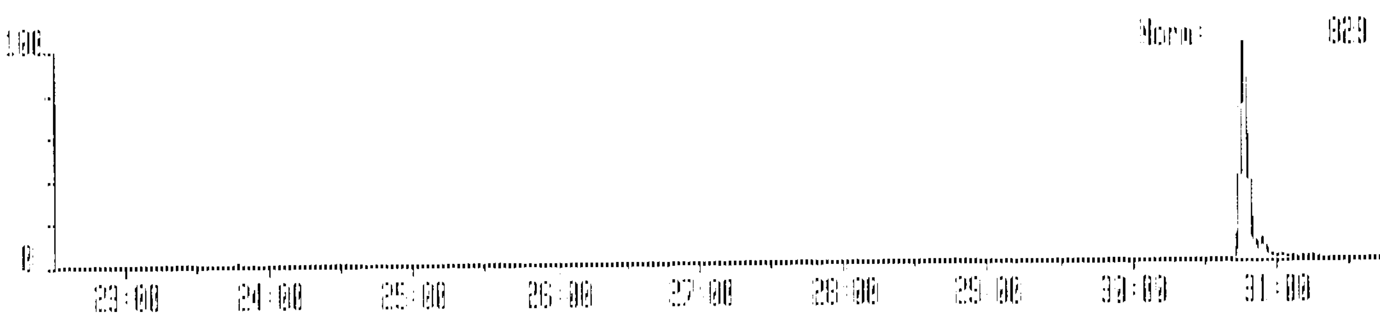
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 355.8546
Text:2727,2728,2730 TL1H205229



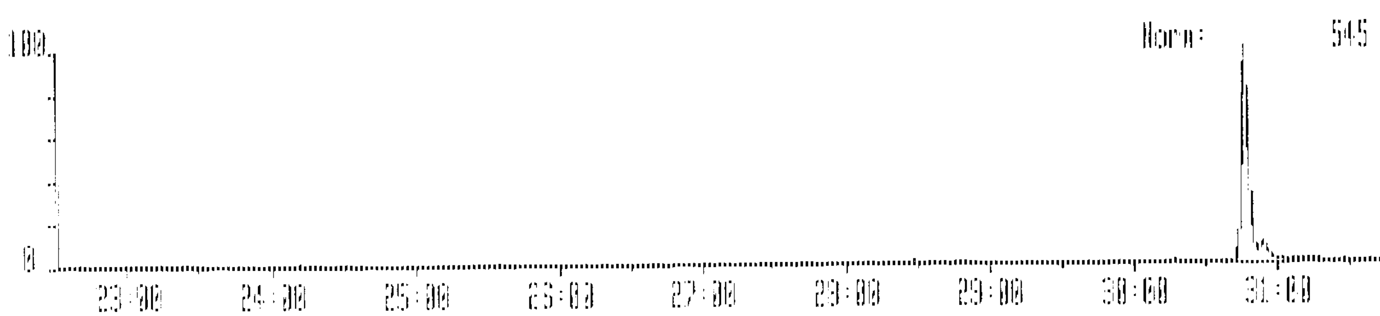
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 357.8516
Text:2727,2728,2730 TL1H205229



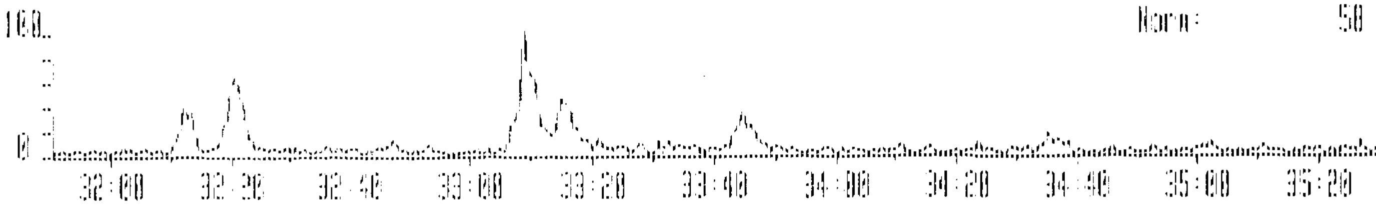
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 367.8949
Text:2727,2728,2730 TL1H205229



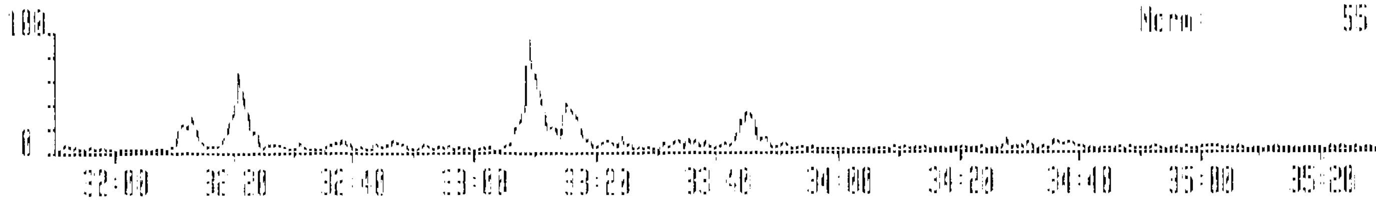
S921620 4-APR-92 Sir:Voltage 70S Sys: M085US
Sample 1 Injection 1 Group 2 Mass 369.8919
Text:2727,2728,2730 TL1H205229



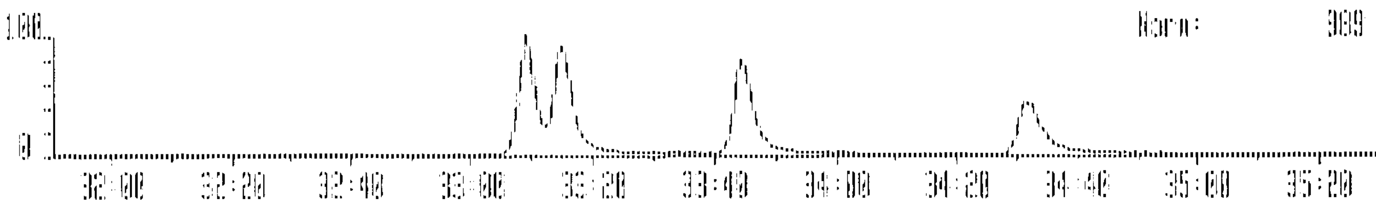
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 373.8208
Text:2727,2728,2730 TL1020522A



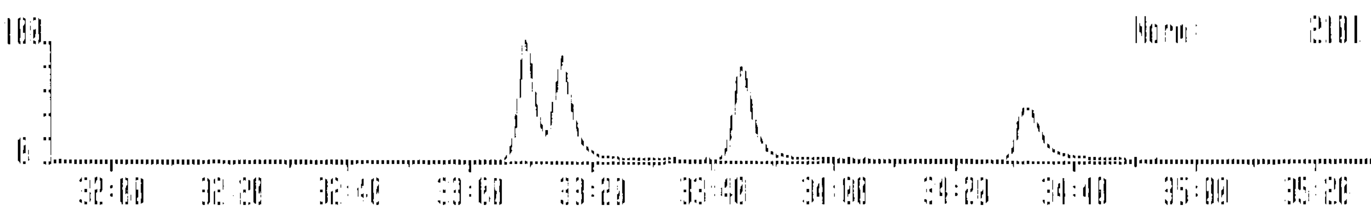
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 375.8178
Text:2727,2728,2730 TL1020522A



