147428

FINAL
SITE INSPECTION PRIORITIZATION
CORNELL DUBLIER ELECTRONICS, INCORPORATED
SOUTH PLAINFIELD, MIDDLESEX COUNTY, NEW JERSEY

PREPARED UNDER

WORK ASSIGNMENT NO. 038-2JZZ
CONTRACT NO. 68-W9-0051

JANUARY 23, 1995
REV. NO. 0

VOLUME 3 OF 3

HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS
575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Lab No. 660546
Type: Misc. - Tier I
Point: Background
Date Collected: 9/11/86
Date Received: 9/12/86
Collected By: CL 99

PRIORITY POLLUTANTS ANALYSIS - PURGEABLE ORGANICS

Scan No.	Cas Number	Compound	ug/kg
	74-87-3	Chloromethane	10U
	74-83-9	Bromomethane	10U
	75-01-4	Vinyl chloride	10U
	75-00-3	Chloroethane	10U
111	75-09-2	Methylene chloride	4000
	75-69-4	Trichlorofluoromethane	10U
188	75-35-4	1,1-dichloroethene	61
	75-34-3	1,1-dichloroethane	10U
	156-60-5	Cis/Trans-1,2-dichloroethene	10U
	67-66-3	Chloroform	10U
	107-06-2	1,2-dichloroethane	10U
317	71-55-6	1,1,1-Trichloroethane	110B
	56-23-5	Carbon tetrachloride	10U
	75-27-4	Bromodichloromethane	10U
	79-34-5	1,1,2,2-Tetrachloroethane	10U
	70-87-5	1,2-dichloropropane	10U
	10061-02-6	Trans-1,3-dichloropropene	10U
407	79-01-6	Trichloroethene	6J
	124-48-1	Dibromochloromethane	10U
	79-00-5	1,1,2-trichloroethane	10U
	71-43-2	Benzene	10U
	10061-01-5	cis-1,3-Dichloropropene	10U
	110-75-8	2-chloroethylvinyl ether	10U
	75-25-2	Bromoform	10U
	127-10-4	Tetrachloroethene	10U
594	106-88-3	Toluene	3J
	106-90-7	Chlorobenzene	10U
	100-41-4	Ethylbenzene	10U
	541-73-1	1,2-Dichlorobenzene	10U
	95-50-1	1,3-Dichlorobenzene	10U
	106-46-1	1,4-Dichlorobenzene	10U

Date Reported: 10/15/86

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S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: S-3

ORGANICS ANALYSIS DATA SHEET
(Page 4)

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob. FIT	% Prob. RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown (Carbon Dioxide)	-	-	13	330B
2.		Unknown	-	-	150	31
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H2M

HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS

575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

Lab Name: H2M Labs

Sample Lab No. 660547 - S-3

Concentration: Low

Date Extracted: 9/24/86

Date Analyzed: 10/6/86

Dil. Factor: 1:2

Semi-Volatile Compounds

C.A.S. Number		ug/kg	C.A.S. Number		ug/kg	Scan No
65-75-9	N-Nitrosodimethylamine	20000U	83-32-9	Acenaphthene	760J	886
108-95-2	Phenol	20000U	51-28-5	2,4-Dinitrophenol	20000U	
62-53-3	Aniline	20000U	100-02-7	4-Nitrophenol	20000U	
111-44-4	bis(2-Chloroethyl)Ether	20000U	121-14-2	2,4-Dinitrotoluene	20000U	
95-57-8	2-Chlorpphenol	20000U	606-20-2	2,6-Dinitrotoluene	20000U	
541-73-1	1,3-Dichlorobenzene	20000U	84-66-2	Diethylphthalate	20000U	
106-46-7	1,4-Dichlorobenzene	20000U	7005-72-3	4-Chlorophenyl-phenylether	20000U	
95-50-1	1,2-Dichlorobenzene	20000U	86-73-7	Fluorene	20000U	
39638329	bis(2-chloroisopropyl)ether	20000U	534-52-1	4,6-Dinitro-2-MethyIphenol	20000U	
621-64-7	N-Nitroso-Di-n-Propylamine	20000U	86-30-6	N-Niturososdiphenylamine (1)	20000U	
67-72-1	Hexachloroethane	20000U	101-55-3	4-Bromophenyl-phenylether	20000U	
98-95-3	Nitrobenzene	20000U	118-74-1	Hexachlorobenzene	20000U	
78-59-1	Isophorone	20000U	87-86-5	Pentachlorophenol	20000U	
88-75-5	2-Nitrophenol	20000U	85-01-8	Phenanthrene	15000J	110
105-67-9	2,4-Dimethylphenol	20000U	120-12-7	Anthracene	2900J	110
111-91-1	bis(2-Chloroethoxy)Methane	20000U	84-74-2	Di-n-Butylphthalate	20000U	
120-83-2	2,4-Dichlorophenol	20000U	206-44-0	Fluoranthene	40000	128
120-82-1	1,2,4-Trichlorobenzene	20000U	92-87-5	Benzidine	60000U	
91-20-3	Naphthalene *	620J	129-00-0	Pyrene	25000	131
87-68-3	Hexachlorobutadiene	20000U	85-68-7	Butylbenzylphthalate	20000U	
59-50-7	4-Chloro-3-Methylphenol	20000U	91-94-1	3,3'-Dichlorobenzidine	20000U	
77-47-4	Hexachlorocyclopentadiene	20000U	56-55-3	Benzo(a)Anthracene	12000J	149
88-06-2	2,4,6-Trichlorophenol	20000U	117-81-7	bis(2-Ethylhexyl)Phthalate	3400J	152
91-58-7	2-Chloronaphthalene	20000U	218-01-9	Chrysene	14000J	150
131-11-3	Dimethyl Phthalate	20000U	117-84-0	Di-n-Octyl Phthalate	20000U	
208-96-8	Acenaphthylene	20000U	205-99-2	Benzo(b)Fluoranthene	12000J	164
			207-08-9	Benzo(k)Fluoranthene	12000J	164
			50-32-8	Benzo(a)Pyrene	12200J	168
			193-39-5	Indeno(1,2,3-cd)Pyrene	9600J	184
			53-70-3	Dibenzo(a,h)Anthracene	20000U	
			191-24-2	Benzo(g,h,i)Perylene	12000J	189

* Scan #615

(1) Cannot be separated from diphenylamine

Date Reported: 10/16/86

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S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: S-3

ORGANICS ANALYSIS DATA SHEET
(Page 4)

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob FIT|RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Polychlorinated Biphenyl	96	1342	21000J
2.		Polychlorinated Biphenyl	96	1354	16000J
3.		Polychlorinated Biphenyl	96	1384	21000J
4.		Polychlorinated Biphenyl	98	1442	15000J
5.		Polynuclear Aromatic	-	1649	21000J
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H2M

HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS

575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Sample Lab No. 660548
Date Extracted: 9/18/86
Date Analyzed: 10/7/86
Type: Misc. - Tier I
Point: S-3
Collected By: CL 99

ANALYSIS FOR PESTICIDES/PCB's

C.A.S. No.	Compound	ug/kg
319-84-6	Alpha-BHC	100U
319-87-7	Beta-BHC	100U
319-86-8	Delta-BHC	100U
58-89-9	Gamma-BHC (Lindane)	100U
76-44-8	Heptachlor	100U
309-00-2	Aldrin	100U
1024-57-3	Heptachlor Epoxide	2000U
959-98-8	Endosulfan I	400U
68-57-1	Dieldrin	2000U
72-55-9	4,4'-DDE	400U
72-20-8	Endrin	400U
33213-65-9	Endosulfan II	400U
72-54-8	4,4'-DDD	400U
1031-07-8	Endosulfan Sulfate	400U
50-29-3	4,4'-DDT	2000U
72-43-5	Methoxychlor	80U
53494-70-5	Endrin Ketone	16U
57-74-9	Chlordane	400U
8001-35-2	Toxaphene	400U
12674-11-2	Aroclor 1016	300U
11104-28-2	Aroclor 1221	300U
11141-16-5	Aroclor 1232	300U
53469-21-9	Aroclor 1242	300U
12672-29-6	Aroclor 1248	300U
11097-69-1	Aroclor 1254	410000
11096-82-5	Aroclor 1260	2000U

Vi = Volume of extract injected (uL)
Ws = Weight of sample extracted (g)
Vs = Ws = 9.05 g Vt = 10 mL
Date Reported: 10/17/86

Vs = Volume of water extracted (mL)
Vt = Volume of Total extract (mL)
Vi = 5 uL

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S.C. McLendon, P.E.
Laboratory Director

25
235

Lab Name : H2M LABS

ORGANICS ANALYSIS DATA SHEET

Sample Number
660548

NJDEP #CD910-S3
Run2269

Tentatively identified Compounds

	C.A.S. Number	Compound Name	% Probability FIT	% Probability RCFIT	RT or Scan Number	Estimated Concentration (ug/ L or ug/kg)
1.		Unknown			2.22	80
2.		Unknown			2.74	270
3.		Unknown			3.09	220
4.		Unknown			348	980
5.		Unknown			4.25	1300
6.		Unknown			17.54	88
7.		Unknown			19.11	700
8.		Unknown			20.36	32
9.		Unknown			21.38	380
10.		Unknown			28.41	230
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H2M
Environmental Engineers & Scientists
HOLZMACHER, McLENDON and MURRELL, P.C.
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040

WATER RESOURCES • WATER SUPPLY & TREATMENT • SEWERAGE & TREATMENT • ECOLOGICAL & IMPACT STUDIES
MODEL STUDIES • PILOT PLANT STUDIES • WATER/WASTE WATER LABORATORY AND ANALYTICAL SERVICES

LABORATORY REPORT

LAB NO. 660549
PROJECT NO. 2C

CLIENT'S NAME AND ADDRESS

NEW JERSEY D.E.P.
65 PROSPECT ST.
TRENTON, NEW JERSEY 08618

TYPE OF SAMPLE - MISCELLANEOUS
COLLECTED BY CL 99
DATE COLLECTED - 9/11/86
DATE RECEIVED - 9/12/86

NJDEP SAMPLE #CD 910-S3
NJDEP SAMPLE POINT I.D. #BACKGROUND
SOIL SAMPLE

PARAMETER	RESULT	PARAMETER	RESULT
ANTIMONY	30.4 N	SELENIUM	<0.20 N
ARSENIC	26.2	SILVER	11.1 N
BERYLLIUM	2.90	THALLIUM	<2.20 N
CADMIUM	55.3	ZINC	1800 N
CHROMIUM	242.	PHENOLS	0.07
COPPER	1600	CYANIDE	<3.50
LEAD	1930	TOTAL SOLIDS	90.0 %
MERCURY	1.40 N		
NICKEL	589.		

ALL RESULTS REPORTED IN mg/kg DRY WEIGHT

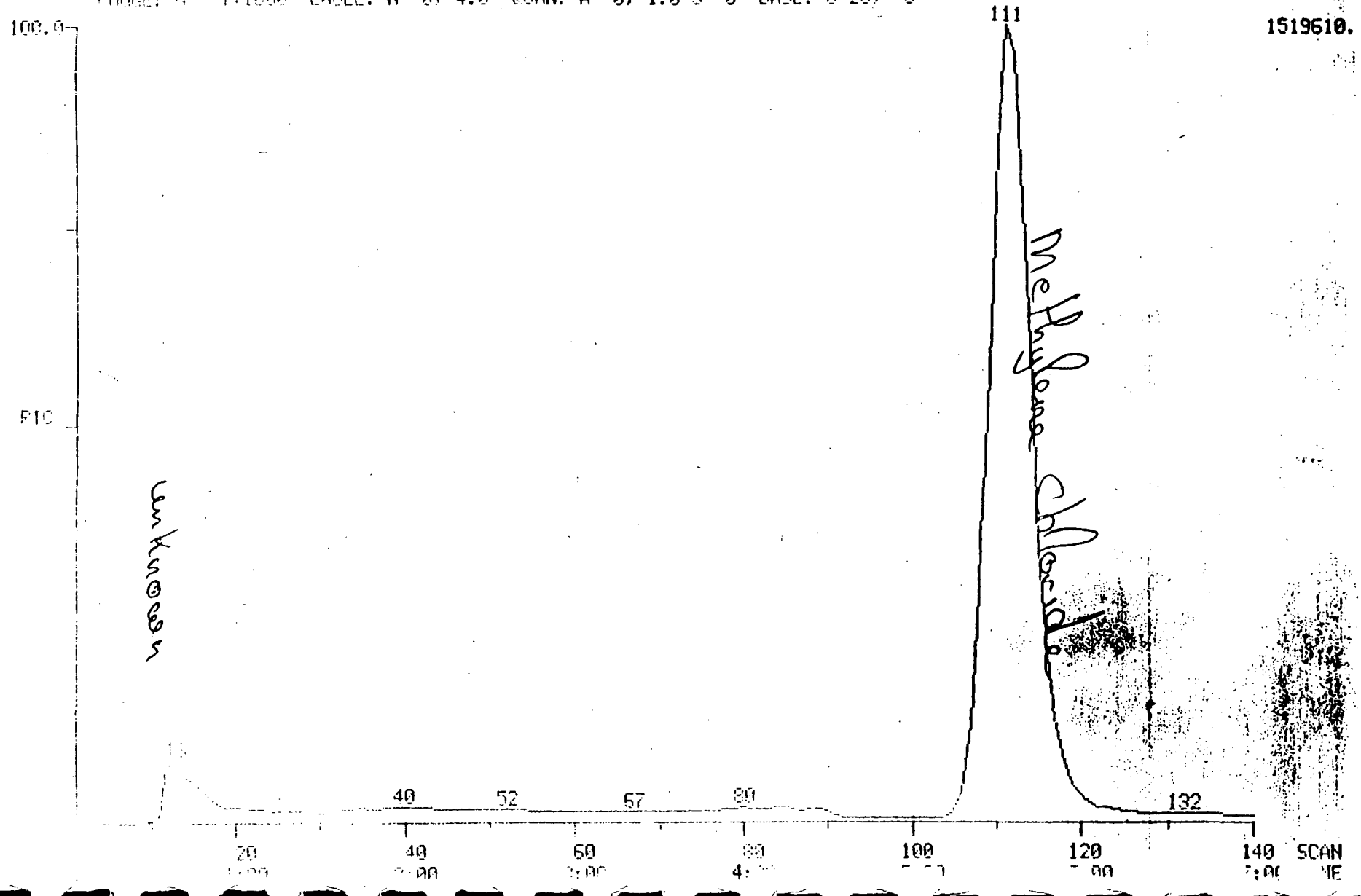
ALL RESULTS IN (MG/L) EXCEPT AS NOTED BY # (UG/L) OR % (PERCENT) AND
T.COLI BACT. I FECAL COLI (MPN/100ML)
COLOR, ODOR, TURBIDITY & PH (UNITS)
APC & FECAL STREP (COUNTS/ML)
SPEC.COND. (UMHOS) SETT.SOLIDS(ML/L)

DATE REPORTED 10/ 8/86

S. C. McLENDON, P.E., LABORATORY DIRECTOR

THE LIABILITY OF H2M CORP. SHALL BE LIMITED TO THE PRICE OF THE SERVICE RENDERED AND PAID.

DATA: FU6434 #1 SCANS 1 TO 140
CALI: FU6434 #2
20:03:00
SAMPLE: 5005X
46 gms
PAGE: 1.1000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



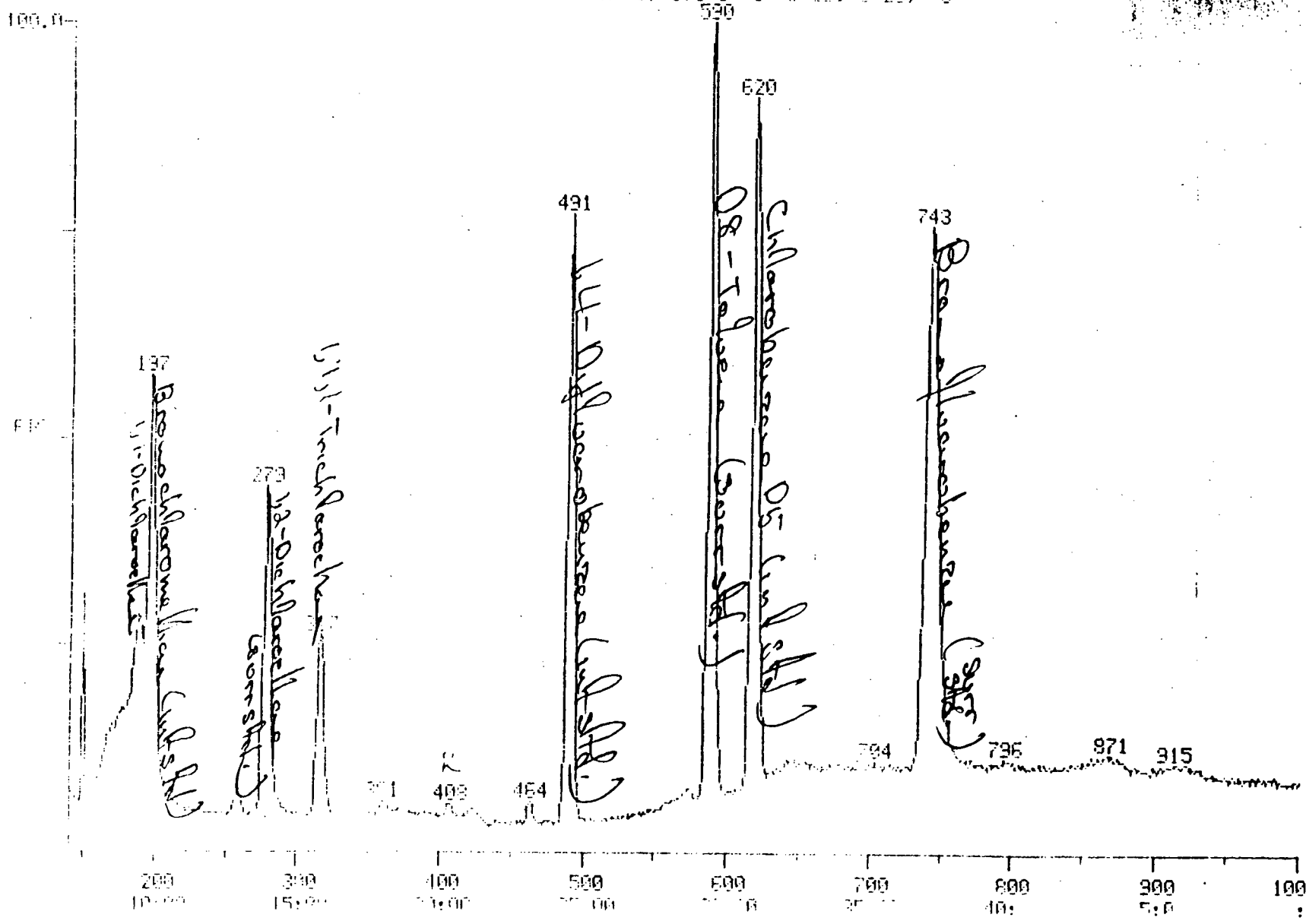
DATA: FU6434 #1
CAL: FU5434 #2

SCANS 140 TO 1000

16 gms

RANGE: 0 1-1000 LABEL: U 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

182528.