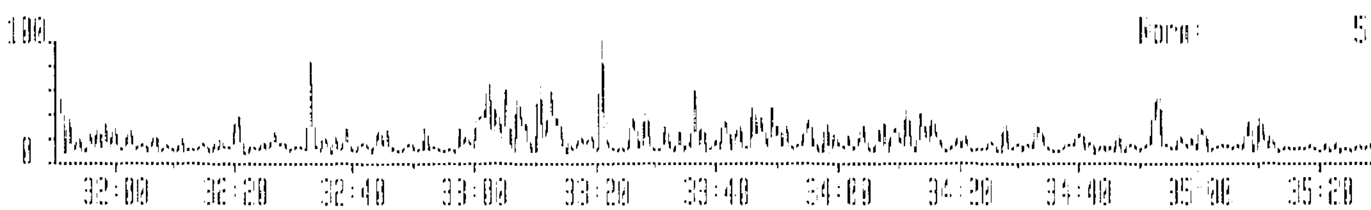
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 383.8639
Text:2727,2728,2730 TL1020522A



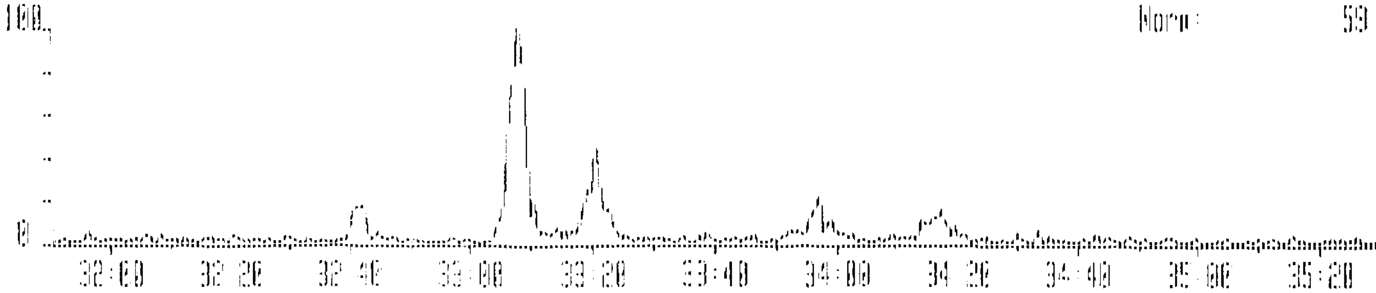
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 385.8610
Text:2727,2728,2730 TL1020522A



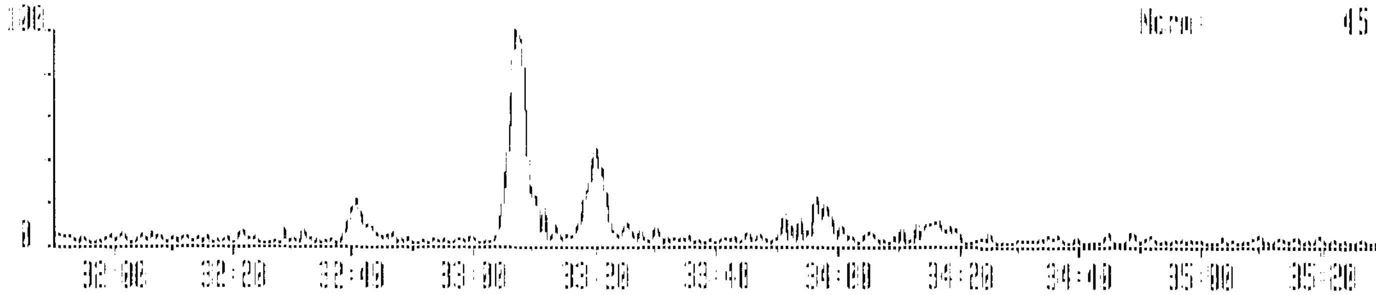
S921620 4-APR-92 Str-Voltage 70S Sys: NO35US
Sample 1 Injection 1 Group 3 Mass 445.7555
Text:2727,2728,2730 TL1020522A



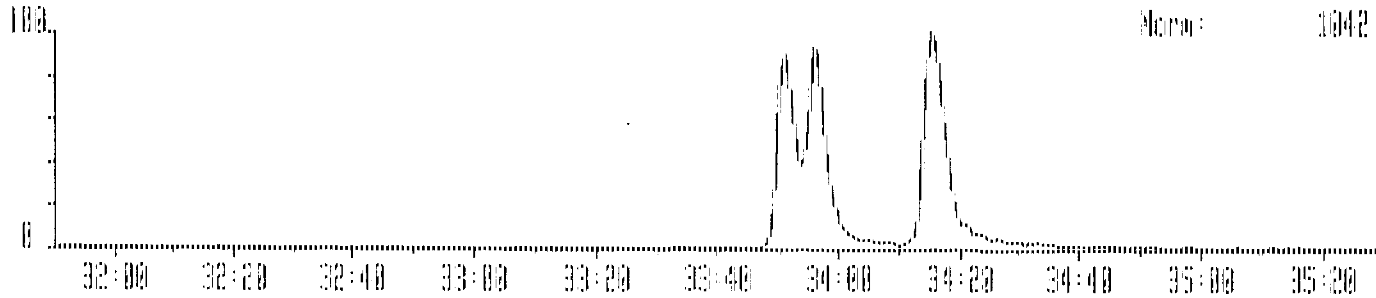
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 389.8156
Text:2727,2728,2730 TLI#20522A



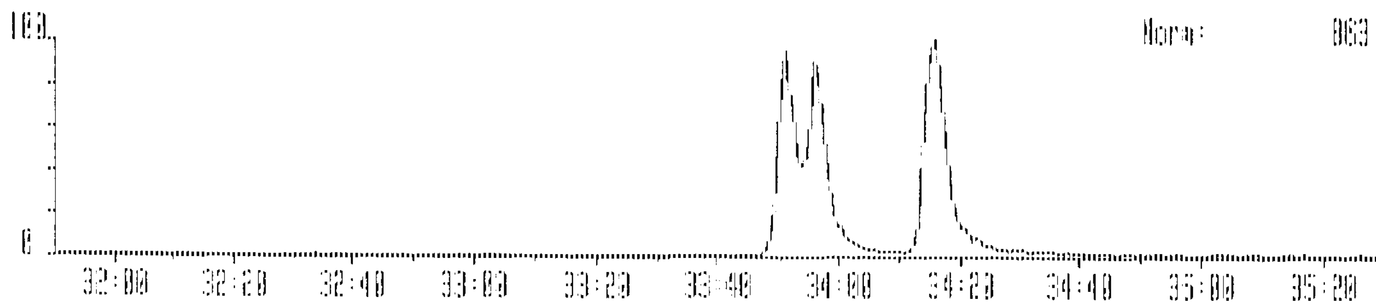
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 391.8127
Text:2727,2728,2730 TLI#20522A



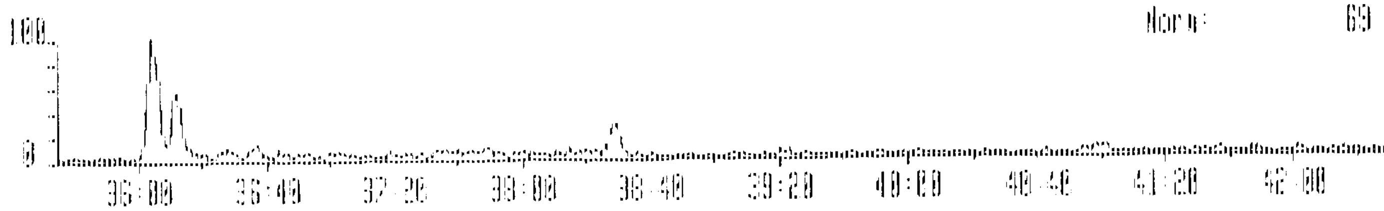
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 401.8558
Text:2727,2728,2730 TLI#20522A