65e

QUANTITATION REPORT FILE: PU6434

DATA: PU6434.TI
09/26/86 20:09:00
SAMPLE: 660536
CONDS.: 46 gms
SUBMITTED BY: NJDEP ANALYST: CC

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
RESP. FAC. FROM LIBRARY ENTRY

No	NAME
1	BROMOCHRLOROMETHANE (INT. STD.)
2	1,2-DICHLOROETHANE D4 (SURR. BID)
3	CHLOROMETHANE
4	BROMOMETHANE
5	VINYL CHLORIDE
6	CHLOROETHANE
7	METHYLENE CHLORIDE (C)
8	ACETONE
9	CARBON DISULPHIDE
10	1,1-DICHLOROETHENE (B)
11	1,1-DICHLOROETHANE(E)
12	TRANS -1,2-DICHLOROETHENE (D)
13	CHLOROFORM
14	1,2-DICHLOROETHANE(H)
15	TRICHLOROFLUOROMETHANE
16	DICHLOROFLUOROMETHANE
17	ACROLEIN
18	ACRYLONITRILE
19	1,4-DIFLUOROBENZENE(INT STD)
20	2-BUTANONE (MEK)
21	1,1,1-TRICHLOROETHANE (I)
22	CARBON TETRA CHLORIDE
23	BROMODICHLOROMETHANE(L)
24	1,2-DICHLOROPROPANE(X)
25	TRANS-1,3-DICHLOROPROPENE (AA)
26	TRICHLOROETHENE(K)
27	DIBROMOCHLOROMETHANE(O)
28	1,1,2-TRICHLOROETANE(M)
29	BENZENE(BEN)
30	CIS-1,3-DICHLOROPROPENE(Z)
31	2-CHLOROETHYLVINYLETHER(NN)
32	BROMOFORM(P)
33	CHLOROBENZENE-D5 (INT STD)
34	2-HEXANONE(MBK)
35	4-METHYL-2-PENTANONE(MIBK)
36	TETRACHLOROETHENE(Q)
37	ETHANE, 1,1,2,2-TETRACHLORO-
38	TOLUENE(TOL)
39	CHLOROBENZENE(G)
40	ETHYLBENZENE(EB)
41	STYRENE
42	META-XYLENE
43	ORTHO/PARA-XYLENE
44	META-DICHLOROBENZENE
45	ORTHO-DICHLOROBENZENE
46	PARA-DICHLOROBENZENE
47	[illegible]
48	BROMOFLUOROBENZENE(S)

No	MIN	SCAN	TIME	RT	RRT	METH	AREA(UGHT)	AMOUNT

24

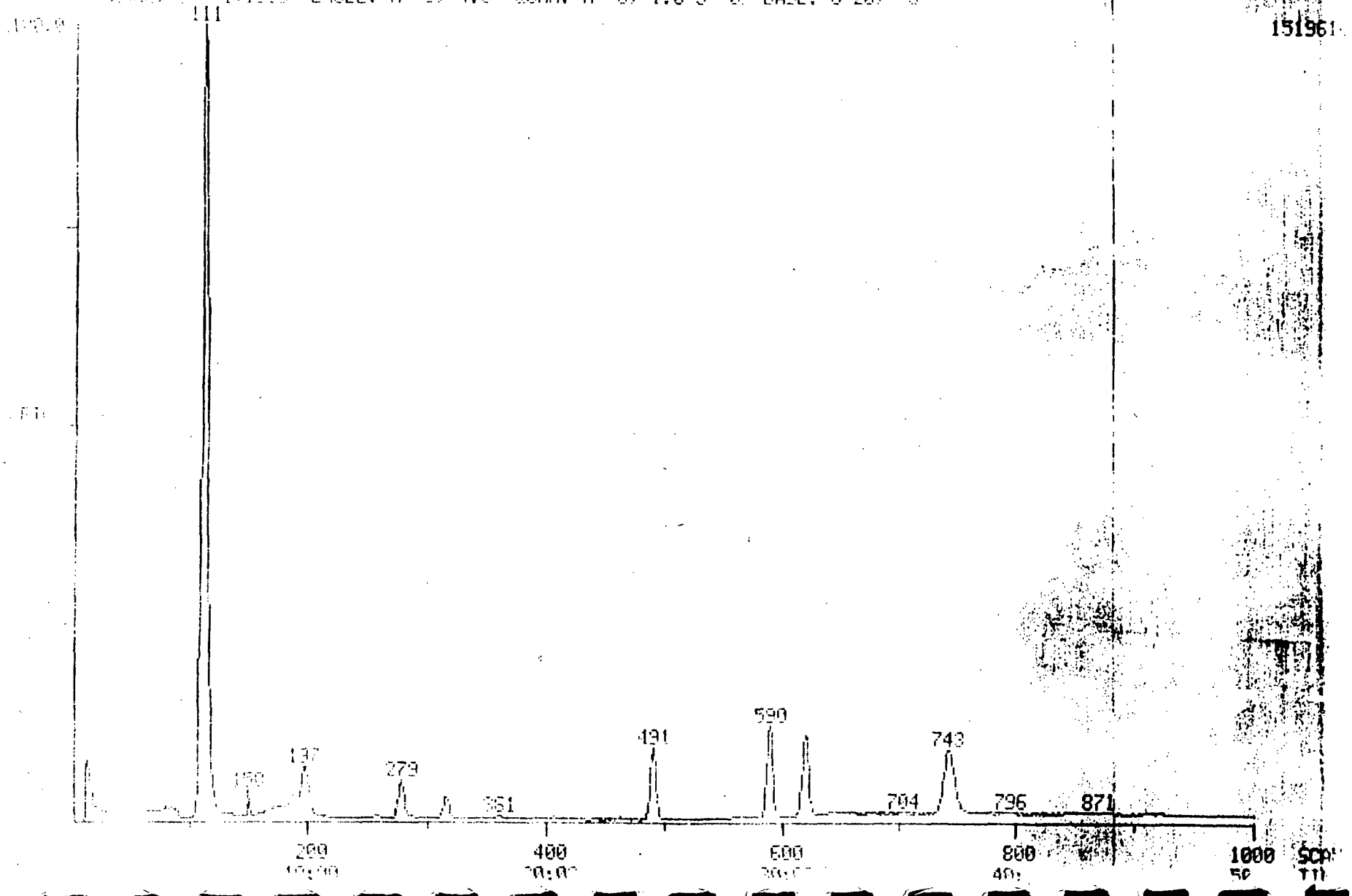
09e

4	NOT FOUND									
5	NOT FOUND									
6	NOT FOUND									
7	84	111	5:33	1	0.561	A BB	1704080.	3711.170	NG	60.95
8	43	139	6:57	1	0.702	A BB	7297.	42.440	NG	0.76
9	NOT FOUND									
10	96	188	9:24	1	0.949	A BB	17275.	56.704	NG	0.93
11	NOT FOUND									
12	NOT FOUND									
13	NOT FOUND									
14	NOT FOUND									
15	NOT FOUND									
16	85	52	2:36	1	0.263	A BB	3489.	456.821	NG	7.50
17	NOT FOUND									
18	NOT FOUND									
19	114	491	24:33	19	1.000	A BB	287823.	250.000	NG	4.11
20	43	287	14:21	19	0.585	A*VB	13119.	49.128	NG	0.81
21	97	317	15:51	19	0.646	A BB	50609.	100.591	NG	1.65
22	NOT FOUND									
23	NOT FOUND									
24	NOT FOUND									
25	NOT FOUND									
26	130	407	20:21	19	0.829	A BB	3047.	5.817	NG	0.10
27	NOT FOUND									
28	NOT FOUND									
29	78	432	21:36	[illegible]	0.880	A BB	191.	0.101	NG	0.01
30	NOT FOUND									
31	NOT FOUND									
32	NOT FOUND									
33	117	620	31:00	33	1.000	A BB	240303.	250.000	NG	4.11
34	43	511	25:33	33	0.824	A*BB	881.	137.748	NG	2.26
35	43	549	27:27	33	0.885	A BV	2899.	66.413	NG	1.01
36	NOT FOUND									
37	NOT FOUND									
38	92	594	29:42	33	0.958	A BB	2532.	2.645	NG	0.04
39	NOT FOUND									
40	NOT FOUND									
41	NOT FOUND									
42	NOT FOUND									
43	106	796	39:48	33	1.284	A BB	340.	156.508	NG	2.57
44	NOT FOUND									
45	NOT FOUND									
46	NOT FOUND									
47	100	590	29:30	33	0.952	A BB	171910.	277.103	NG	4.54
48	95	743	37:09	33	1.198	A BB	216741.	238.597	NG	3.91

DATA: PU5434 #1 SCANS 1 TO 1000
CALI: PU5434 #2

46 gms

1.1000 LABEL: N 0. 4.0 QUAN: A 0. 1.0 J 0. BASE: U 20. 3



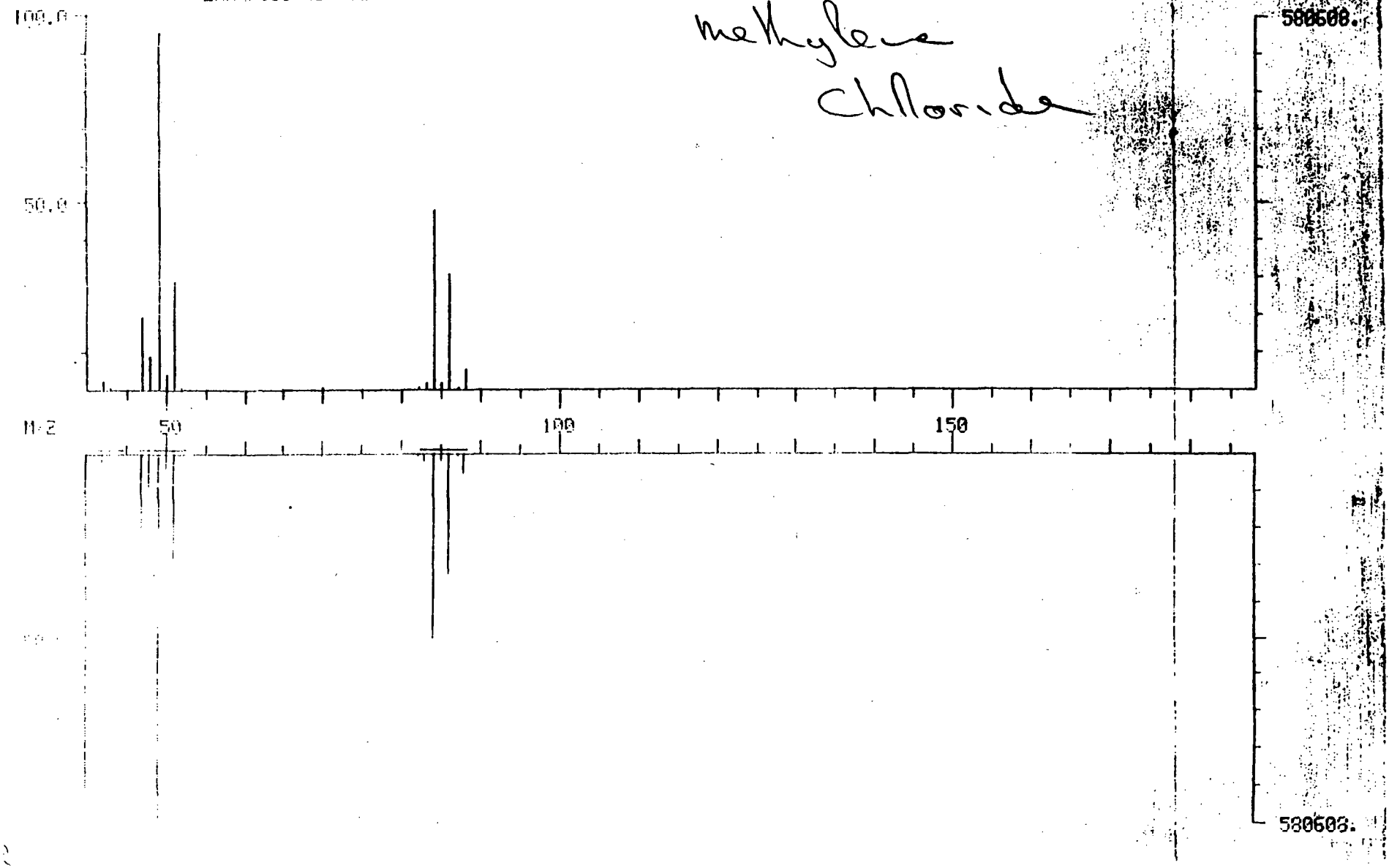
151961

SPECTRUM
20:09:00 + 5:33
SAMPLE: 5505X
CONDS.: 46gm
ENHANCED (S 15B 2N 0T)

DATA: PU6434 #111
CAL 1: PU6434 #2

BASE M/Z: 49/ 49
PIC: 1441790./ 1521660.

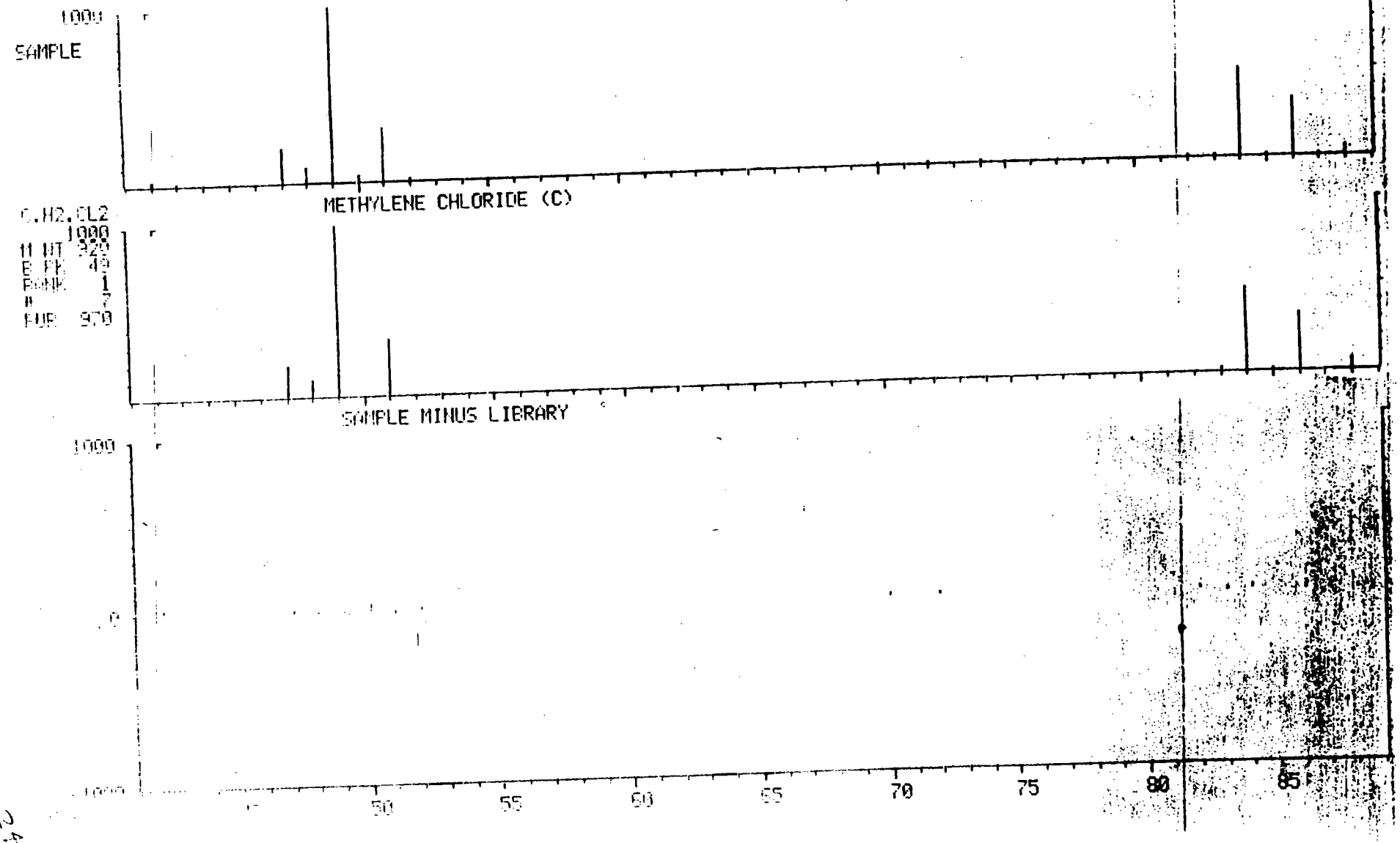
methylene Chloride



LIBRARY SEARCH
DATE: 20:09:00 + 5:33
SAMPLE: 660538
CONDS.: 46 gms
ENHANCED (S 15B 2M 0T)

DATA: PU6434 # 111
CALI: PU6434 # 2

BASE M/Z: 49
RIC: 1441790.



263

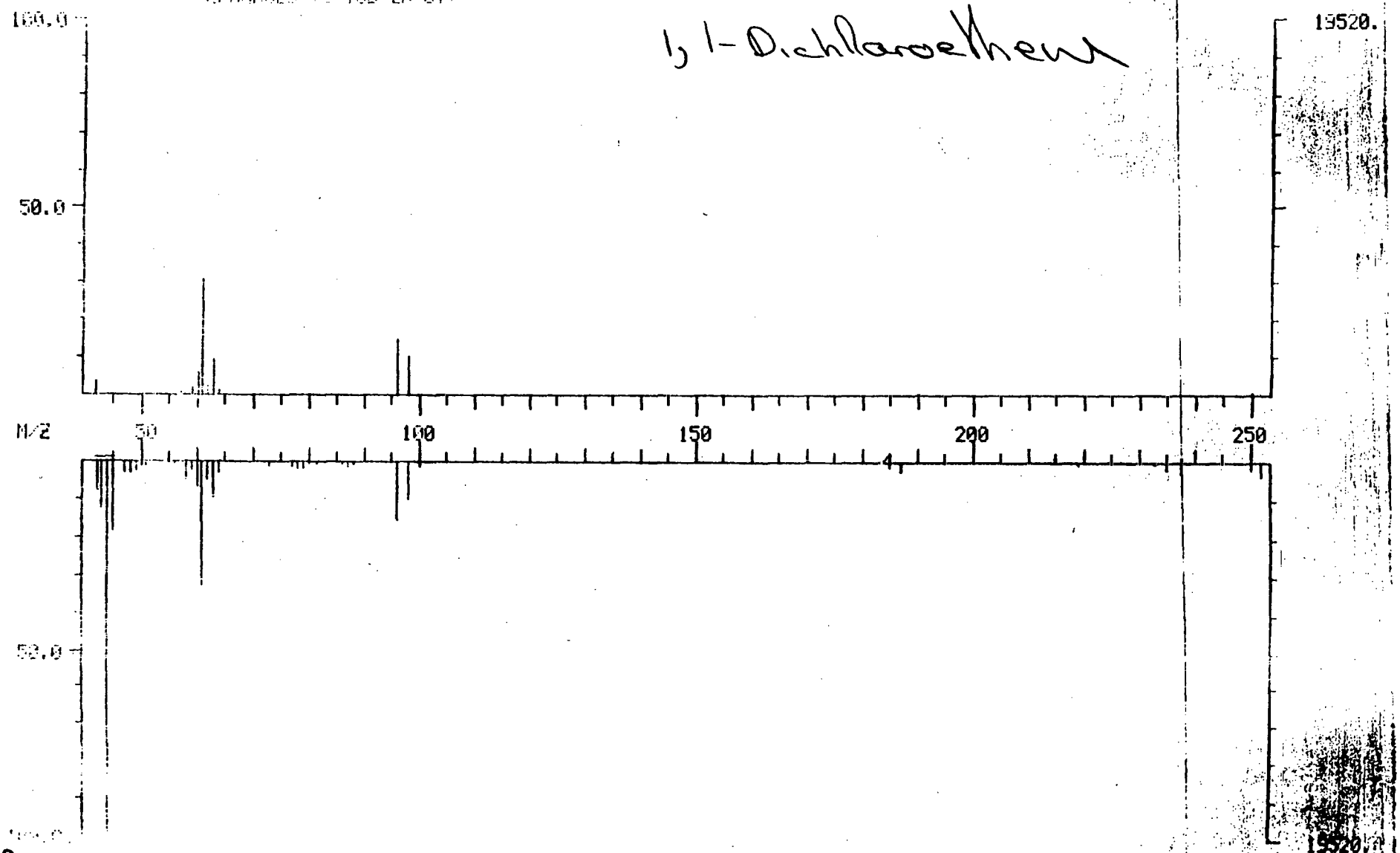
24

DUAL MASS SPECTRUM
02/20/86 20:09:00 + 9:24
SAMPLE: 6605X
CONDS.: 46 gms
ENHANCED (S 15B 2N 0T)

DATA: PU6434 #189
CALI: PU6434 #2

BASE M/Z: 61 44
RIC: 15871. 51455.