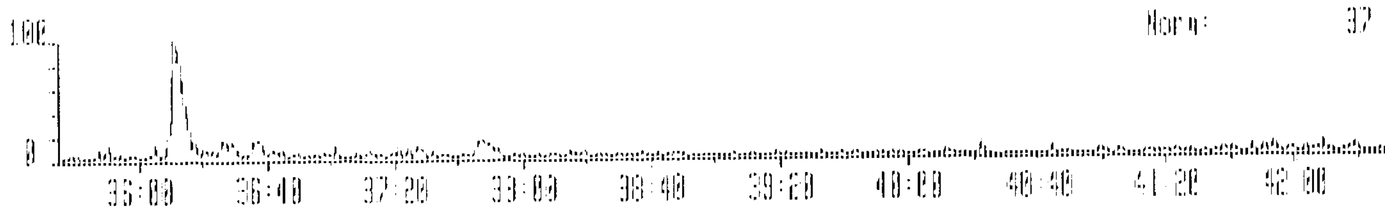
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 3 Mass 403.8529
Text:2727,2728,2730 TLI#20522A



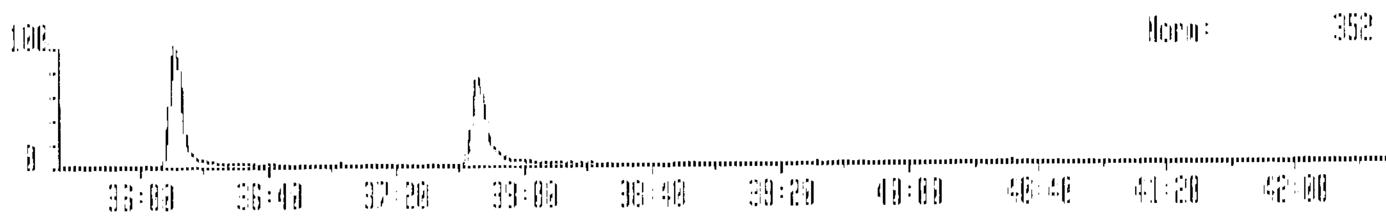
S921620   4-APR-92   Str Voltage 70S   Sys: NDB5US
Sample 1   Injection 1   Group 4   Mass 407.7818
Text:2727,2728,2730 TLI#20522A



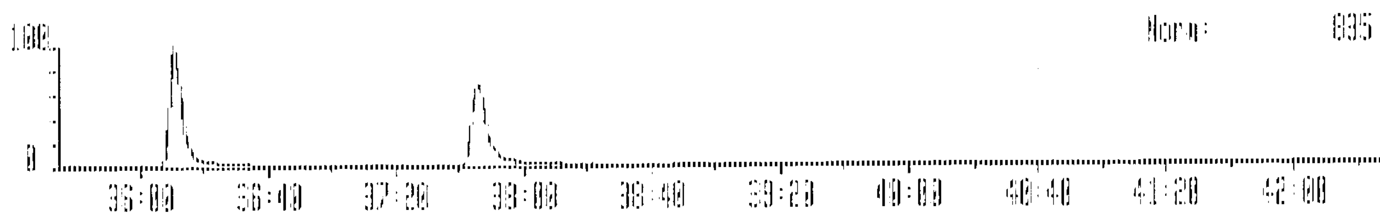
S921620   4-APR-92   Str Voltage 70S   Sys: NDB5US
Sample 1   Injection 1   Group 4   Mass 409.7789
Text:2727,2728,2730 TLI#20522A



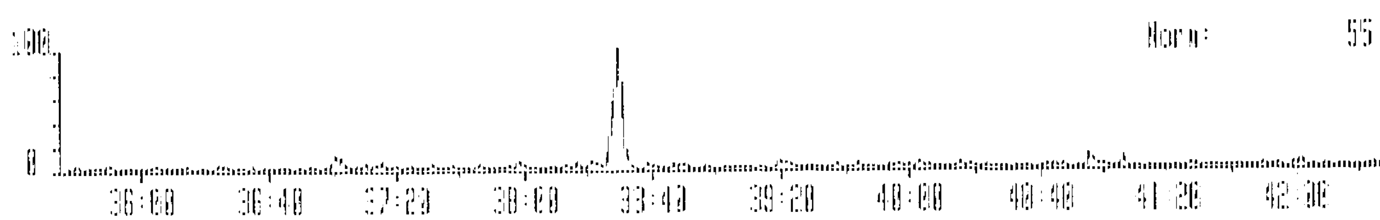
S921620   4-APR-92   Str Voltage 70S   Sys: NDB5US
Sample 1   Injection 1   Group 4   Mass 417.8253
Text:2727,2728,2730 TLI#20522A



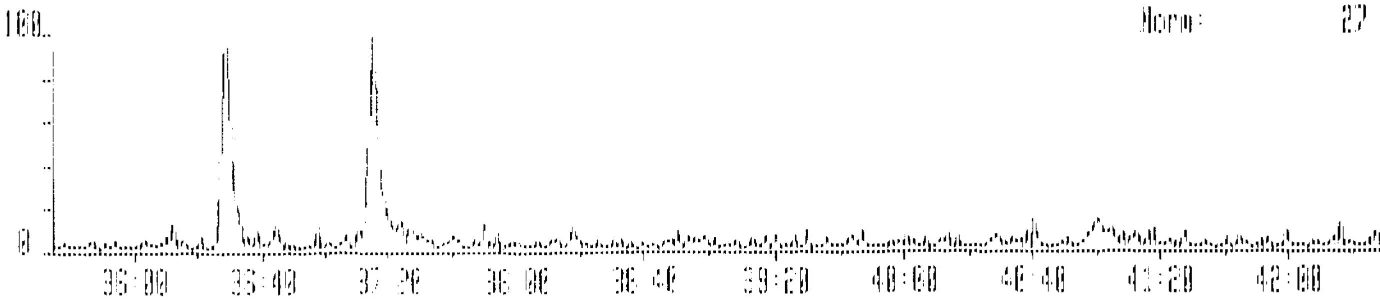
S921620   4-APR-92   Str Voltage 70S   Sys: NDB5US
Sample 1   Injection 1   Group 4   Mass 419.8220
Text:2727,2728,2730 TLI#20522A



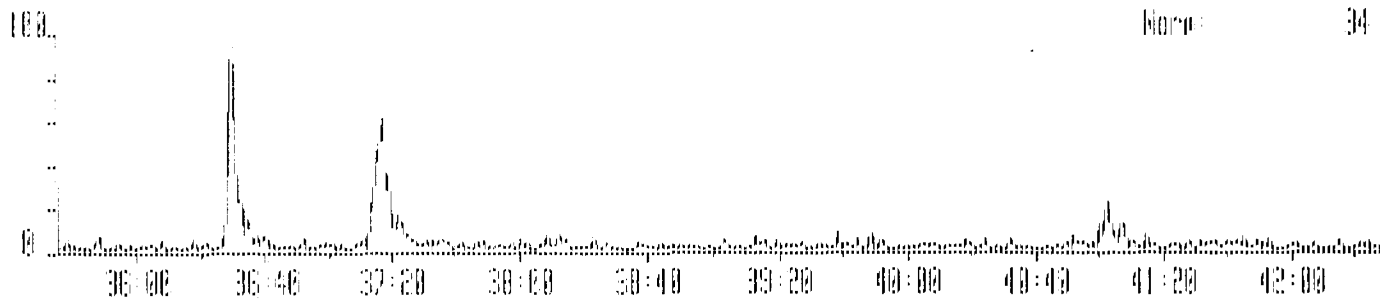
S921620   4-APR-92   Str Voltage 70S   Sys: NDB5US
Sample 1   Injection 1   Group 4   Mass 479.7165
Text:2727,2728,2730 TLI#20522A



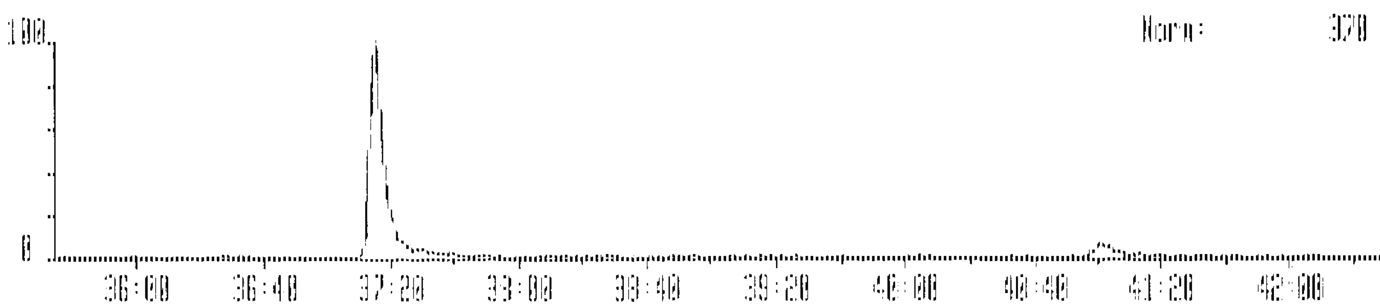
S921620 4-APR-92 Sir Voltage 705 Sys: MDB5US
Sample 1 Injection 1 Group 4 Mass 423.7766
Text:2727,2728,2730 TL1420522A



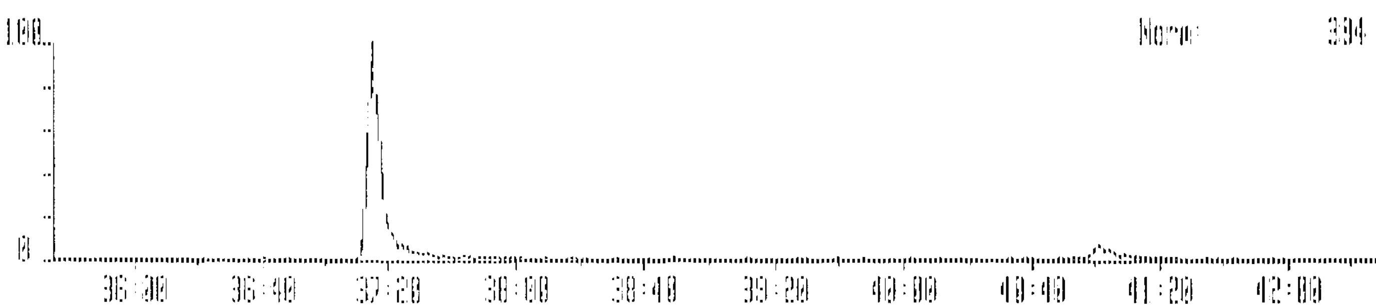
S921620 4-APR-92 Sir Voltage 705 Sys: MDB5US
Sample 1 Injection 1 Group 4 Mass 425.7737
Text:2727,2728,2730 TL1420522A



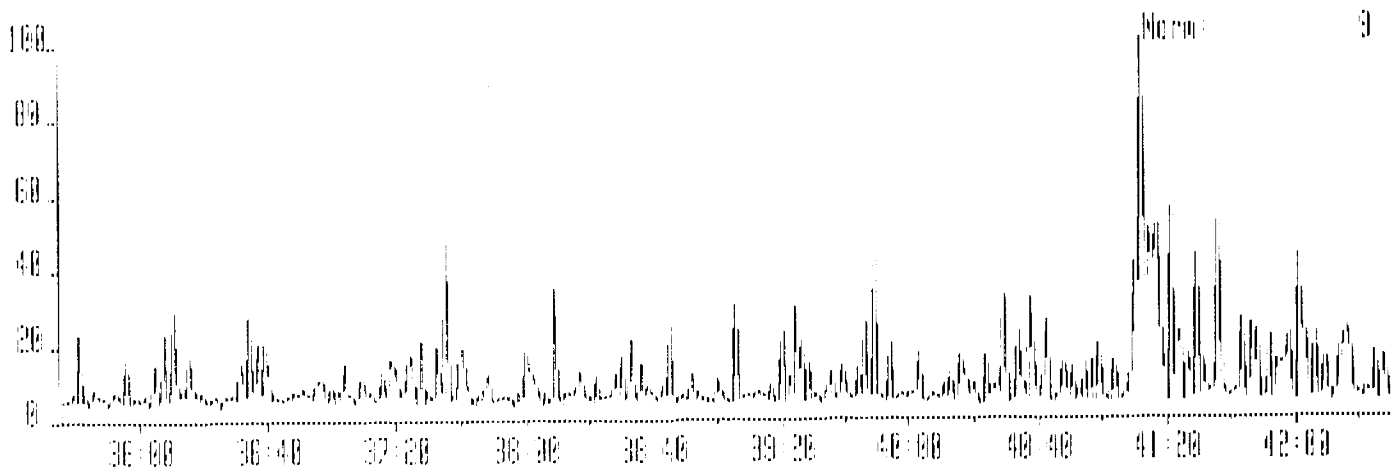
S921620 4-APR-92 Sir:Voltage 705 Sys: MDB5US
Sample 1 Injection 1 Group 4 Mass 435.8169
Text:2727,2728,2730 TL1420522A



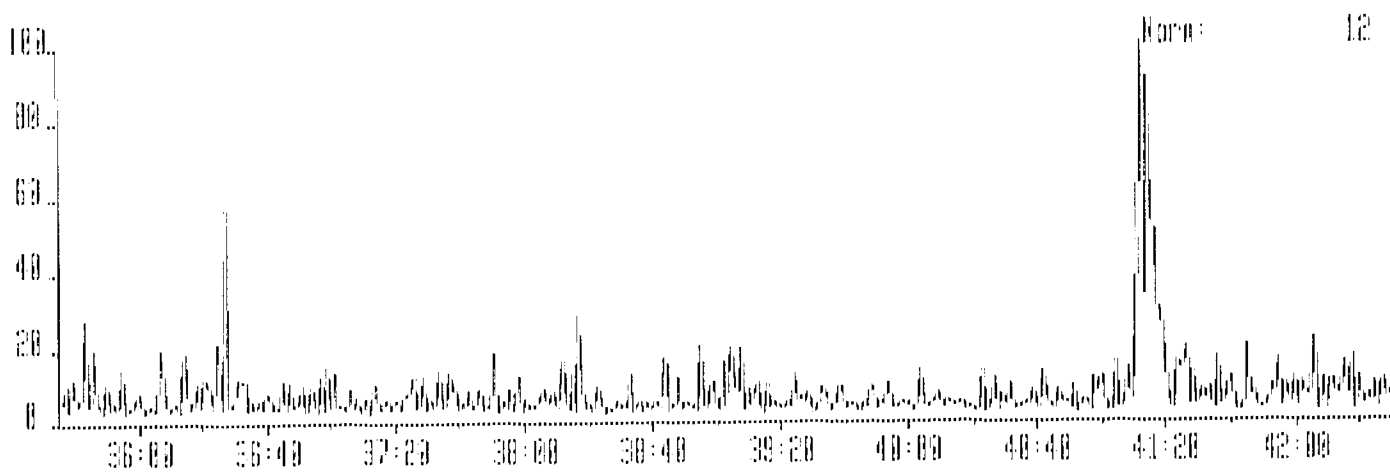
S921620 4-APR-92 Sir:Voltage 705 Sys: MDB5US
Sample 1 Injection 1 Group 4 Mass 437.8140
Text:2727,2728,2730 TL1420522A