1,1-Dichloroethene

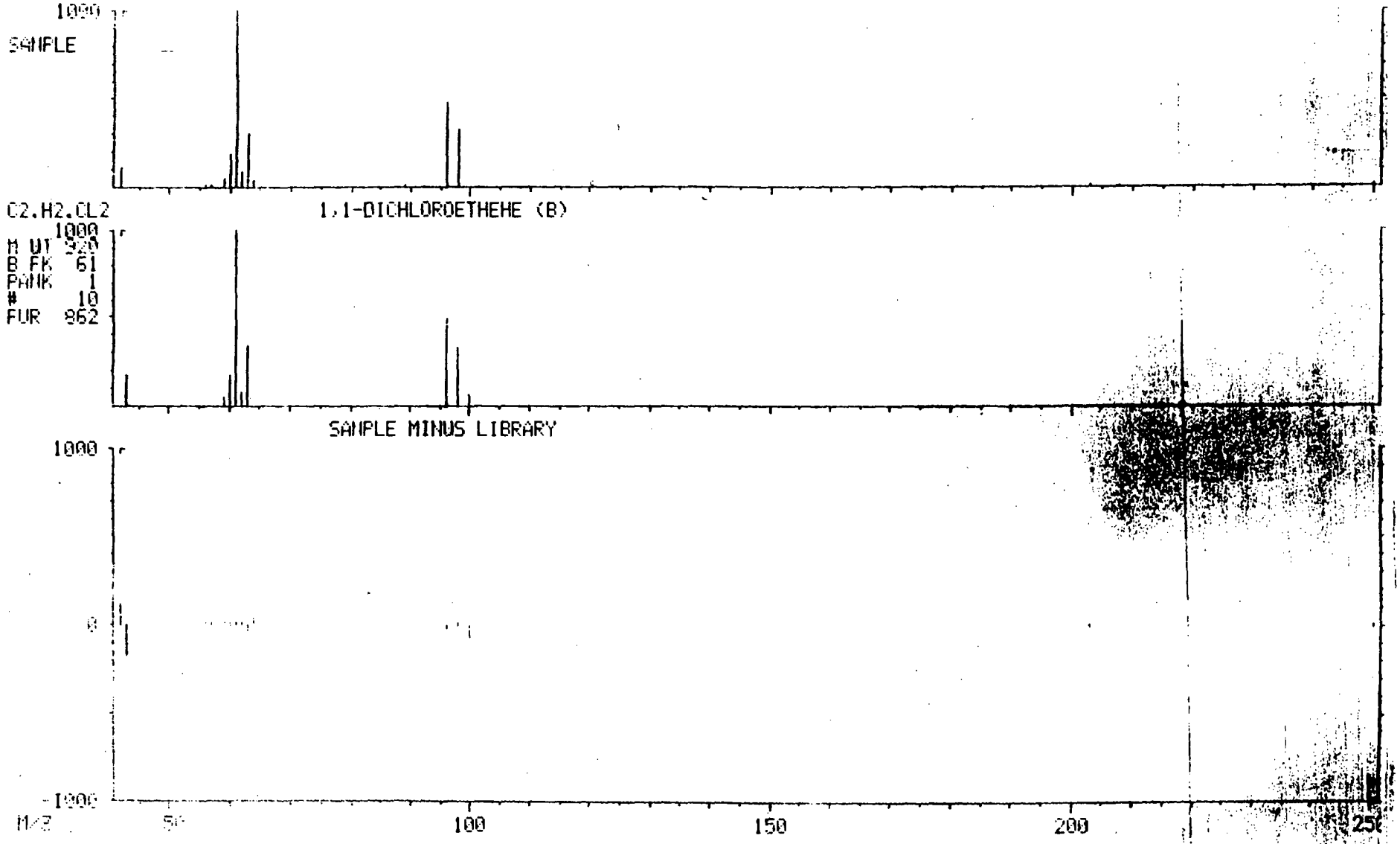


26

LIBRARY SEARCH
09/26/85 20:09:00 + 9:24
SAMPLE: 66055
CONDS.: 46 gms
ENHANCED (S 150 2N 0T)

DATA: PU6434 # 188
CALI: PU6434 # 2

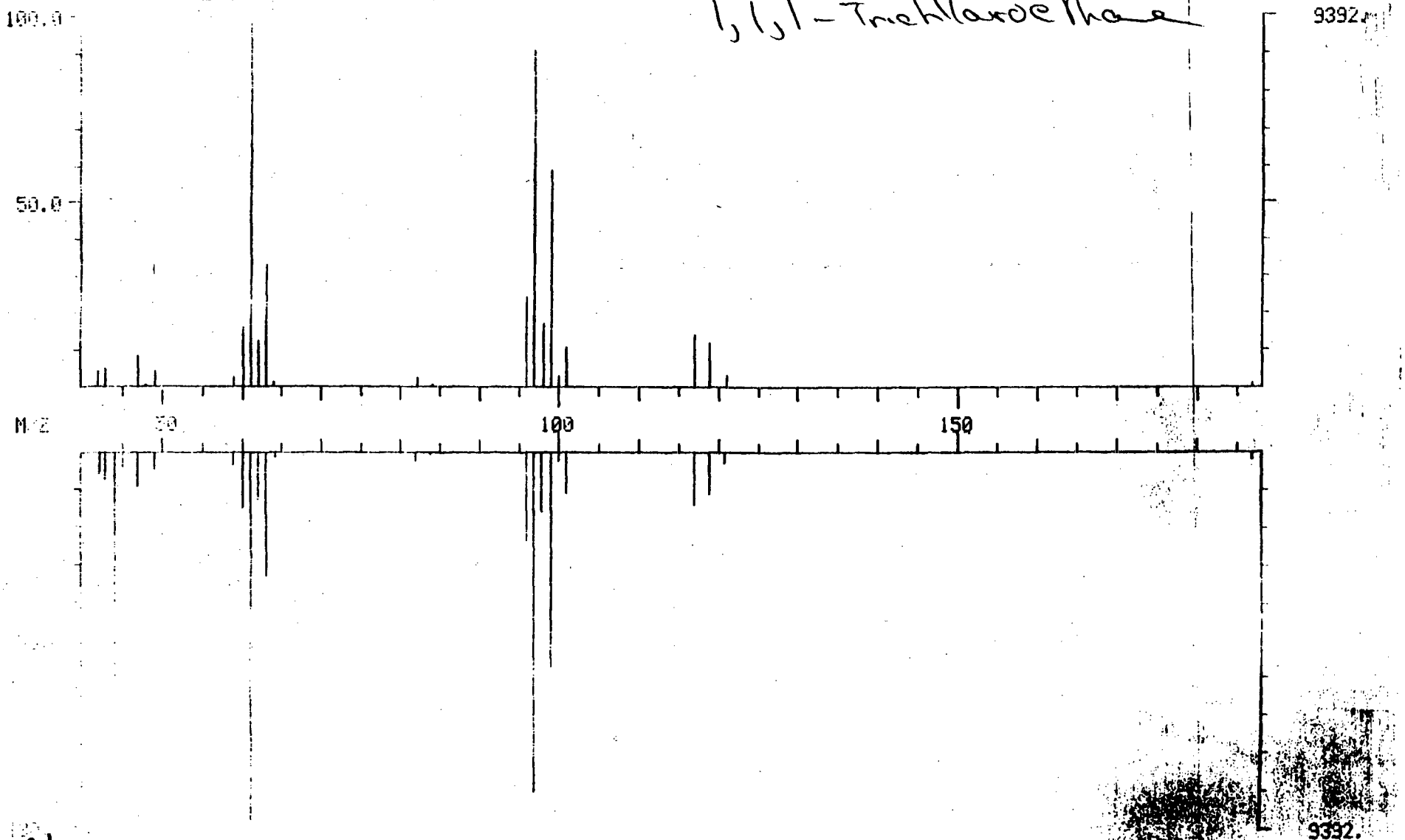
BASE M/Z: 61
RIC: 15871.



265

DATA: PU6434 #317 BASE M/Z: 61 51
CALI: PU6434 #2 RIC: 39615. 47615.

1,1,1-Trichloroethane

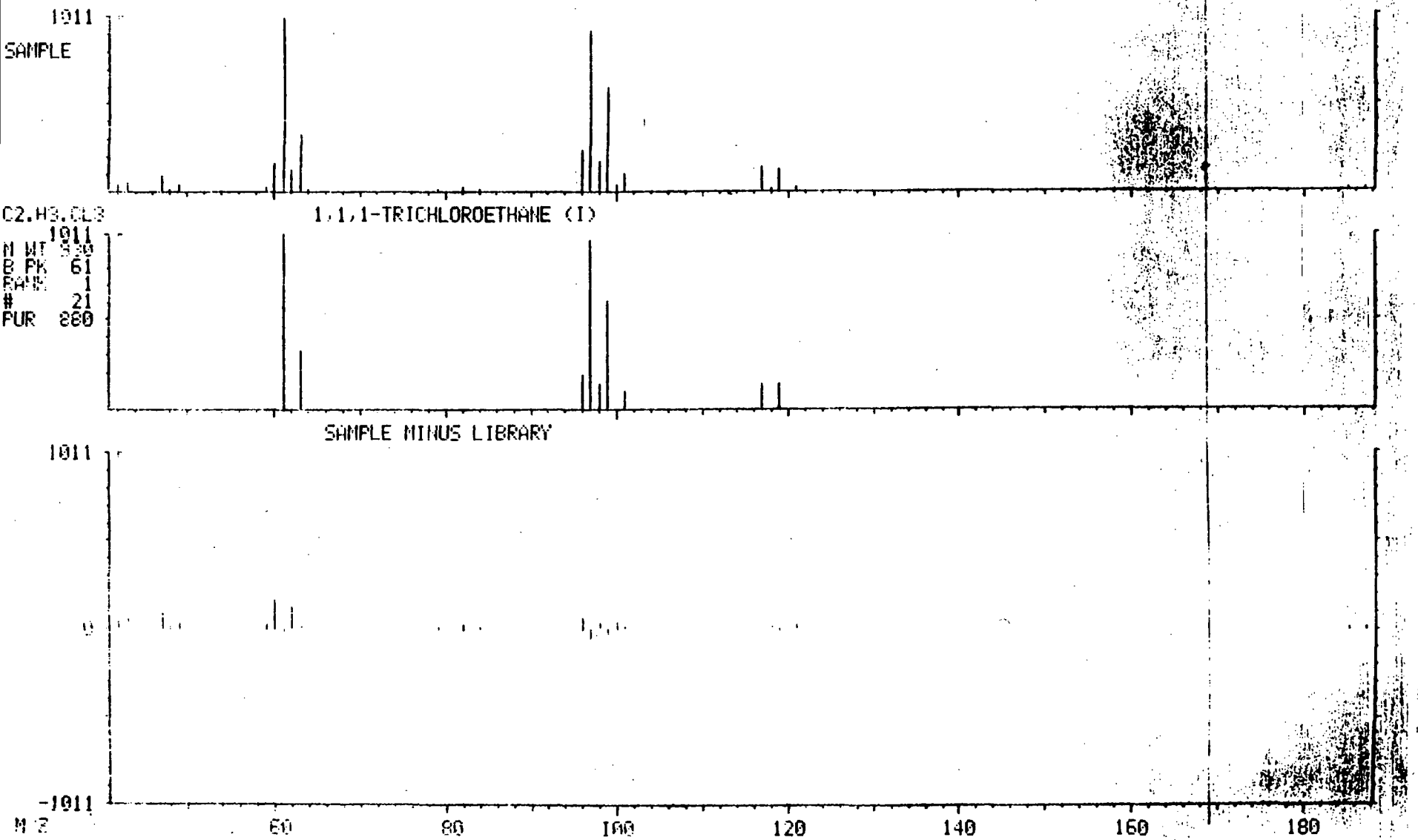


266

LIBRARY SEARCH
09 25 86 20:09:03 + 15:51
SAMPLE: 6E0526
CONDS.: 46 gms
ENHANCED (S 15B 2M 0T)

DATA: FU6434 # 317
CALI: FU6434 # 2

BASE M/Z: 61
RIC: 39615.



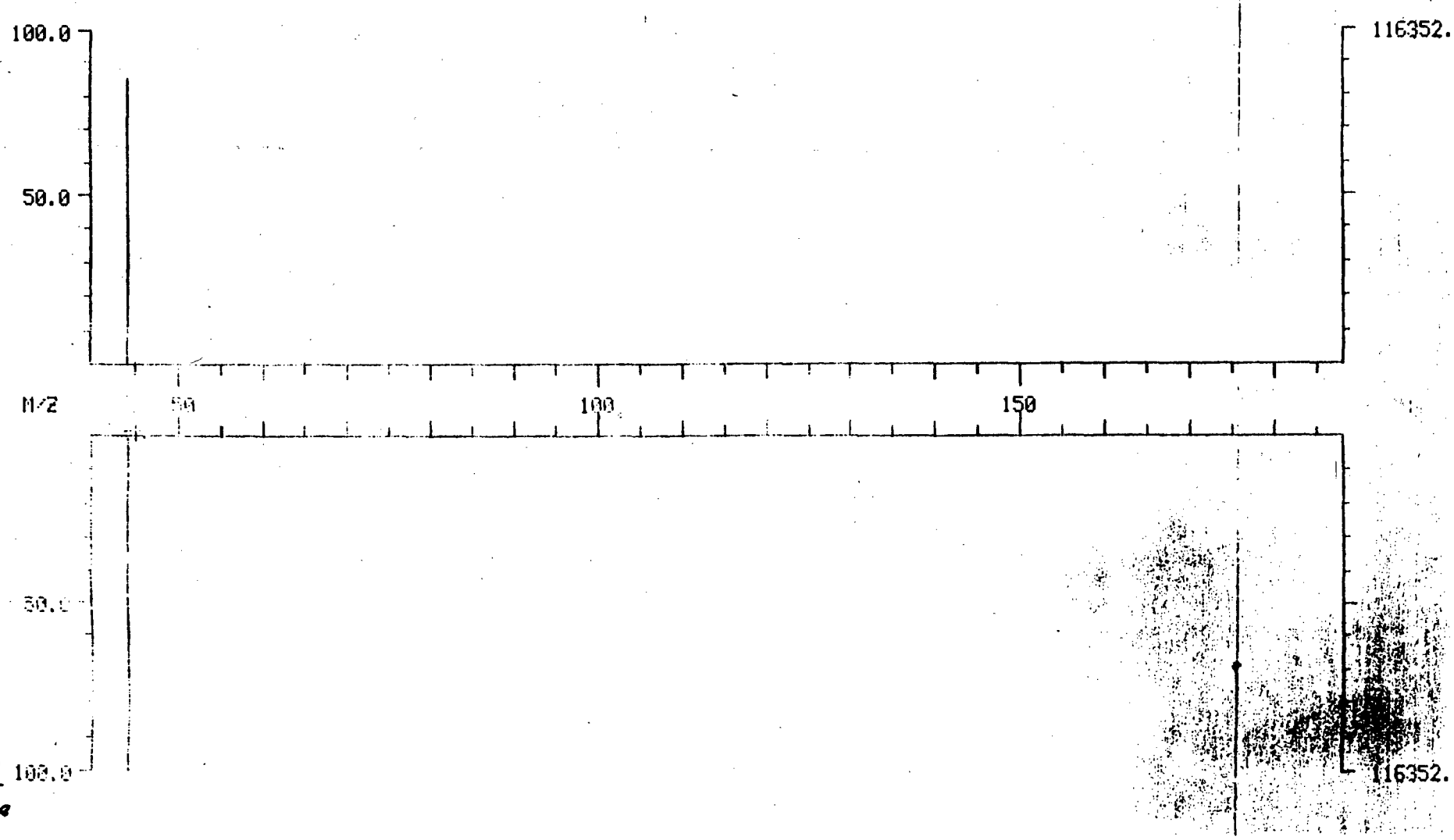
967

DUAL MASS SPECTRUM
03/25/85 20:31:00 + 0:39
SAMPLE: PEOC X 46 gms
COMDE.:
ENHANCED (S 15B 2N 0T)

DATA: PU6434 #13
CAL1: PU6434 #2

BASE M/Z: 44/ 44
RIC: 100863. 118527.