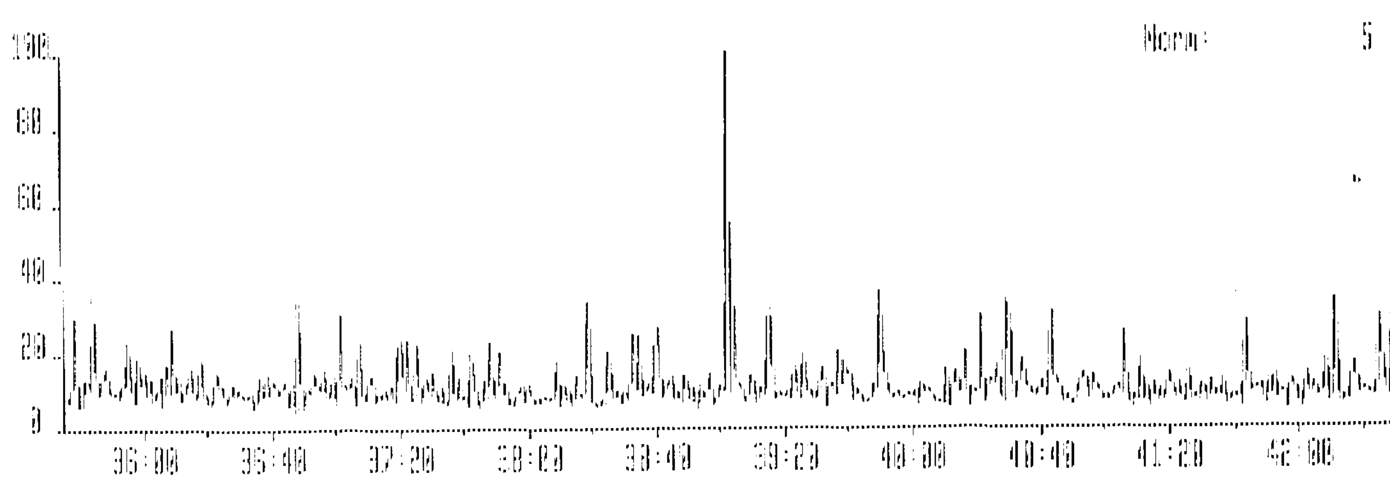
S921620 4-APR-92 Str:Voltage 705 Sys: ND35US
Sample 1 Injection 1 Group 4 Mass 441.7420
Text:2727,2728,2730 TL1#205228



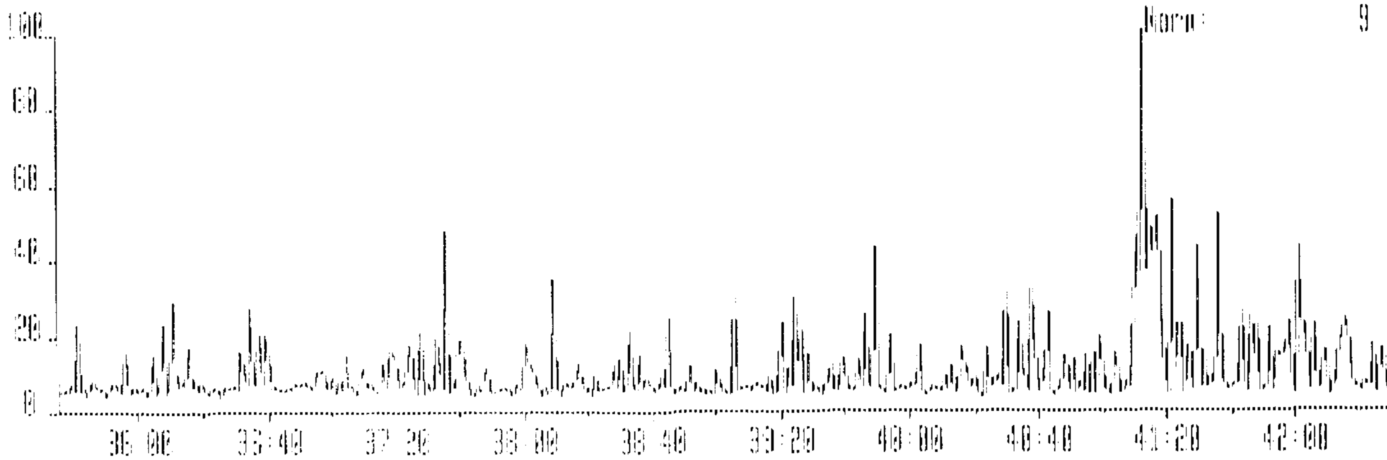
S921620 4-APR-92 Str:Voltage 705 Sys: ND35US
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1#205228



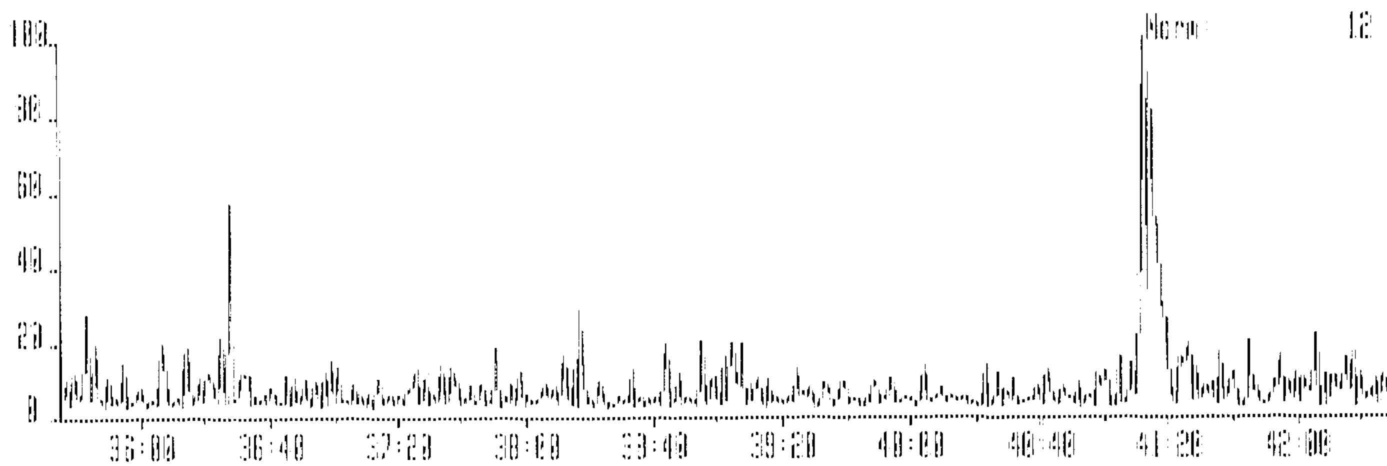
S921620 4-APR-92 Str:Voltage 705 Sys: ND35US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1#205228



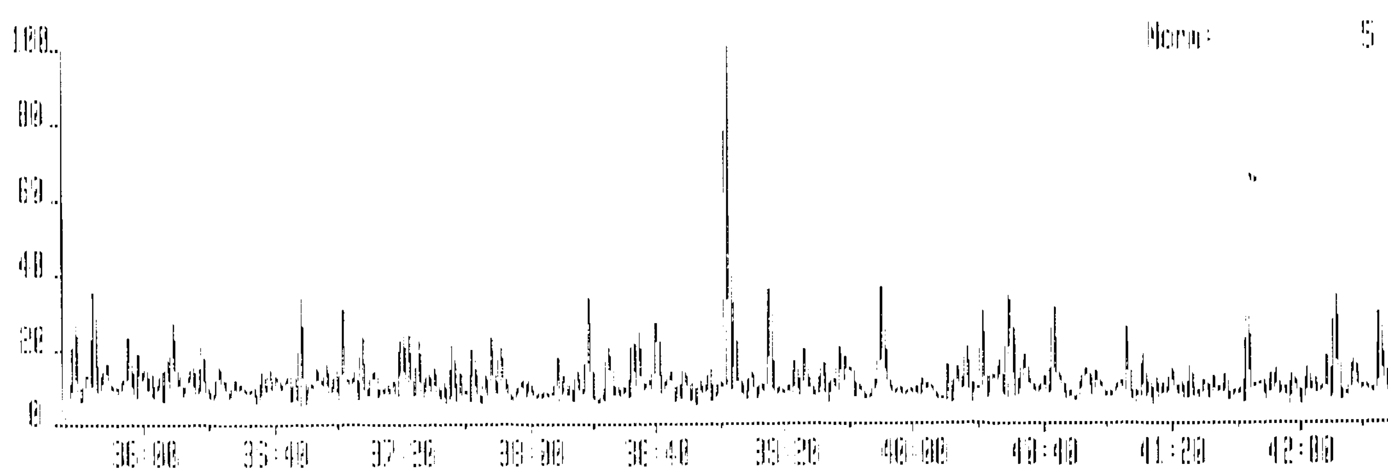
S921620 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL1H205228



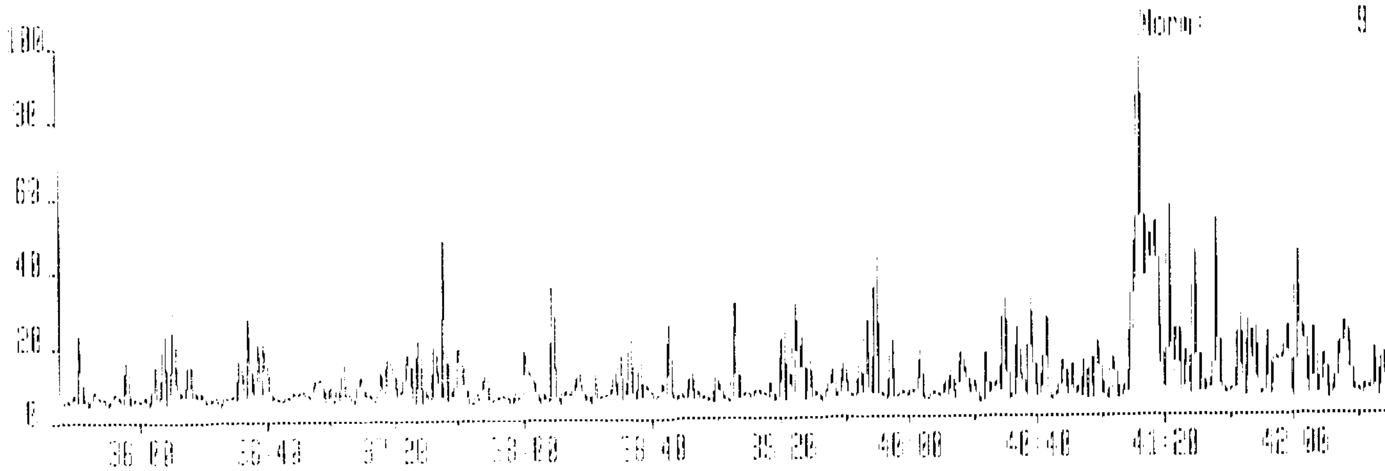
S921620 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 443.7399
Text:2727,2728,2730 TL1H205228



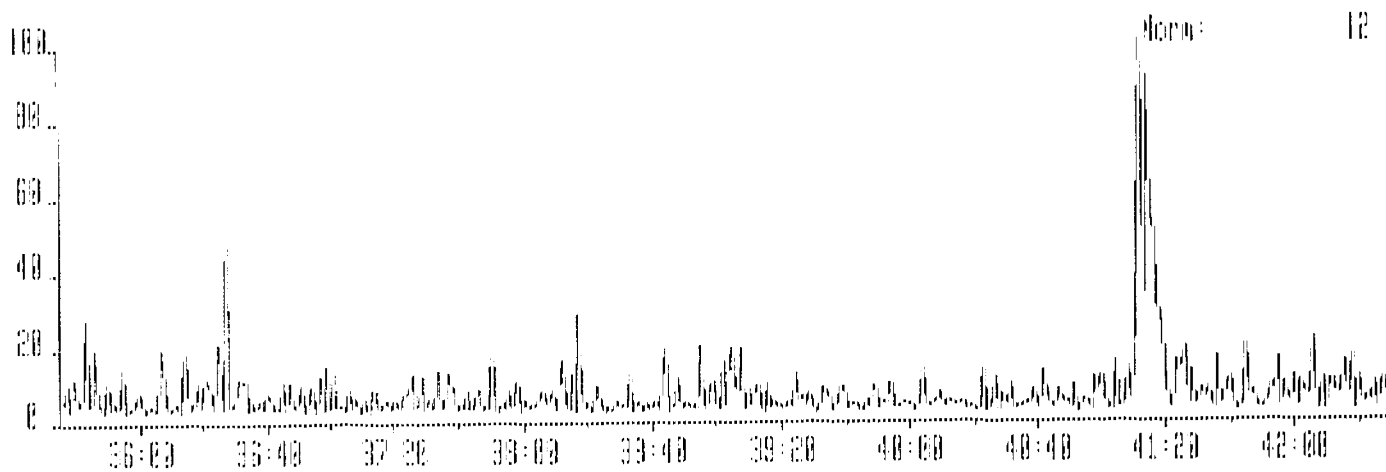
S921620 4-APR-92 Sir:Voltage 70S Sys: NOBSUS
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL1H205228



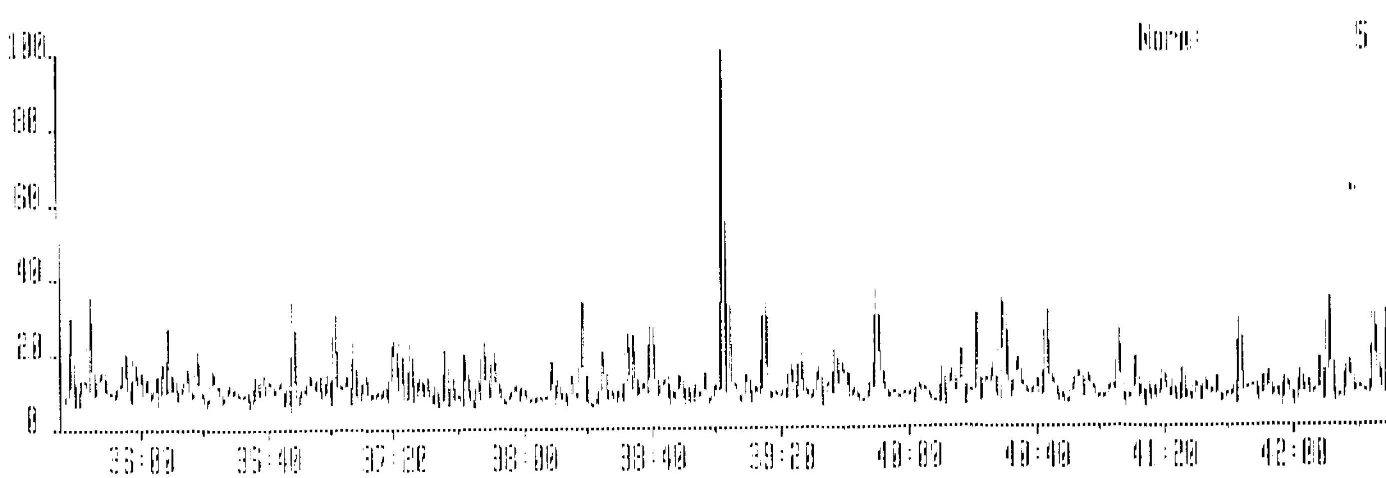
S921620 4-APR-92 Sir Voltage 705 Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 441.7428
Text:2727,2728,2730 TL10205228