Unknown

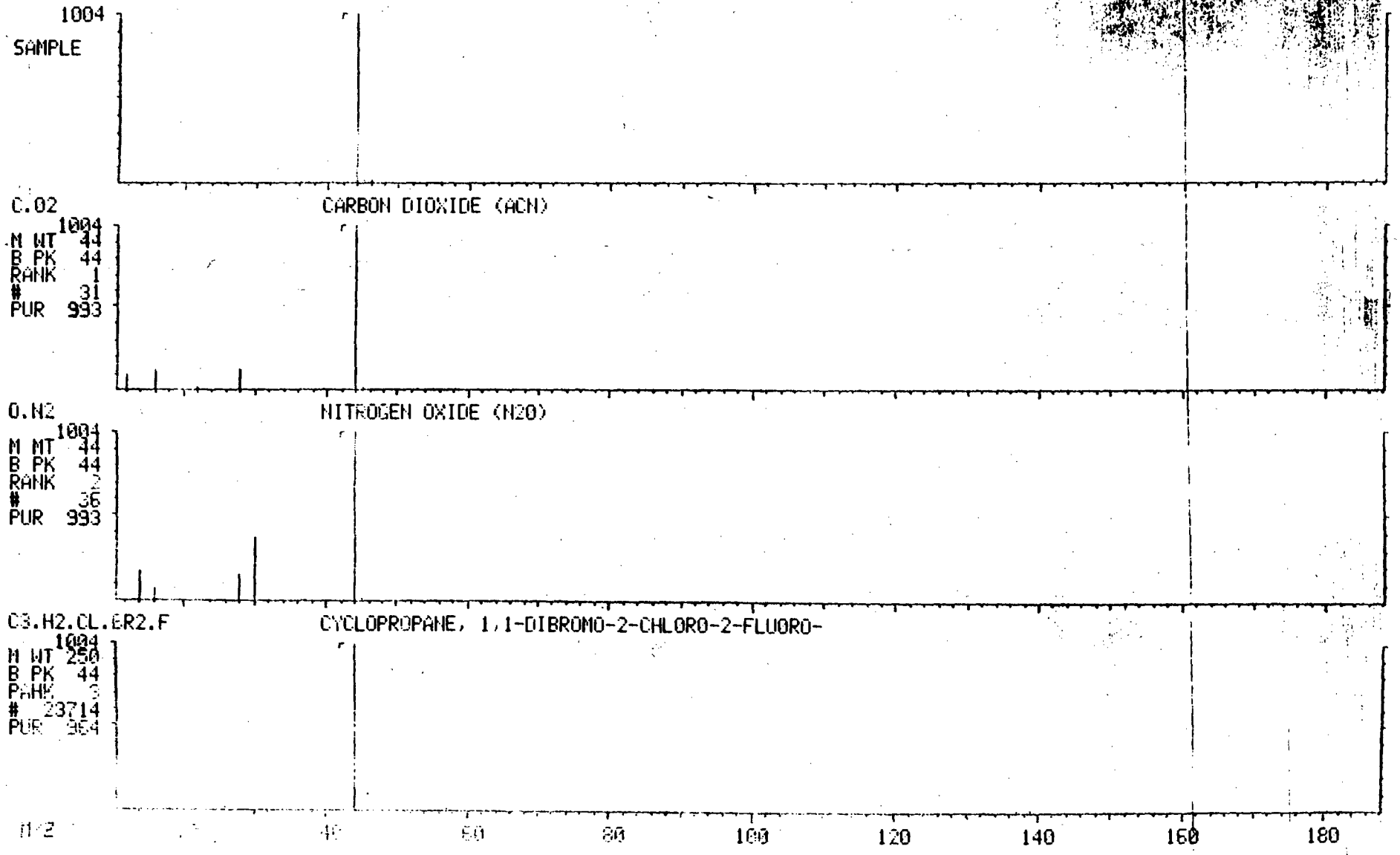


Page 28

LIBRARY SEARCH
09/26/85 20:03:00 + 0:39
SAMPLE: 6ERS 46 gm
CONDS.:
ENHANCED (S 15B 2N OT)

DATA: PU6434 # 13
CALI: PU6434 # 2

BASE M/Z: 44
RIC: 100863.



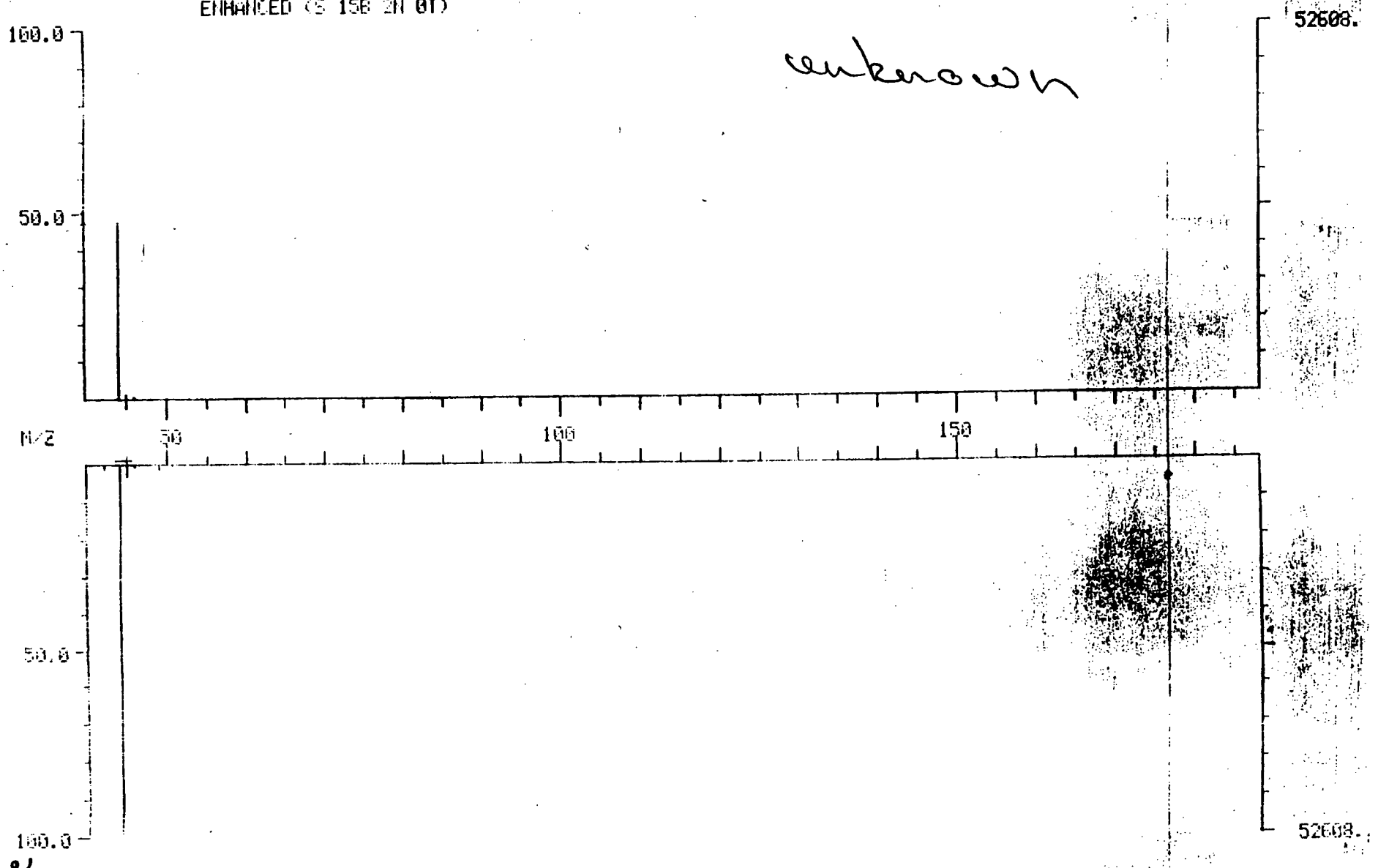
269

DUAL MASS SPECTRUM
09/26/86 20:00:00 + 7:30
SAMPLE: 880526 46 gms
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6434 #150
CAL1: PU6434 #2

BASE M/Z: 44/ 44
PIC: 26175./ 56447.

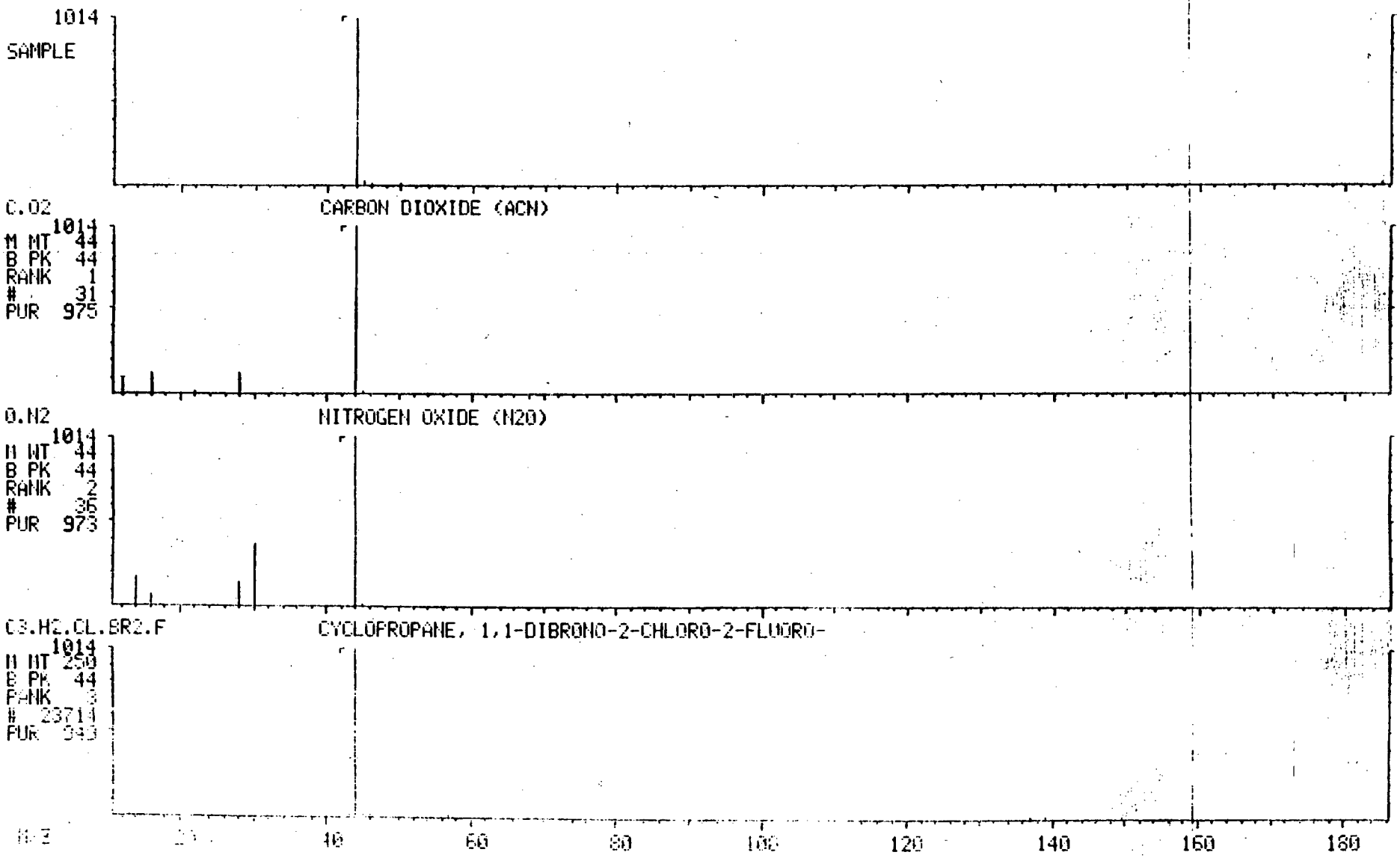
unknown



LIBRARY SEARCH
03/26/89 20:09:00 + 7:30
SAMPLE: 6605~~X~~ 46
CONDS.: gms
ENHANCED (S 15B 2N OT)

DATA: PU6434 # 150
CALI: PU6434 # 2

BASE M/Z: 44
RIC: 26175.



ILC

QUANT REPORT

Operator ID: STEVE
Output Filo: ^P2507::OP
Data File: >P2507::03
Name: 2UL 660547 BNA
Misc: CD 910-S3

Quant Rev: 4
Quant Time: 861007 01:25
Injected at: 861007 00:40
Dilution Factor: 1.00

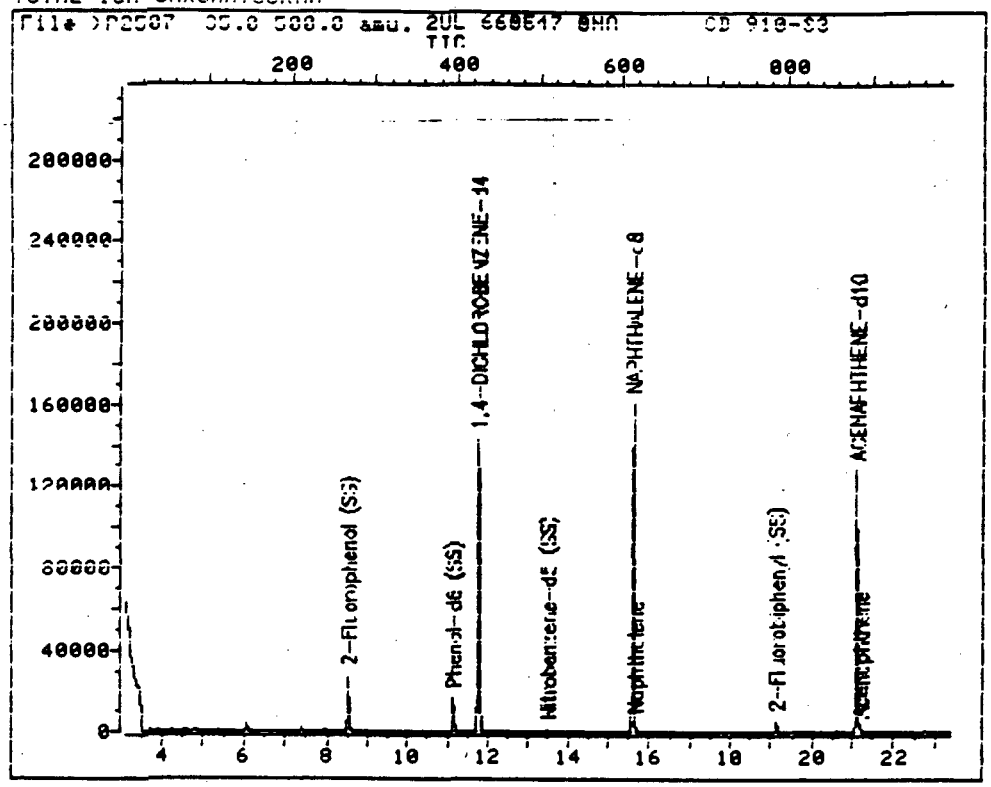
BTL#97

ID File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 861006 19:44

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-d4	11.77	425	56278	40.00	NG	91
3)	2-Fluorophenol (SS)	8.52	266	16868	10.71	NG	83
7)	Phenol-d6 (SS)	11.14	394	13949	8.00	NG	71
15)	*NAPHTHALENE-dS	15.62	613	178929	40.00	NG	50
16)	Nitrobenzene-d5 (SS)	13.49	509	1020	.62	NG	82
24)	Naphthalene	15.66	615	1727	.31	NG	41
27)	*ACENAPHTHENE-d10	21.12	882	66354	40.00	NG	94
31)	2-Fluorobiphenyl (SS)	19.13	785	5541	2.08	NG	94
34)	Acenaphthene	21.20	886	988	.38	NG	90
42)	2,4,6-Tribromophenol (SS)	23.55	1001	4504	7.59	NG	80
43)	*PHENANTHRENE-d10	25.57	1100	91792	40.00	NG	53
50)	Phenanthrene	25.64	1103	20882	7.46	NG	49
51)	Anthracene	25.76	1109	4130	1.46	NG	49
53)	Fluoranthene	29.26	1280	30702	19.78	NG	58
54)	*CHRYSENE-d12	33.70	1497	66052	40.00	NG	46
55)	Terphenyl-d14 (SS)	30.59	1345	2895	2.74	NG	41
57)	Pyrene	29.91	1312	27863	12.41	NG	36
60)	Benzo(a)Anthracene	33.64	1494	12775	6.18	NG	76
61)	bis(2-Ethylhexyl)Phthalate	34.27	1525	2977	1.68	NG	87
62)	Chrysene	33.76	1500	14723	6.99	NG	98
63)	*PERYLENE-d12	37.78	1696	76342	40.00	NG	77
65)	Benzo(b)Fluoranthene	36.77	1647	16724	5.93	NG	94
66)	Benzo(k)Fluoranthene	36.81	1649	15518M	5.89	NG	95
67)	Benzo(a)Pyrene	37.61	1688	14765	6.06	NG	90
68)	Indeno(1,2,3-cd)Pyrene	40.89	1848	13917	4.77	NG	84
70)	Benzo(g,h,i)Perylene	41.75	1890	14003	5.87	NG	65

* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3

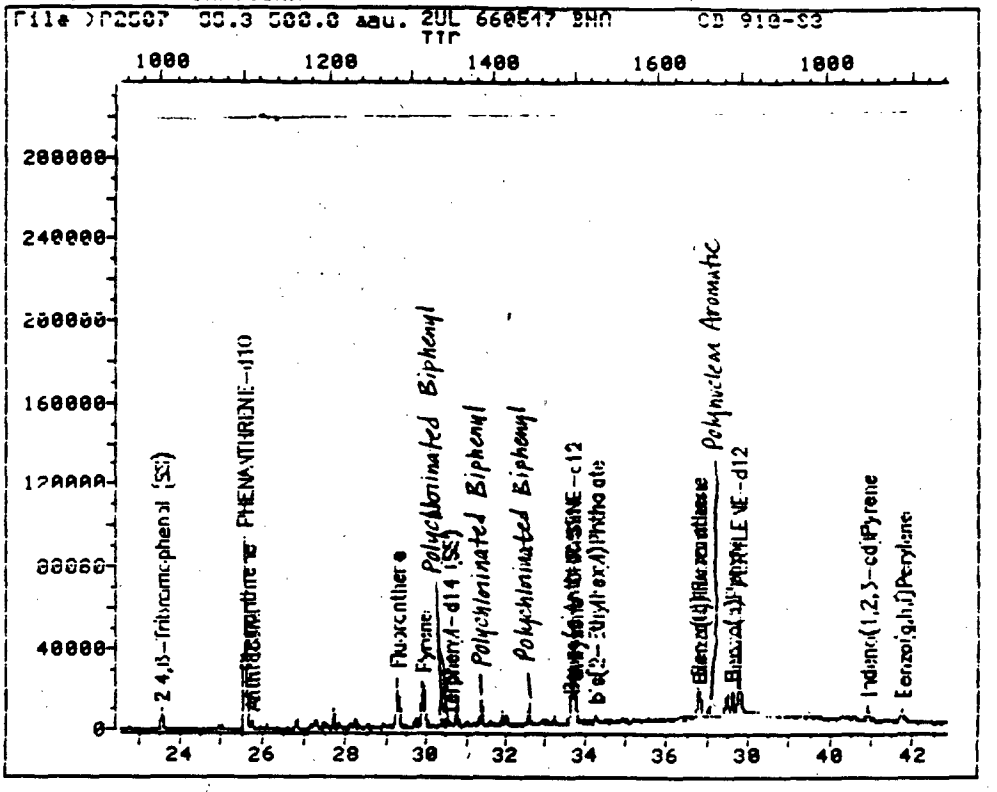
BTL#97

Id File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 861006 19:44

Operator ID: STEVE
Quant Time: 861007 01:25
Injected at: 861007 00:40

TIC page 1 of 2

TOTAL ION CHROMATOGRAM



Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3

BTL#97

Id File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 861006 19:44

Operator ID: STEVE
Quant Time: 861007 01:25
Injected at: 861007 00:40

TIC page 2 of 2

MS data file header from : >P2507

Sample: 2UL 660547 BNA Operator: STEVE MS 10/07/86 0:40
Misc : CD 910-S3 BTL#97
Sys. #: 1 MS model: 96 SU/HU rev.: CA ALS # : 0
Method file: EXTRII Tuning file: MT9301 No. of extra records: 1
Source temp.: 200 Analyzer temp.: 220 Transfer line temp. : 280

Chromatographic temperatures :	30.	300.	0.	0.	0.
Chromatographic times, min. :	4.0	5.0	0.0	0.0	0.0
Chromatographic rate, deg/min:	8.0	0.0	0.0	0.0	0.0

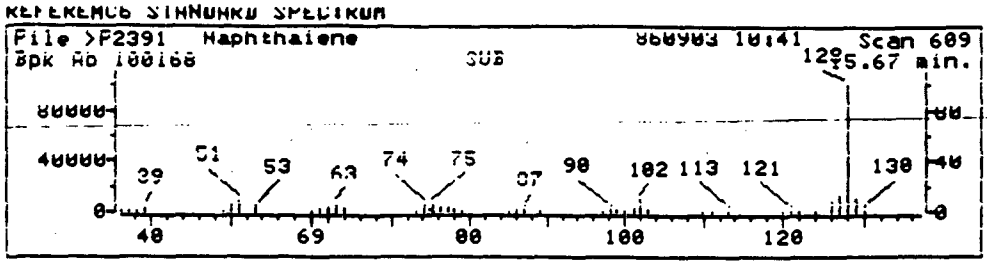
>P2507 2UL 660547 BNA CD 910-S3
35.01 500.0 CLP AOC TIC

Peak #	R.T. min.	first scan	max scan	last scan	peak height	raw area	corr. area	corr. % max.	% of total
1	15.597	609	612	619	119666	543703	543703	100.00	26.56
2	21.198	878	886	889	35354	239797	239797	44.10	11.71
3	25.554	1096	1099	1114	61455	527853	525952	96.74	25.70
4	30.526	1340	1342	1350	6884	66062	46813	8.61	2.28
5	30.771	1352	1354	1356	14519	43042	33700	6.20	1.64
6	31.386	1379	1384	1387	11633	66068	43732	8.04	2.13
7	32.573	1439	1442	1446	10938	57867	32940	6.06	1.61
8	33.679	1489	1496	1515	15446	273197	171795	31.60	8.39
9	36.814	1643	1649	1654	12495	169788	84893	15.61	4.14
10	37.716	1683	1693	1706	24554	573076	323156	59.44	15.79

Sum of corrected areas: 2046481.