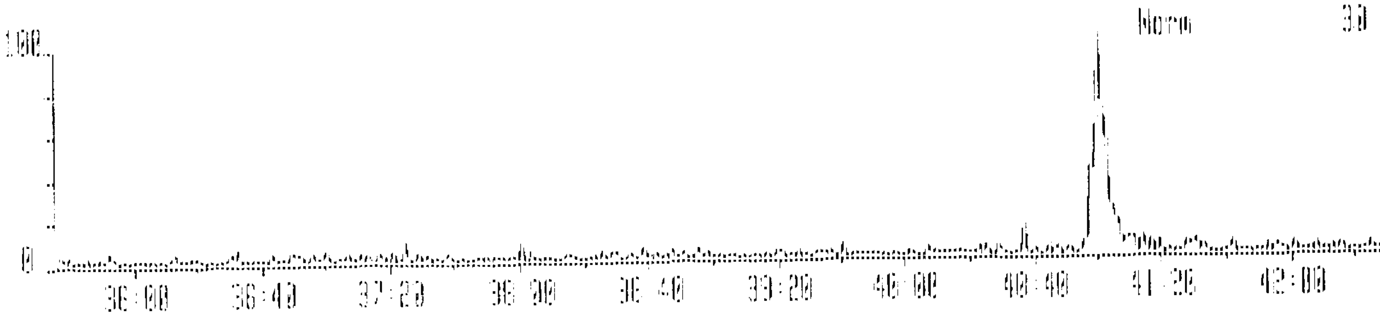
S921620 4-APR-92 Sir Voltage 705 Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 443.7393
Text:2727,2728,2730 TL10205228



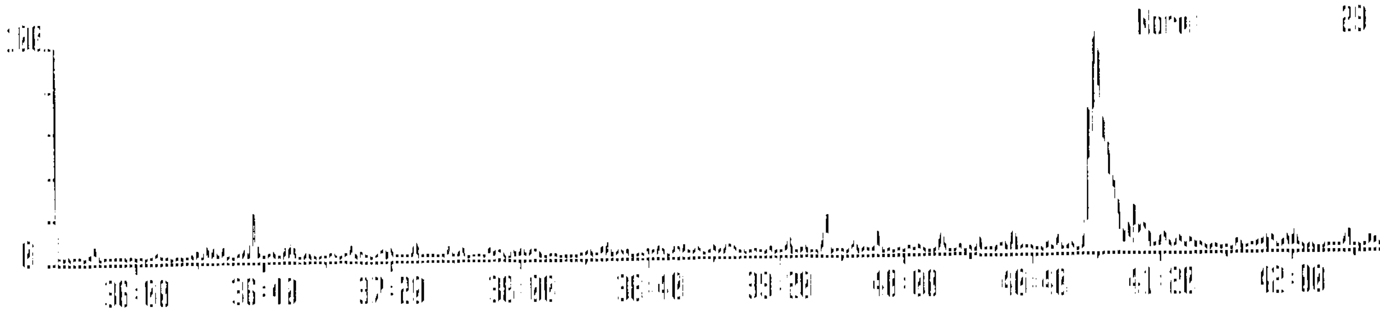
S921620 4-APR-92 Sir Voltage 705 Sys: NOB5US
Sample 1 Injection 1 Group 4 Mass 513.6775
Text:2727,2728,2730 TL10205228



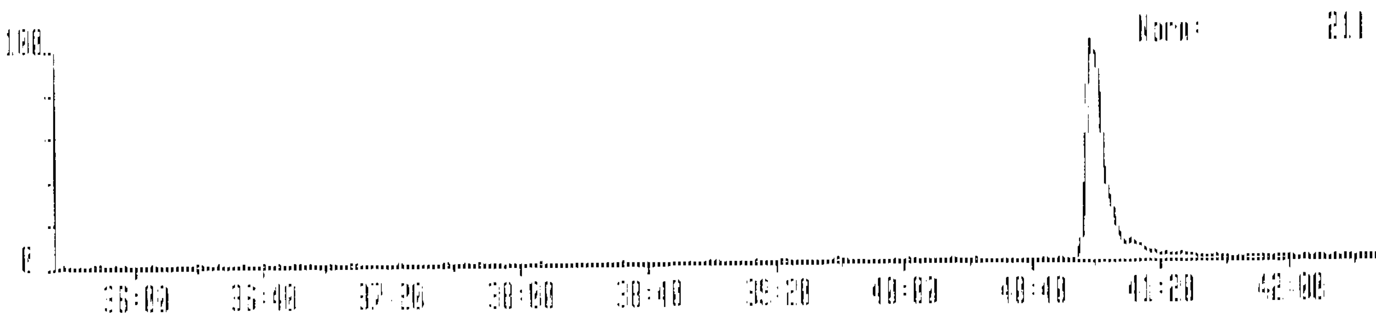
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 457.7377
Text:2727,2728,2730 TL1H205228



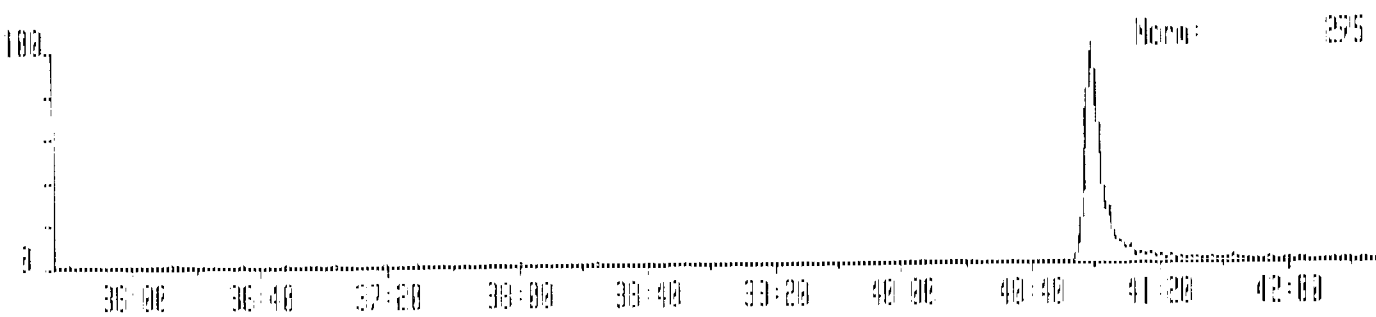
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 459.7348
Text:2727,2728,2730 TL1H205228