4:28 PM TUE., 7 OCT., 1986

REFERENCE STANDARD SPECTRUM



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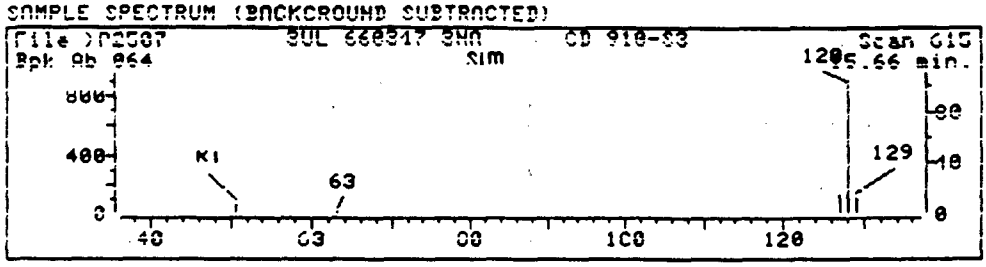
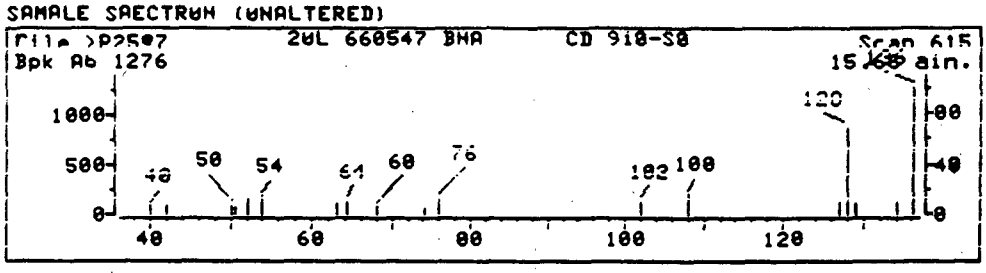


SAMPLE SPECTRUM (UNALTERED)

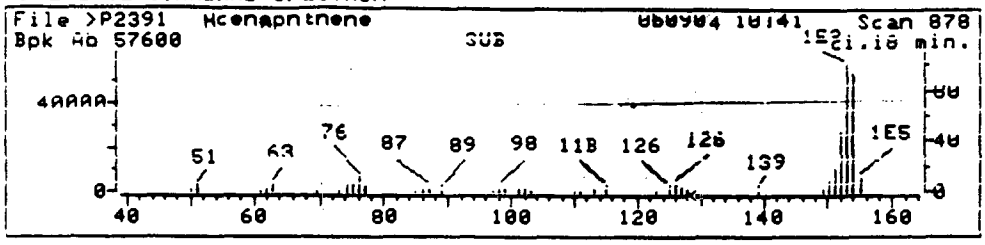


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

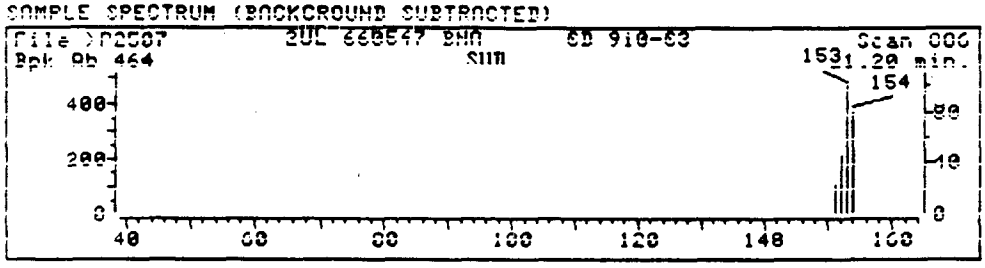
BTL#97

Compound No: 24
Compound Name: Naphthalene
Scan Number: 615
Retention Time: 15.66 min.
Area: 1727
Concentration: .31 NG
q-value: 41

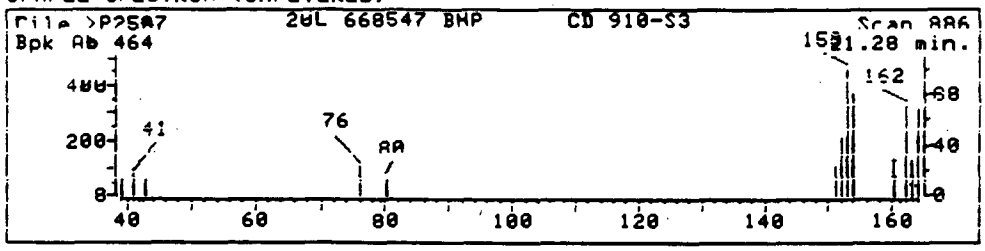
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



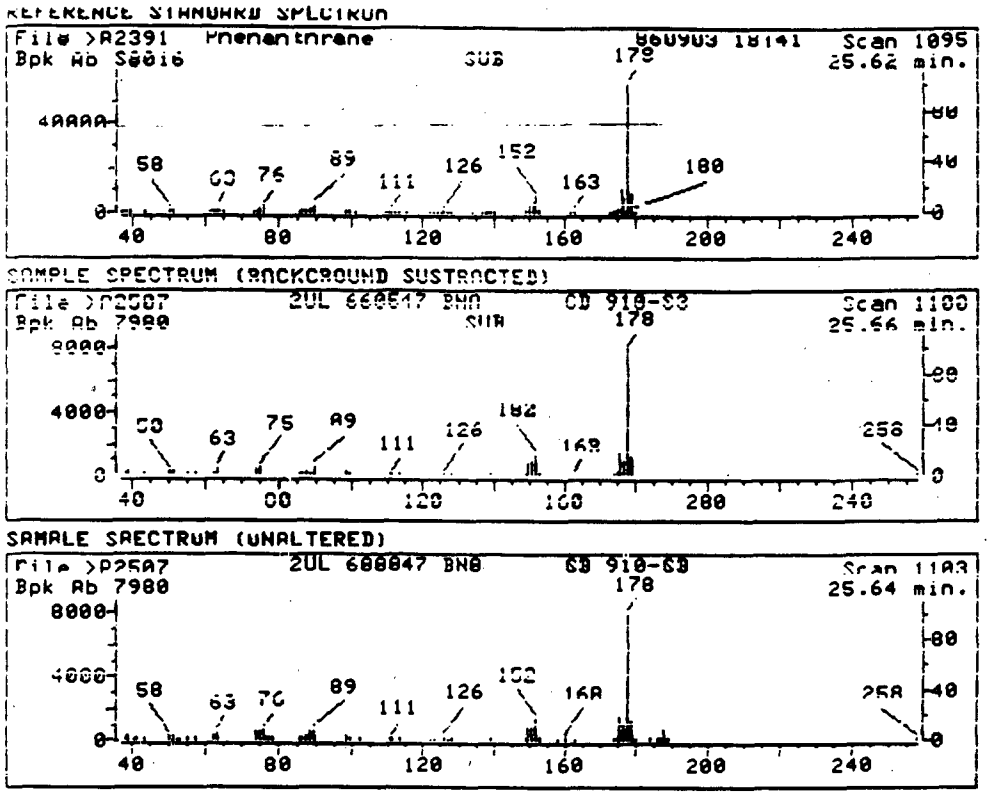
SAMPLE SPECTRUM (UNFILTERED)



Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

Compound No: 34
Compound Name: Acenaphthene
Scan Number: 886
Retention Time: 21.20 min.
Area: 988
Concentration: .38 NG
q-value: 90

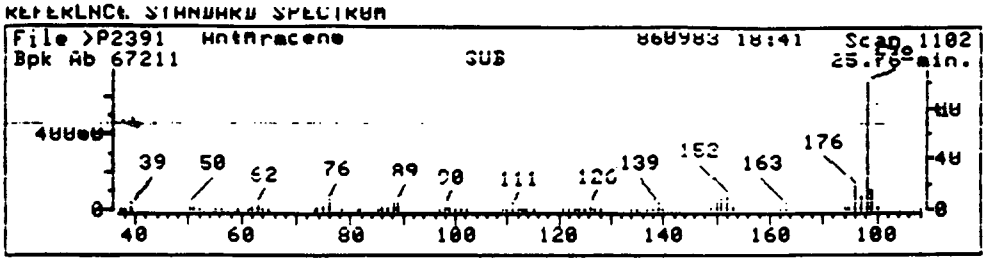


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

Compound No: 50
Compound Name: Phenanthrene
Scan Number: 1103
Retention Time: 25.64 min.
Area: 20882
Concentration: 7.46 NG
a-value: 49

REFERENCE STANDARD SPECTRUM



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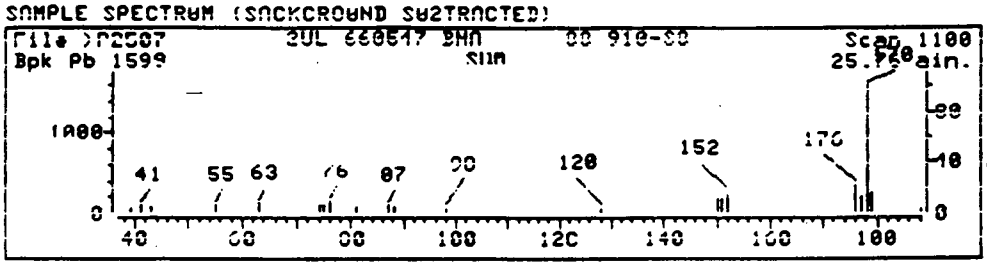
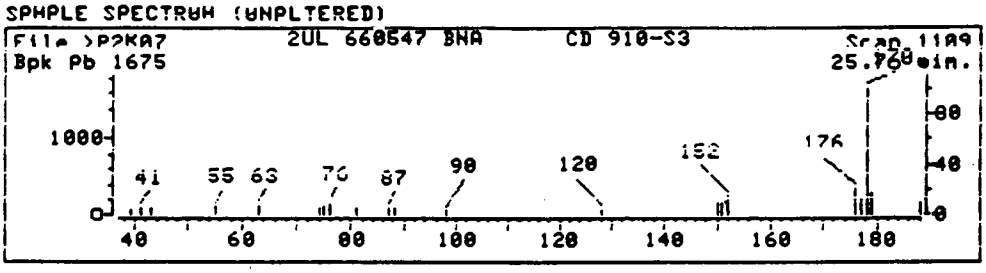


SAMPLE SPECTRUM (UNFILTERED)

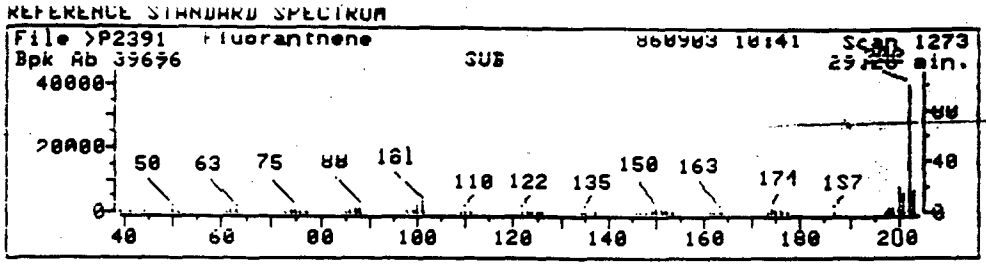


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

Compound No: 51
Compound Name: Anthracene
Scan Number: 1109
Retention Time: 25.76 min.
Area: 4130
Concentration: 1.46 NG
q-value: 49

REFERENCE STANDARD SPECTRUM



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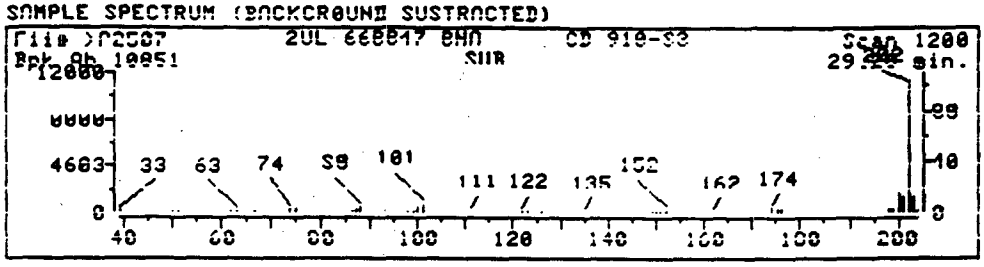

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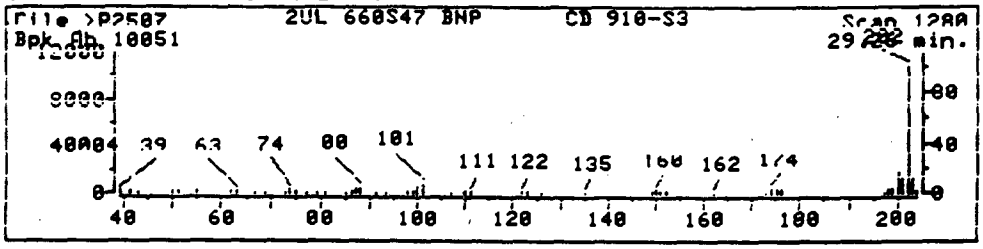
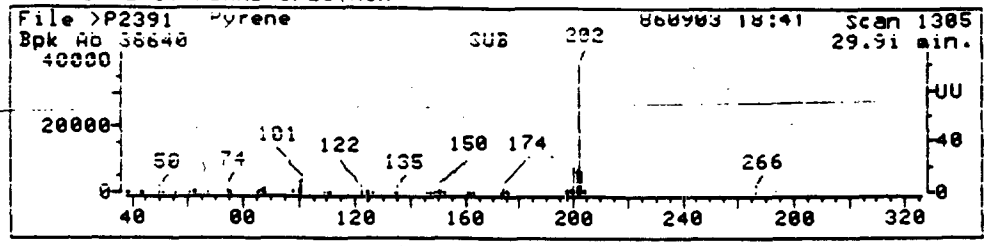


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

Compound No: 53
Compound Name: Fluoranthene
Scan Number: 1280
Retention Time: 29.26 min.
Area: 30702
Concentration: 19.78 NG
q-value: 58

REFERENCE STANDARD SPECTRUM



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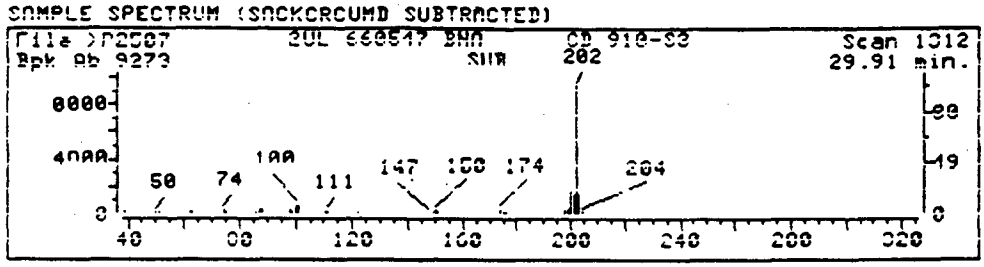

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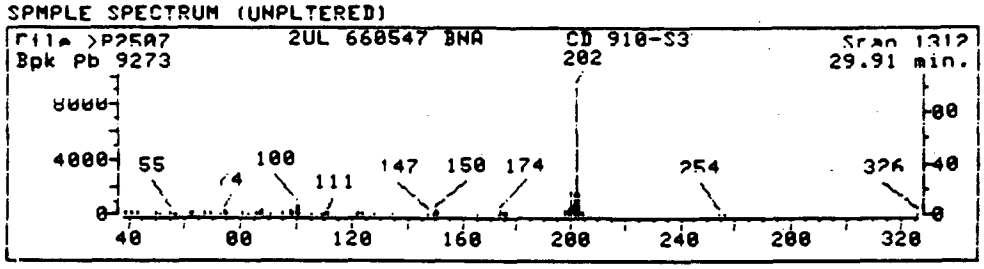
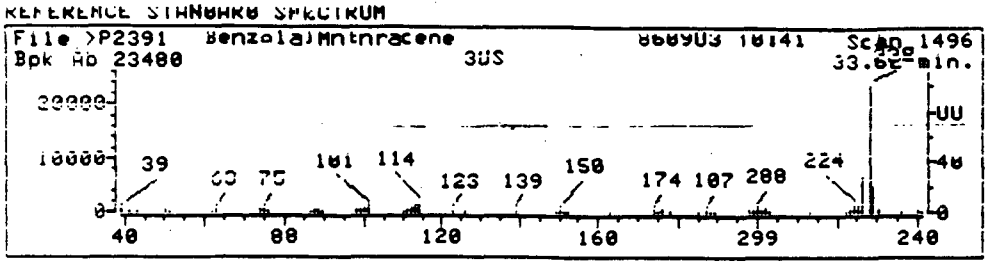


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

Compound No: 57
Compound Name: Pyrene
Scan Number: 1312
Retention Time: 29.91 min.
Area: 27863
Concentration: 12.41 NG
q-value: 36

REFERENCE STANDARD SPECTRUM



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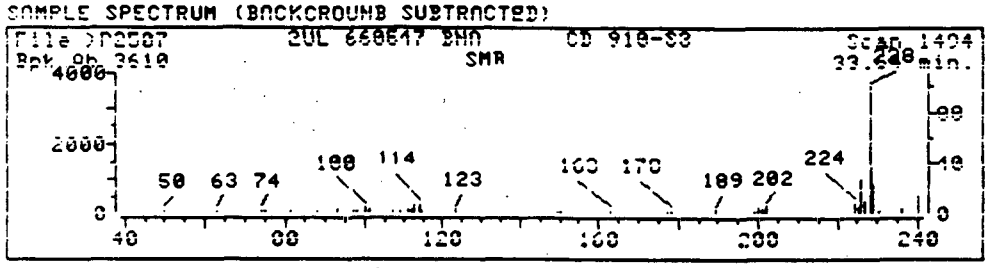
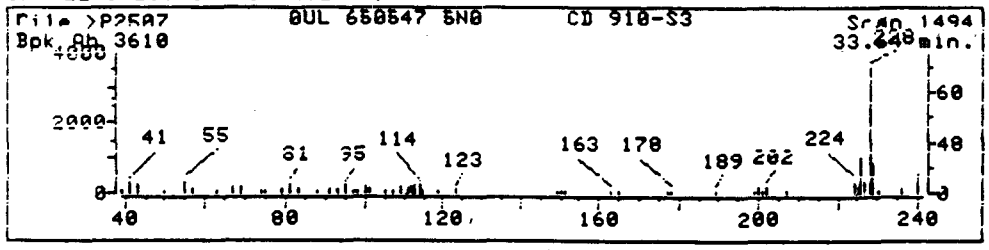


SAMPLE SPECTRUM (UNFILTERED)

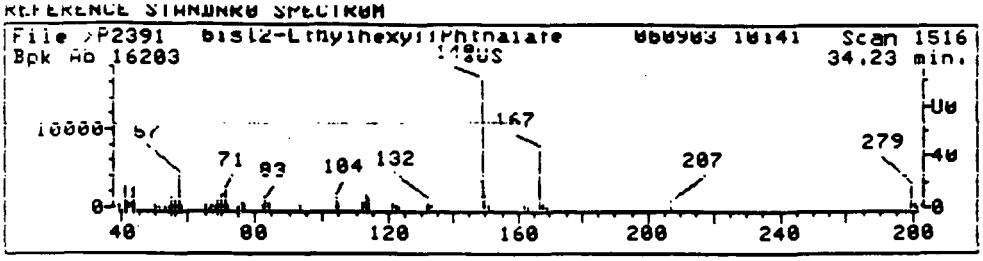


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

Compound No: 60
Compound Name: Benzo(a)Anthracene
Scan Number: 1494
Retention Time: 33.64 min.
Area: 12775
Concentration: 6.18 NG
q-value: 76

REFERENCE STANDARD SPECTRUM



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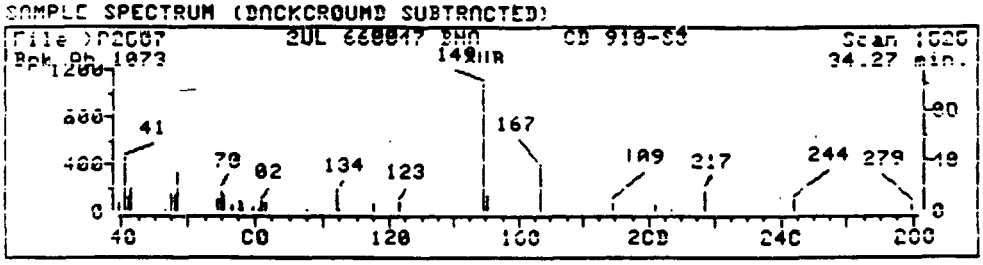
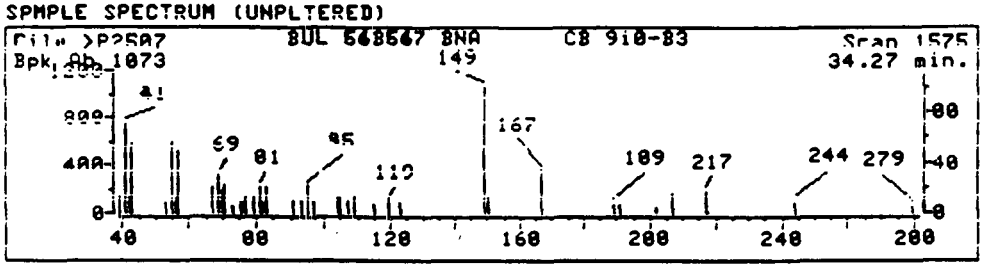


SAMPLE SPECTRUM (UNFILTERED)

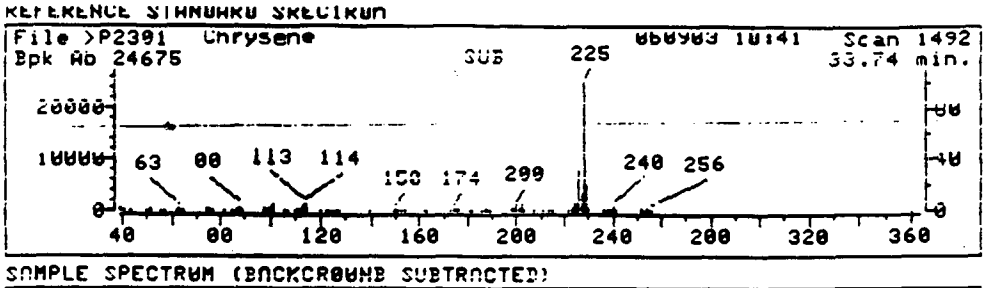


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

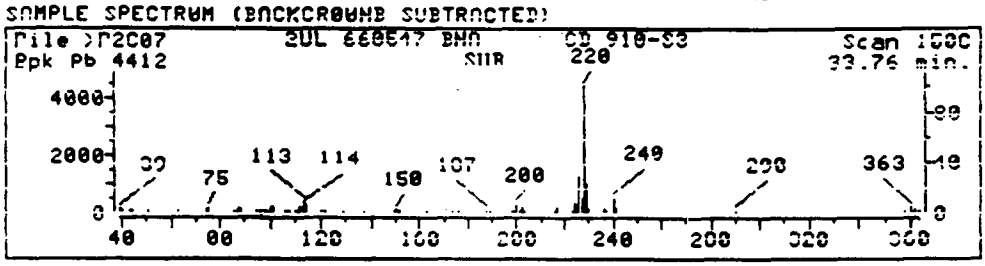
BTL#97

Compound No: 61
Compound Name: bis(2-Ethylhexyl)Phthalate
Scan Number: 1525
Retention Time: 34.27 min.
Area: 2977
Concentration: 1.68 NG
q-value: 87

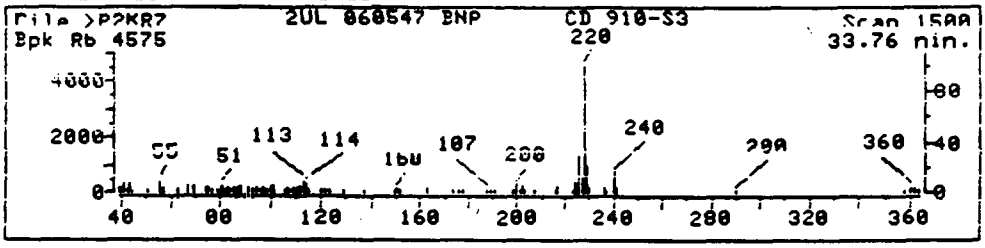
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



SAMPLE SPECTRUM (UNALTERED)

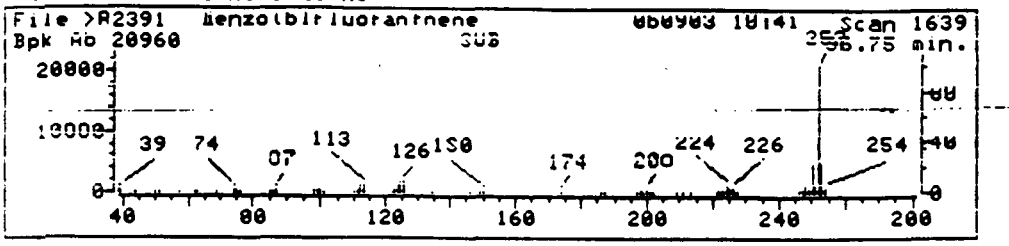


Data File: >P2507::D3
Name: 2UL 660547 SNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

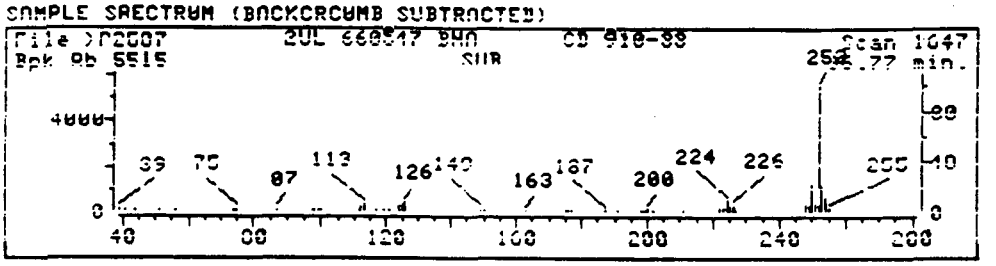
BTL#97

Compound No: 62
Compound Name: Chrysene
Scan Number: 1500
Retention Time: 33.76 min.
Area: 14723
Concentration: 6.99 NG
q-value: 98

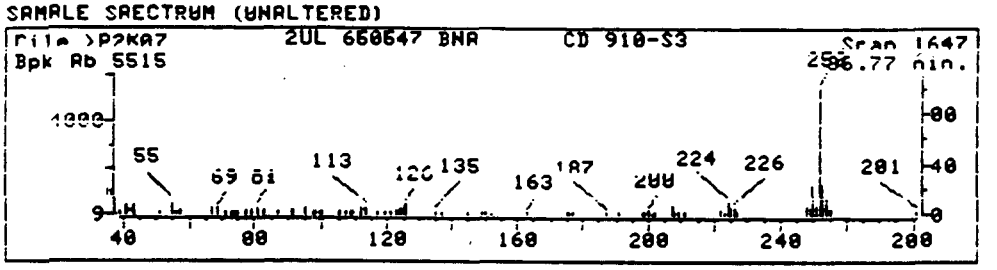
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



SAMPLE SPECTRUM (UNALTERED)

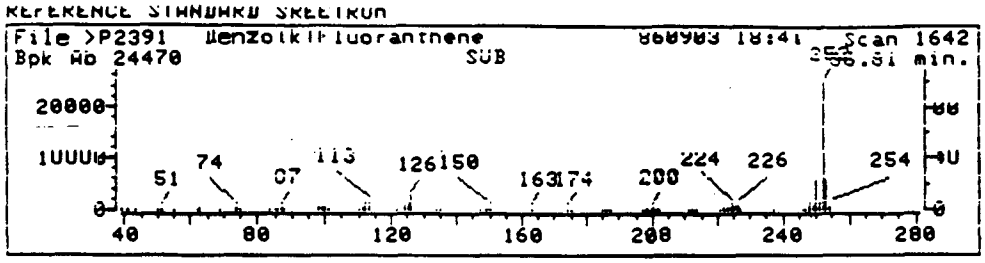


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

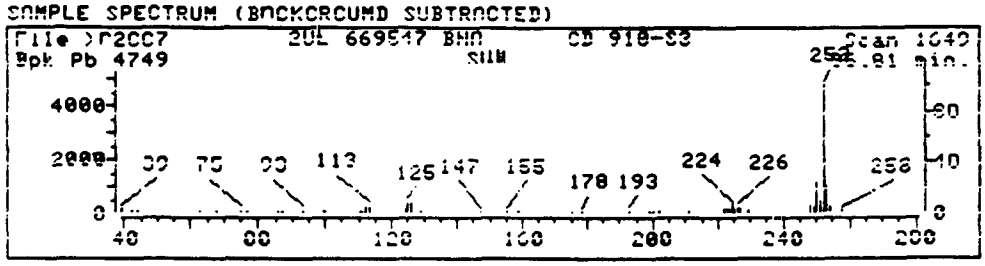
BTL#97

Compound No: 65
Compound Name: Benzo(b)Fluoranthene
Scan Number: 1647
Retention Time: 36.77 min.
Area: 16724
Concentration: 5.93 NG
q-value: 94

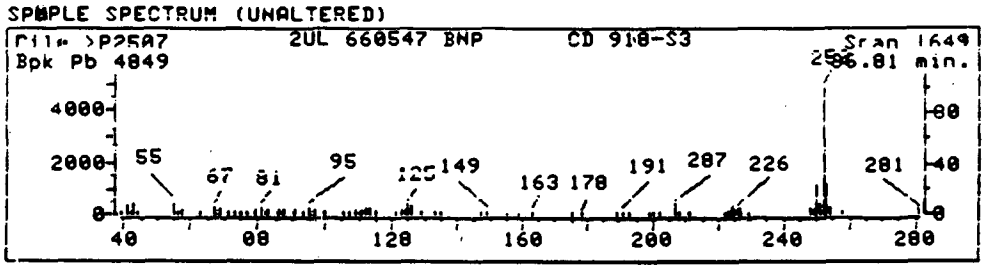
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



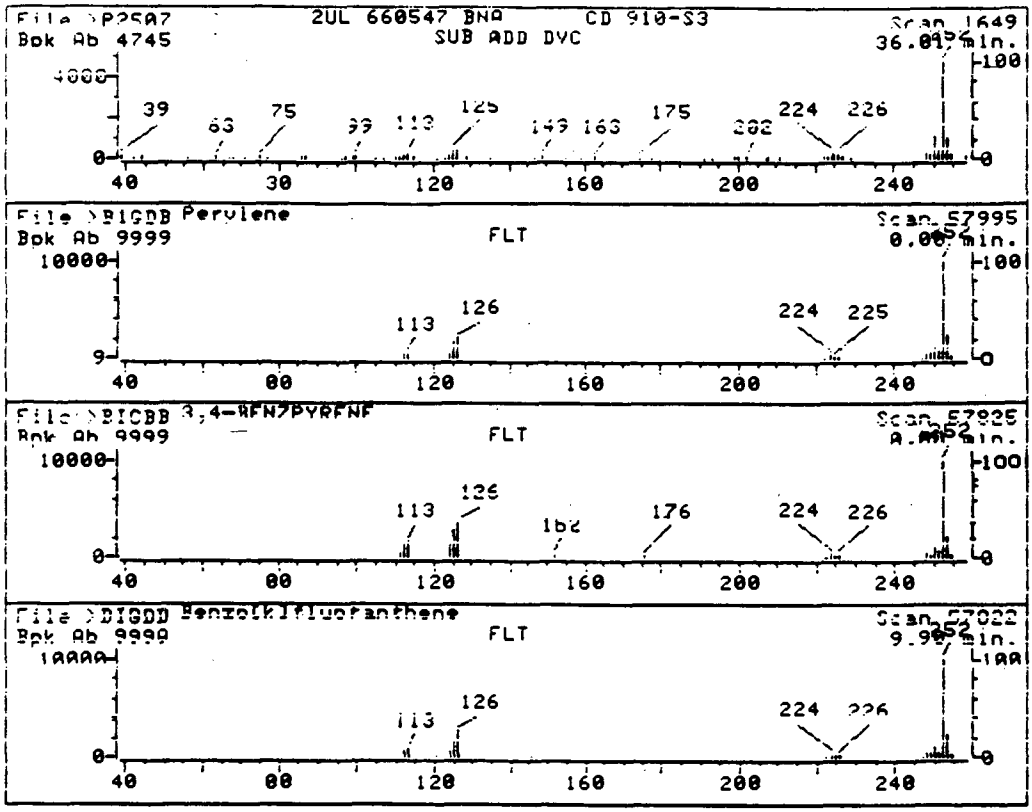
SAMPLE SPECTRUM (UNALTERED)



Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

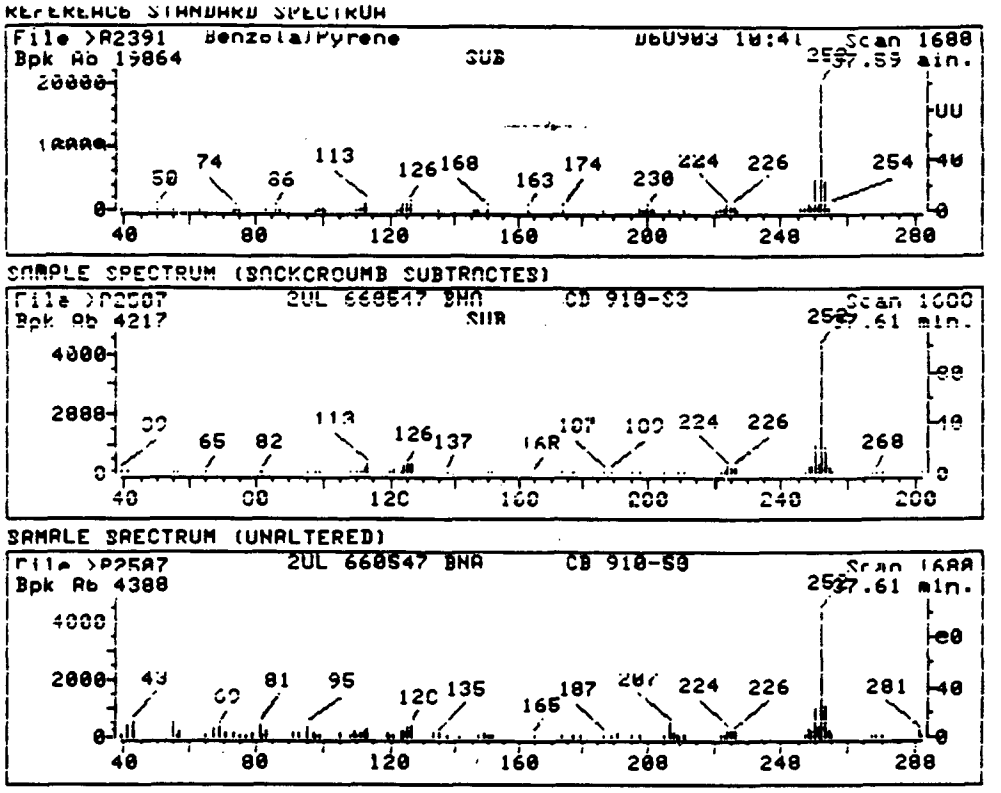
Compound No: 66
Compound Name: Benzo(k)Fluoranthene
Scan Number: 1649
Retention Time: 36.81 min.
Area: 15518M
Concentration: 5.89 NG
q-value: 95



1. Perylene 252 C20H12
2. 3,4-BENZPYRENE 252 C20H12
3. Benzo[k]fluoranthene 252 C20H12
4. Benzo[a]pyrene 252 C20H12
5. Benzo[a]pyrene 252 C20H12

Sample file: >P2507 Spectrum #: 1649
Search speed: 1 Tilting option: N No. of ion ranges searched: 43

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C	I	R	IV
1.	83*	198550	57895	"BIGDB	76	62	2	0	91	9	54	59		
2.	81*	0	57825	"BIGDB	67	72	2	0	100	7	53	46		
3.	81*	207089	57822	"BIGDB	63	72	2	0	93	9	53	41		
4.	79*	50328	57894	"BIGDB	62	68	1	0	71	14	43	60		
5.	79*	50328	57819	"BIGDB	60	73	2	0	99	9	48	37		