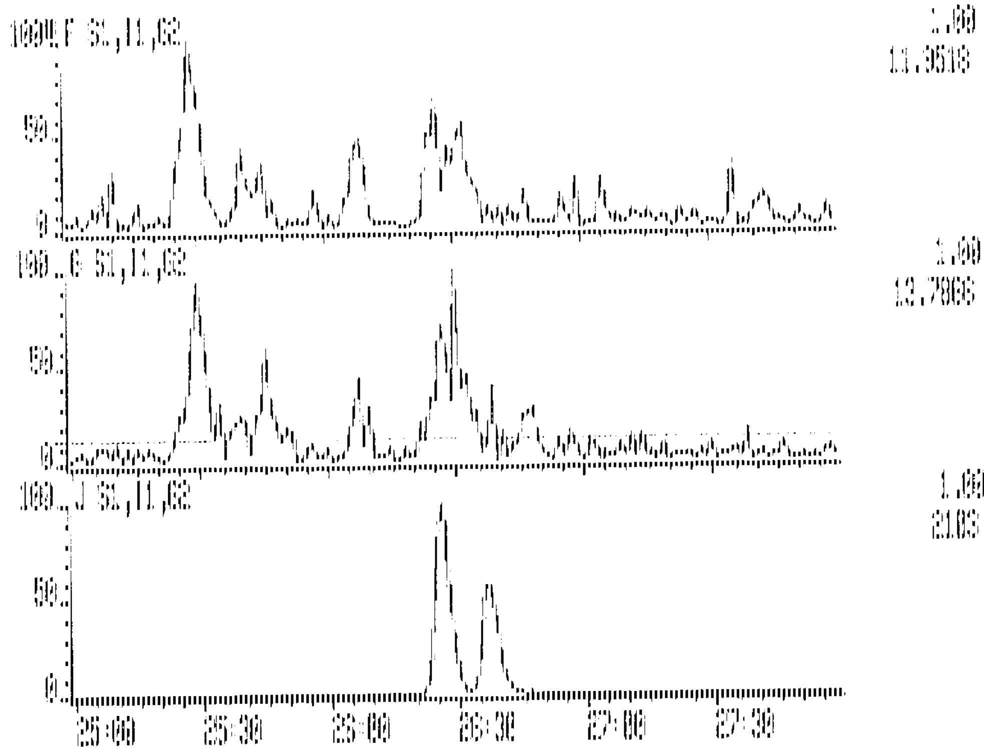
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 469.7779
Text:2727,2728,2730 TL1H205228



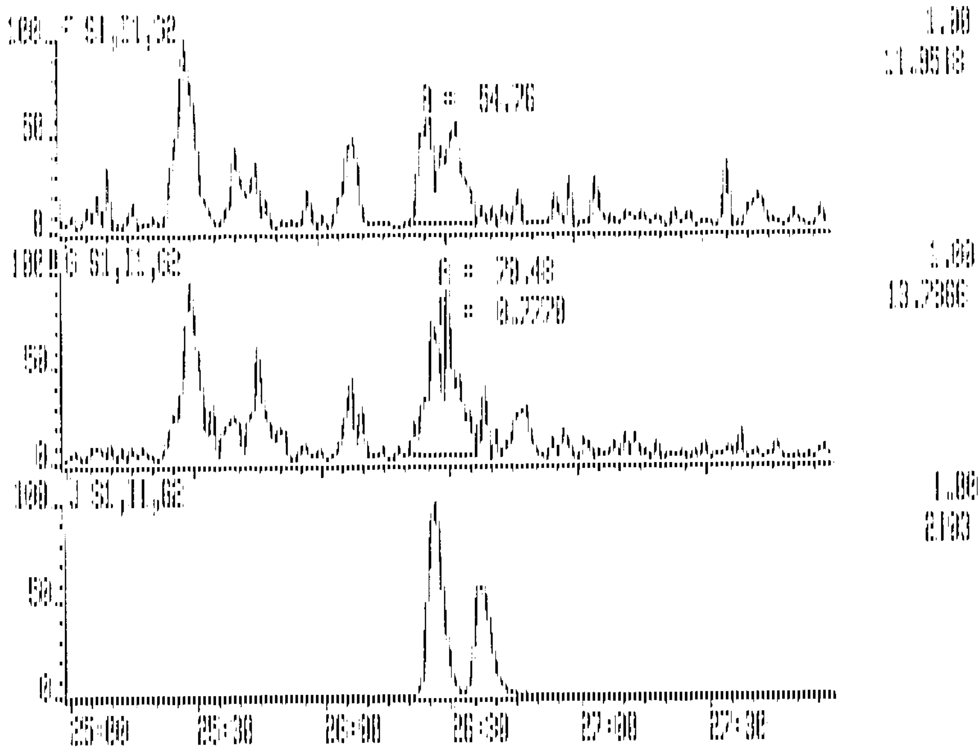
S921620 4-APR-92 Sir:Voltage 70S Sys: NDB5US
Sample 1 Injection 1 Group 4 Mass 471.7750
Text:2727,2728,2730 TL1H205228



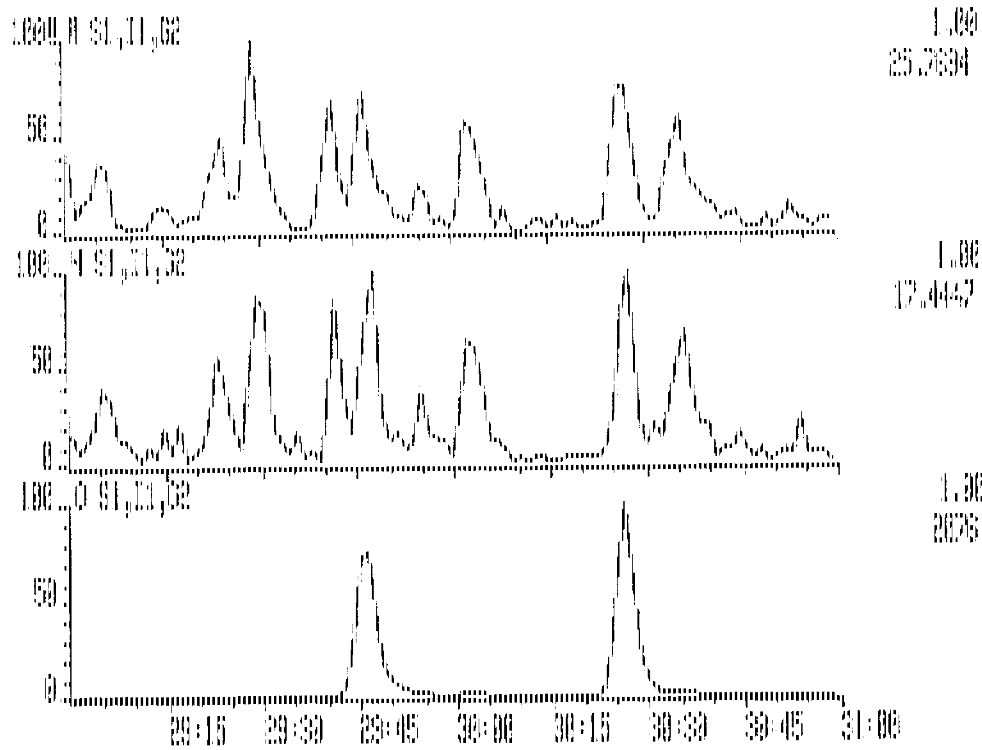
3921520 4-APR-92 14:25 70S (EI-) Sys:NOBSUS
SR 2 F: 319.8965 G: 321.8936 H: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 TL1005228A



S921620   4-APR-92 14 25 70S   (EI+)   Sys:NDB5US
GR 2 I: 319.8965 G: 321.8936 F: 327.8847 I: 330.9792 J: 331.9368
Text:2727,2728,2730 T.J0205228



S921620 4-APR-92 14:25 705 (EI+) Sys:HO85US
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TLIN20522A



S921620   4-APR-92 14:25 709   (EI+)   Sys:NDB5UG
GR 2 M: 339.8597 N: 341.8567 O: 351.9000 P: 353.8970 Q: 355.8546
Text:2727,2728,2730 TL140205228