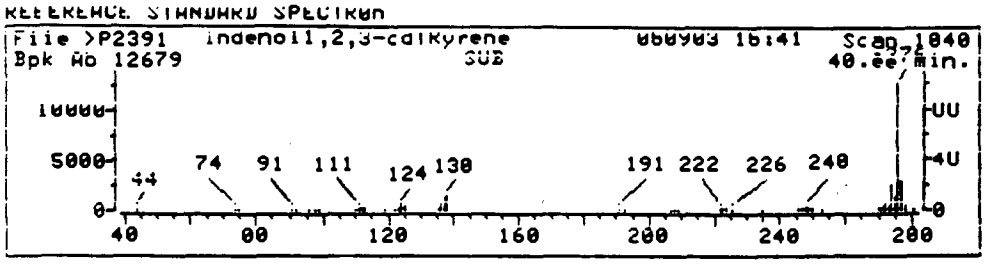


Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

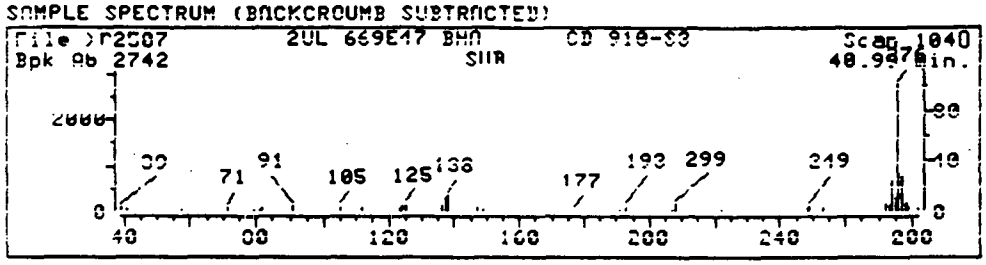
8TL#97

Compound No: 67
Compound Name: Benzo(a)Pyrene
Scan Number: 1688
Retention Time: 37.61 min.
Area: 14765
Concentration: 6.06 NG
q-value: 90

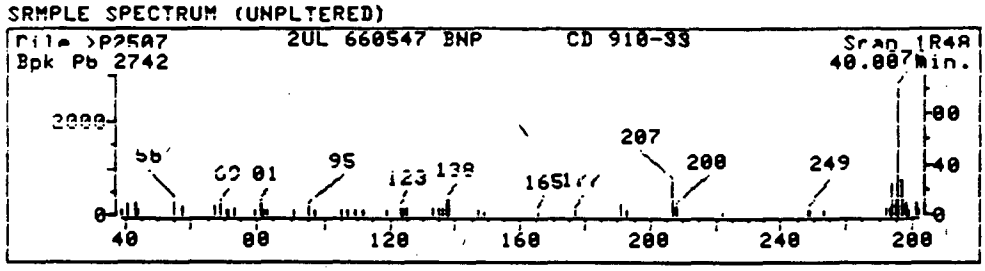
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



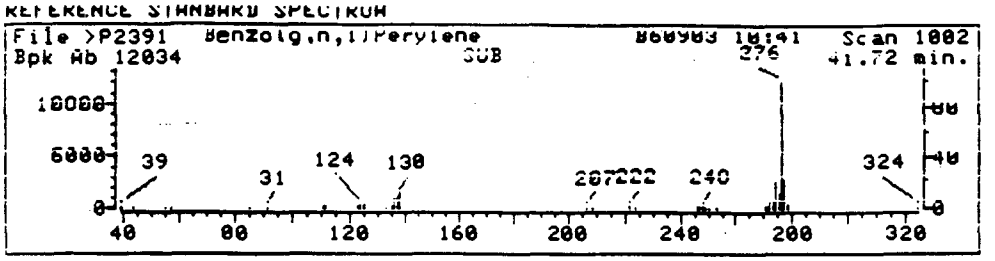
SAMPLE SPECTRUM (UNFILTERED)



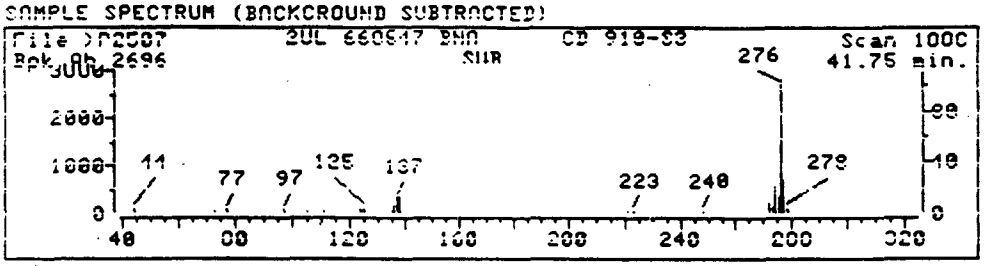
Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3 BTL#97
Quant Time: 861007 01:25
Injected at: 861007 00:40

Compound No: 68
Compound Name: Indeno(1,2,3-cd)Pyrene
Scan Number: 1848
Retention Time: 40.89 min.
Area: 13917
Concentration: 4.77 NG
q-value: 84

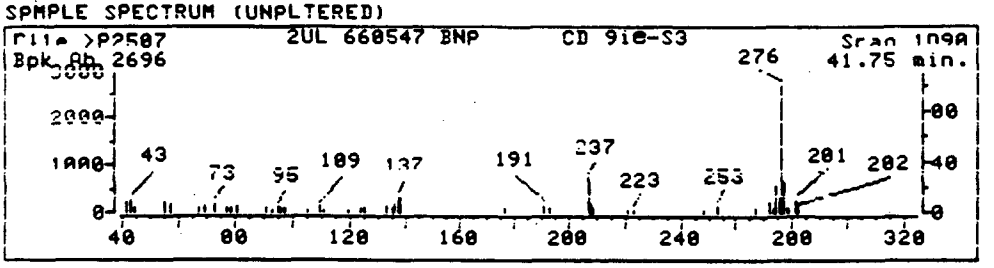
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



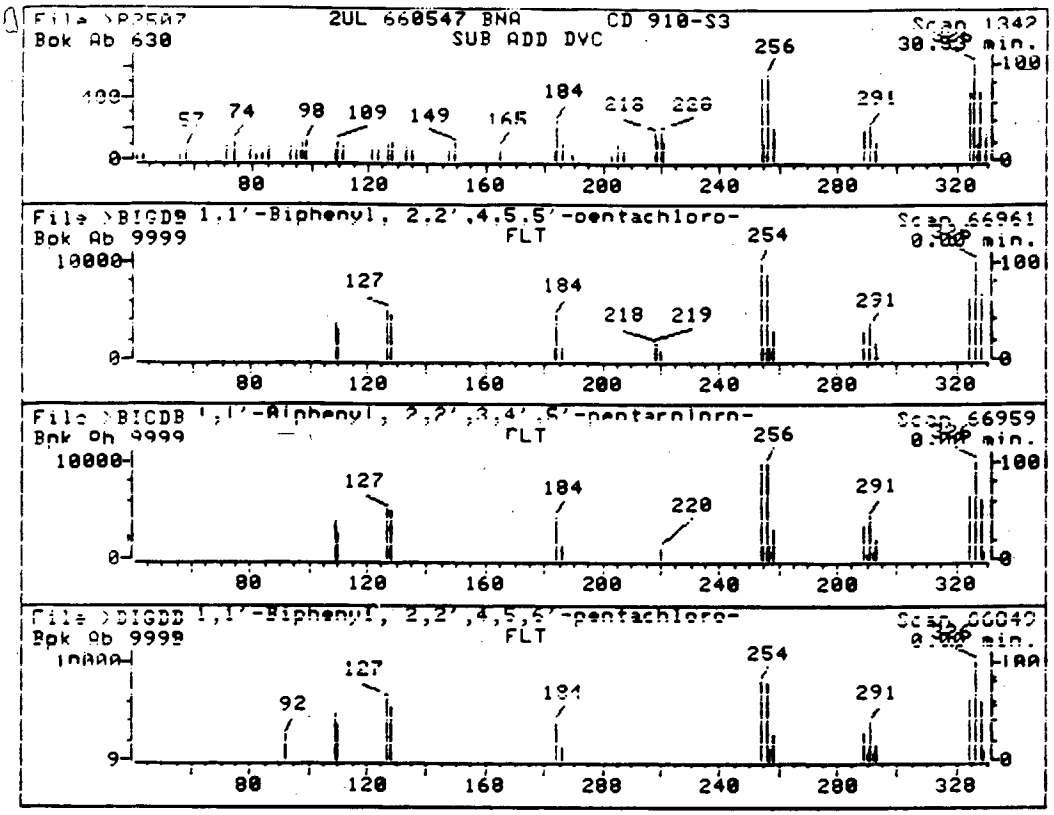
SAMPLE SPECTRUM (UNFILTERED)



Data File: >P2507::D3
Name: 2UL 660547 BNA
Misc: CD 910-S3
Quant Time: 861007 01:25
Injected at: 861007 00:40

BTL#97

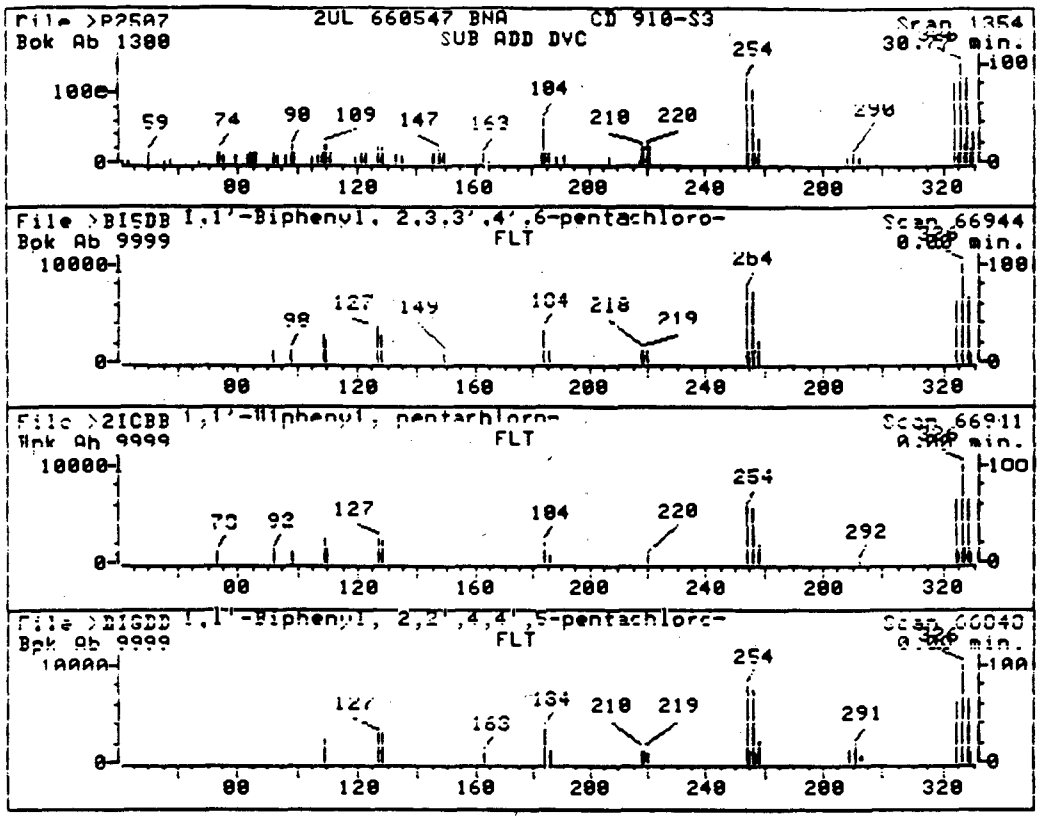
Compound No: 70
Compound Name: Benzo(g,h,i)Perylene
Scan Number: 1890
Retention Time: 41.75 min.
Area: 14003
Concentration: 5.87 NG
a-value: 65



1. 1,1'-Biphenyl, 2,2',4,5,5'-pentachloro- 324 C12H5Cl5
2. 1,1'-Biphenyl, 2,2',3,4',5'-pentachloro- 324 C12H5Cl5
3. 1,1'-Biphenyl, 2,2',4,5,6'-pentachloro- 324 C12H5Cl5
4. 1,1'-Biphenyl, pentachloro- 324 C12H5Cl5
5. 1,1'-Biphenyl, 2,2',3,3',4-pentachloro- 324 C12H5Cl5

Samole file: >P2507 Spectrum #: 1342
Search speed: 1 Tilting option: N No. of ion ranges searched: 46

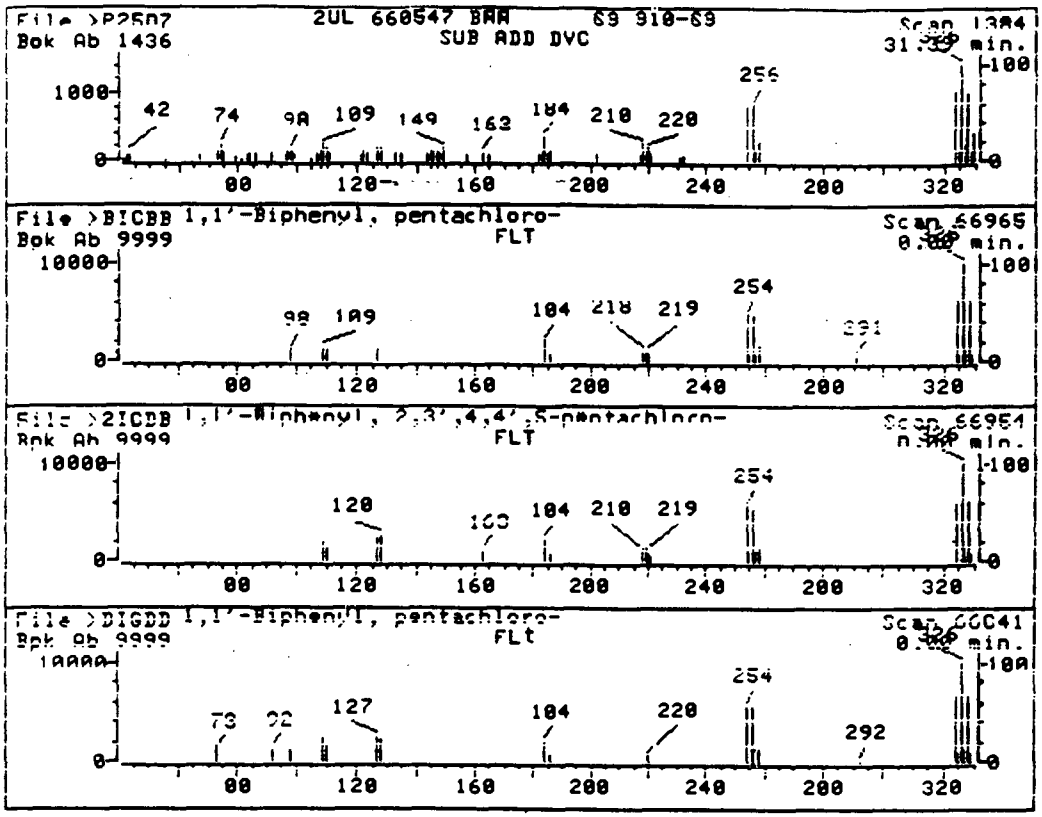
	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C	I	R	IV
1.	96*	37680732	66961	"BIGDB	146	65	3	0	85	0	72		96	
2.	95*	41464511	66959	"BIGDB	129	81	3	0	86	0	72		93	
3.	93*	68194069	66849	"BIGDB	120	87	3	0	100	0	68		86	
4.	93*	25429292	66962	"BIGDB	118	86	3	0	97	2	68		80	
5.	89*	52663624	66847	"BIGDB	99	111	3	0	83	2	66		63	



1. 1,1'-Biphenyl, 2,3,3',4',6-pentachloro- 324 C12H5Cl5
2. 1,1'-Biphenyl, pentachloro- 324 C12H5Cl5
3. 1,1'-Biphenyl, 2,2',4,4',5-pentachloro- 324 C12H5Cl5
4. 1,1'-Biphenyl, 2,3,3',4,4'-pentachloro- 324 C12H5Cl5
5. 1,1'-Biphenyl, 2,2',4,5,6'-pentachloro- 324 C12H5Cl5

Sample file: >P2507 Spectrum #: 1354
Search speed: 1 Tilting option: N No. of ion ranges searched: 46

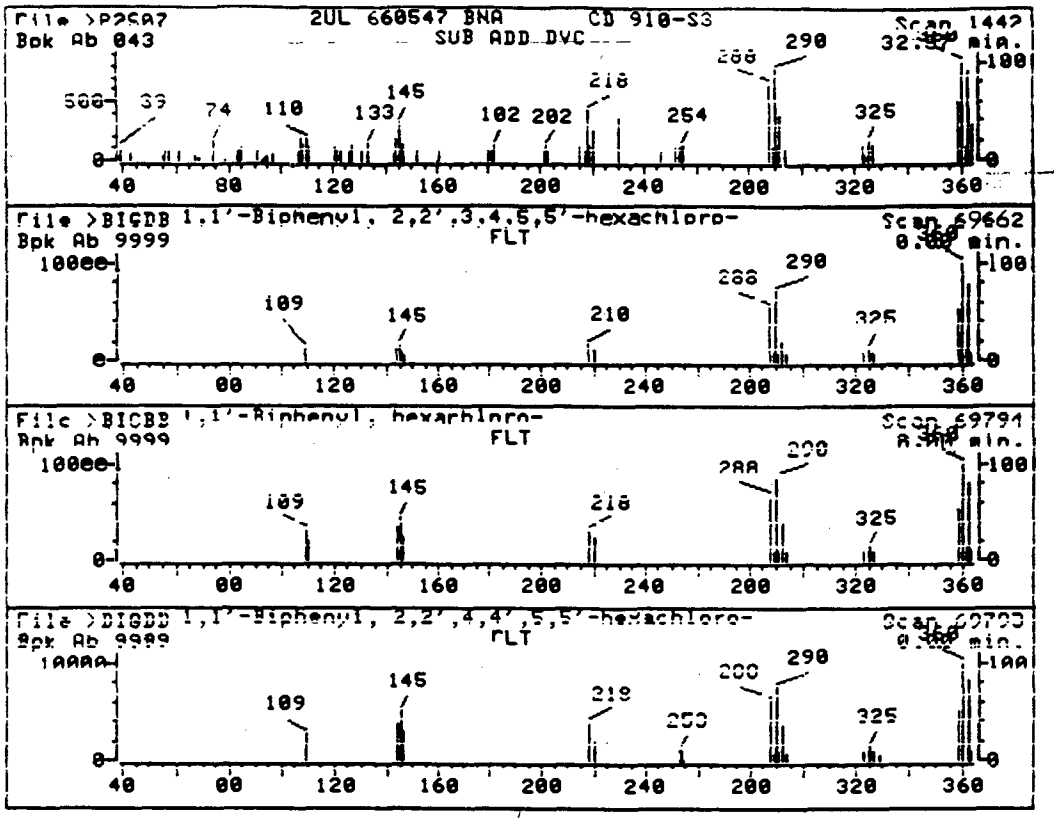
	Prob.	CAS #	CON #	ROOT	K	OK	#FLG	TILT	%	CON	C	I	R	IV
1.	96*	38380039	66844	"BIGDB	141	61	3	0	100	2	72		96	
2.	93*	25429292	66841	"BIGDB	118	73	3	0	100	4	68		80	
3.	89*	38380017	66843	"BIGDB	97	104	3	0	100	2	66		61	
4.	89*	32598144	66842	"BIGDB	123	73	3	0	100	10	62		89	
5.	87*	68194069	66849	"BIGDB	79	128	3	0	95	2	63		44	



1. 1,1'-Biphenyl, pentachloro- 324 C12H5Cl5
2. 1,1'-Biphenyl, 2,3',4,4',5-pentachloro- 324 C12H5Cl5
3. 1,1'-Biphenyl, pentachloro- 324 C12H5Cl5
4. 1,1'-Biphenyl, 2,3,3',4',6-pentachloro- 324 C12H5Cl5
5. 1,1'-Biphenyl, 2,3,3',4,4'-pentachloro- 324 C12H5Cl5

Sample file: >P2507 Spectrum #: 1384
Search speed: 1 Tilting option: N No. of ion ranges searched: 45

	Prob.	CAS #	CON #	ROOT	K	OK	#FLG	TILT	%	CON	C	I	R	IV
1.	96*	25429292	66965	"BIGDB	144	40	3	0	100	6	68		96	
2.	96*	31508006	66954	"BIGDB	135	47	3	0	100	3	72		94	
3.	94*	25429292	66841	"BIGDB	127	64	3	0	100	0	72		92	
4.	89*	38380039	66844	"BIGDB	124	78	3	0	77	6	62		89	
5.	89*	32598144	66842	"BIGDB	101	95	3	0	100	3	66		66	



1. 1,1'-Biphenyl, 2,2',3,4,5,5'-hexachloro- 358 C12H4Cl6
2. 1,1'-Biphenyl, hexachloro- 358 C12H4Cl6
3. 1,1'-Biphenyl, 2,2',4,4',5,5'-hexachloro- 358 C12H4Cl6
4. 1,1'-Biphenyl, 2,2',3,3',5,6'-hexachloro- 358 C12H4Cl6
5. 1,1'-Biphenyl, 2,2',3,3',4,4'-hexachloro- 358 C12H4Cl6

Sample file: >P2507 Spectrum #: 1442
Search speed: 1 Tilting option: N No. of ion ranges searched: 43

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C	I	R	IV
1.	98*	52712046	69662	"BIGDB	111	92	0	0	100	20	60		99	
2.	96*	26601649	69794	"BIGDB	148	71	3	0	100	8	68		96	
3.	95*	35065271	69793	"BIGDB	135	75	3	0	100	8	68		94	
4.	94*	52744135	69676	"BIGDB	133	95	3	0	89	12	64		94	
5.	89*	38380073	69788	"BIGDB	112	93	0	0	82	46	40		99	

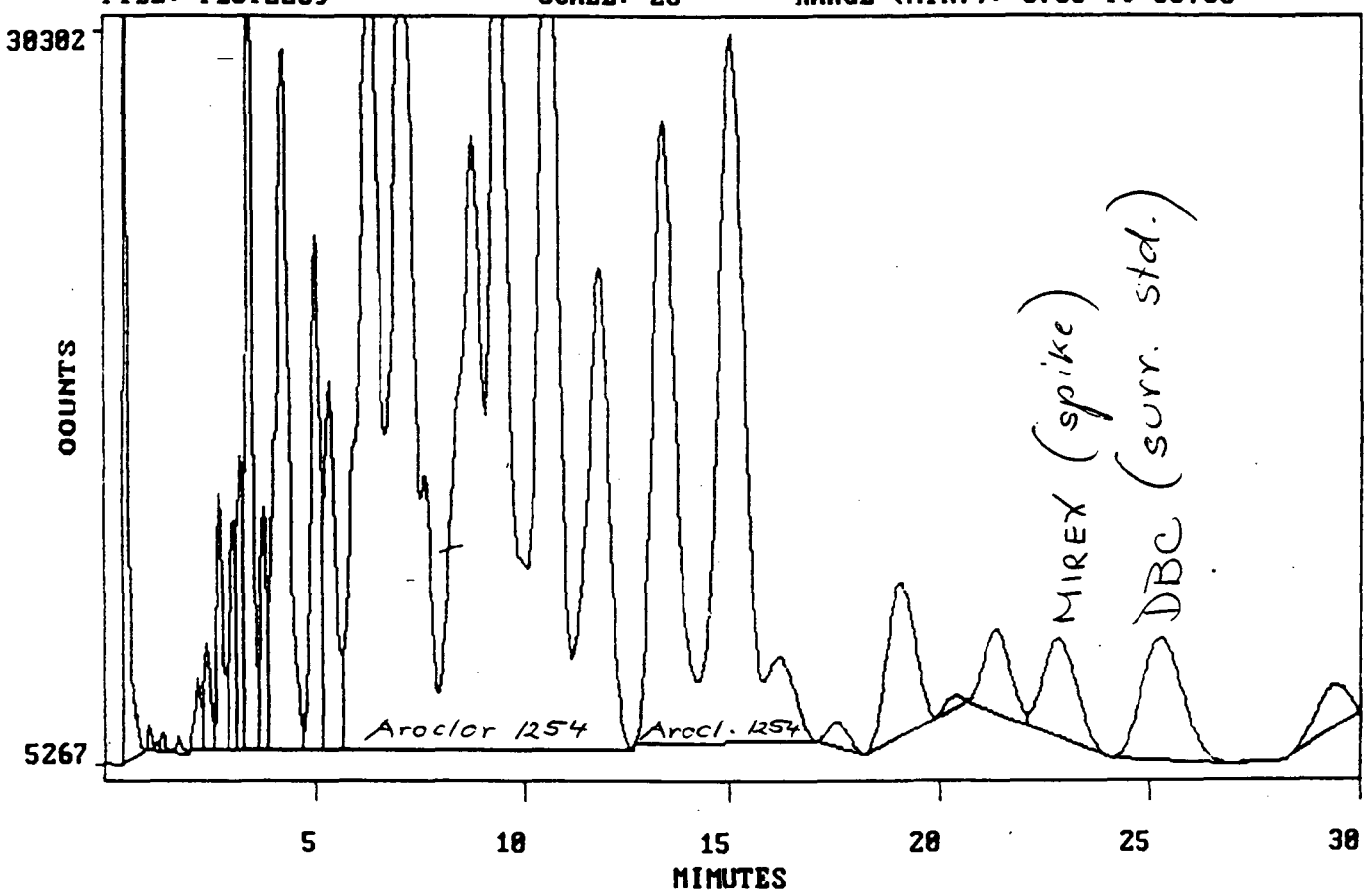
660548
CD910-S3
PRIMARY COLUMN

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:15:06:55 Date:MON 18 OCT 86

Time:19:46:15 Date:TUE 07 OCT 86
Method:ARO1254C

FILE: PEST2269 SCALE: 20 RANGE (MIN.): 0.03 TO 30.00



Channel # REINT Time:15:04:53 Date MON 13 OCT 86

Sample name .....
Data file.....PEST2269
Method name ARO1254C

Author .....LAL
Instrument.. Tracer 550 - ECD
Column.....1.5% SP-2250/1.95% SP-2401 on 100/120
Notes.....Reintegration of Aroclors

Run time.....20.00 min. Delay time...0.00 min.
Acq. time.....19:46:15 Acq. date....TUE 07 OCT 86
Start FW.....20.00 sec End FW .....150.00 sec.
Actual PW ...140.0
Slope sens.....0.75 uv/sec.

Area reject ...500
peaks found. 24
Vol Inj.....5.0 ul Sample amount 1.000
Conv factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.551			17.742	2990836	731299	EE
2	1.072			0.042	7074	1168	BV
3	1.251			0.010	1626	320	VV
4	1.390			0.068	11490	903	VB
5	2.219	Unkn.		0.216	36422	3376	BV
6	2.436			0.293	49331	4943	VV
7	2.740	Unkn.		0.710	119755	11680	VV
8	3.090			0.585	98653	10431	VV
9	3.273			0.760	123062	13309	VV
10	3.478			2.632	443771	44162	VV
11	3.801			0.715	120598	10987	VV
12	4.251	Unknown		3.893	656531	31867	VV
13	5.008			2.179	367330	23147	VV
14	5.338			1.657	279315	16637	VV
15	9.415			45.270	7634875	46842	VB
16	15.064			15.694	2645616	31825	BB
17	17.541			0.237	39933	1175	BB
18	19.106			1.875	316143	6865	BV
19	20.364			0.085	14363	548	VB
20	21.381			1.006	169547	3747	BV
21	22.858			1.458	245718	4492	VB

296

24	29 412	0.412	103248	1909	BB
TOTALS		100.000	16857568		

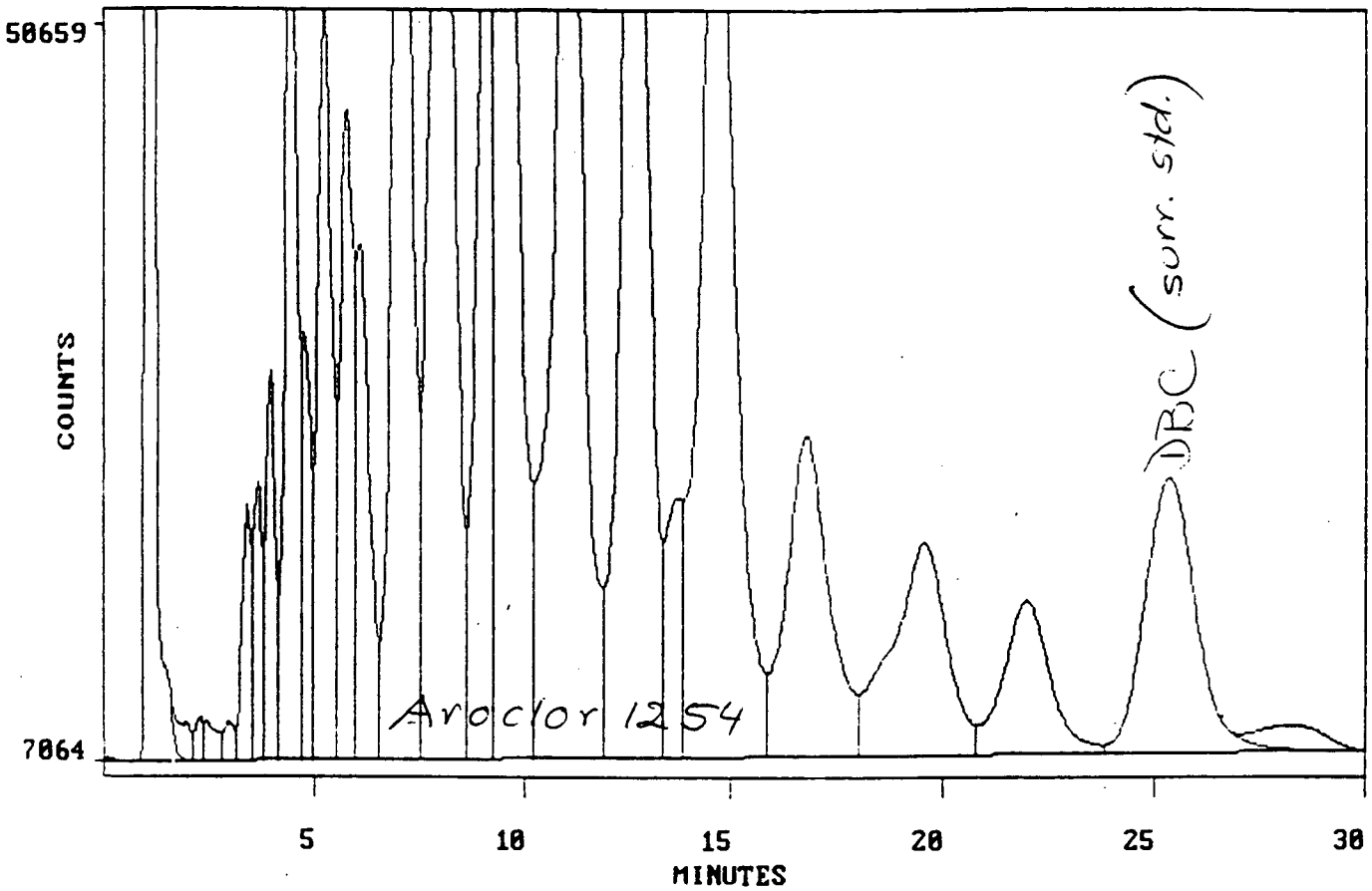
660548
CD910-53

CONFIRMATORY COLUMN

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time 10:53:01 Date THU 03 OCT 91
Time 10:11:24 Date THU 03 OCT 91
Method PEST2

FILE: I:PEST2311 SCALE: 20 RANGE (MIN.): 0.03 TO 30.00



Channel # 4 Time 20:41:55 Date:THU 09 OCT 86
Run #1 of 100

Sample name.....
Data file..... DAT259:PEST2311
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....G
Notes.....Primary Column Runs

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....20:11.24 Acq. date....THU 09 OCT 36
Start PW.....20.00 sec. End PW.....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
peaks found..27
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.110			0.009	3999	27.7	BB
2	1.133			30.822	13658293	871921	BE
3	1.974			0.136	60094	2265	EV
4	2.315			0.105	46466	2661	EV
5	2.460			0.119	52929	2325	EV
6	2.996			0.099	43999	2334	EV
7	3.427			0.523	231691	15207	VV
8	3.666			0.500	221442	16532	VV
9	3.962			0.819	363056	23056	VV
10	4.454			2.620	1161109	61312	VV
11	4.763			0.760	336893	25175	VV
12	5.234			2.391	1059317	45196	VV
13	5.756			1.896	840001	38451	VV
14	6.058			1.438	637048	30366	VV
15	7.054			5.824	2580865	86460	VV
16	8.038			6.855	3037737	77063	VV
17	9.185			3.684	1632546	60871	VV
18	9.612			6.797	3012084	84009	VV
19	11.125			8.268	3664020	81978	VV
20	12.714			7.250	3212304	74171	VV
21	13.726			0.942	417597	15364	VV
22	14.686			7.391	3363839	59521	VV

23	16.793	3.015	1335988	18982	VV
24	19.576	2.559	1133946	12636	VV
25	22.049	1.558	690364	9048	VV
26	25.435	3.087	1367822	16214	VE
27	23.387	0.333	147484	1399	EB
TOTALS		100.000	44313433		

III. 2. Reporting Package
NJ DEP I.D. # SW-1

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575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Lab No. 660550
Type: Misc. - Tier I
Point: SW-1
Date Collected: 9/11/86
Date Received: 9/12/86
Collected By: CL 99

PRIORITY POLLUTANTS ANALYSIS - PURGEABLE ORGANICS

Scan No.	Cas Number	Compound	ug/l
	74-87-3	Chloromethane	10U
	74-83-9	Bromomethane	10U
	75-01-4	Vinyl chloride	10U
	75-00-3	Chloroethane	10U
	75-09-2	Methylene chloride	10U
	75-69-4	Trichlorofluoromethane	10U
	75-35-4	1,1-dichloroethene	10U
	75-34-3	1,1-dichloroethane	10U
	156-60-5	Cis/Trans-1,2-dichloroethene	10U
	67-66-3	Chloroform	10U
	107-06-2	1,2-dichloroethane	10U
330	71-55-6	1,1,1-Trichloroethane	4JB
	56-23-5	Carbon tetrachloride	10U
	75-27-4	Bromodichloromethane	10U
	79-34-5	1,1,2,2-Tetrachloroethane	10U
	70-87-5	1,2-dichloropropane	10U
	10061-02-6	Trans-1,3-dichloropropene	10U
	79-01-6	Trichloroethene	10U
	124-48-1	Dibromochloromethane	10U
	79-00-5	1,1,2-trichloroethane	10U
	71-43-2	Benzene	10U
	10061-01-5	cis-1,3-Dichloropropene	10U
	110-75-8	2-chloroethylvinyl ether	10U
	75-25-2	Bromoform	10U
	127-10-4	Tetrachloroethene	10U
	106-88-3	Toluene	10U
	106-90-7	Chlorobenzene	10U
	100-41-4	Ethylbenzene	10U
	541-73-1	1,2-Dichlorobenzene	10U
	95-50-1	1,3-Dichlorobenzene	10U
	106-46-1	1,4-Dichlorobenzene	10U

Date Reported: 10/15/86

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* *
* *
****
S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: S10-1

ORGANICS ANALYSIS DATA SHEET
(Page 41

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob. FIT	% Prob. RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown (Carbon Dioxide)	-	-	13	130B
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
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25.						
26.						
27.						
28.						
29.						
30.						

JMSlamin

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Lab Name: H2M Labs
Concentration: Low

Sample Lab No. 660551 - SW-1

Date Extracted: 9/15/86
Date Analyzed: 9/22/86

Cooc Factor: 1000:1

Send-Volatile Compounds

C.A.S. Number		ug/l	C.A.S. Number		ug/l	Soar No.
65-75-9	N-Nitrosodimethylamine	10U	83-32-9	Acenaphthene	10U	
108-95-2	Phenol	10U	51-28-5	2,4-Dinitrophenol	10U	
62-53-3	Aniline	10U	100-02-7	4-Nitrophenol	100	
111-44-4	bis(2-Chlaroethyl)Ether	10U	121-14-2	2,4-Dinitrotoluene	100	
95-57-8	2-Chloraphenol	10U	606-20-2	2,6-Dinitrotoluene	10U	
541-73-1	1,3-Dichlorobenzene	10U	84-66-2	Diethylphthalate	100	
106-46-7	1,4-Dichlorobenzene	10U	7005-72-3	4-Chlurophenyl-phenylether	10U	
95-50-1	1,2-Dichlarobenzene	10U	86-73-7	Fluorene	10U	
39638329	bis(2-chloroisopropyl)ether	10U	534-52-1	4,6-Dinitro-2-Methylphenol	50U	
621-64-7	N-Nitroso-Di-n-Propylamine	10U	86-30-6	N-Nitrososdiphenylamine (1)	10U	
67-72-1	Hexachloroethane	10U	101-55-3	4-Bremophenyl-phenylether	10U	
98-95-3	Nitrcbenzene	10U	118-74-1	Hexachlorobenzene	10U	
78-59-1	Isophorone	100	87-86-5	Pentachlorophenol	500	
88-75-5	2-Nitrophenol	10U	85-01-8	Phenanthrene	10U	
105-67-9	2,4-Uimethylphenol	10U	120-12-7	Anthracene	10U	
111-91-1	bis(2-Chlaroethoxy)Methane	10U	84-74-2	Di-n-Butylphthalate	10U	
120-83-2	2,4-Dichlorophenol	10U	206-44-0	Fluoranthene	10U	
120-82-1	1,2,4-Trichlorobenzene	10U	92-87-5	Benzidine	80U	
91-20-3	Naphthalene	10U	129-00-0	Pyrene	10U	
87-68-3	Hexachlarobutadiene	10U	85-68-7	Butylbenzylphthalate	100	
59-50-7	4-Chloro-3-Methylphenol	10U	91-94-1	3,3'-Dichlorobenzidine	20U	
77-47-4	Hexachlanxyclopentadiene	10U	56-55-3	Benzo(a)Anthraoene	10U	
88-06-2	2,4,6-Tcichlocophenol	10U	117-81-7	bis(2-Etlrylhenyl)Phthalate	61	1525
91-58-7	2-Chlarcnaphthalene	10U	218-01-9	Chrysene	100	
131-11-3	Dimethyl Phthalate	10U	117-84-0	Di-n-Uctyl Phthalate	10U	
208-96-8	Acenaphthylene	10U	205-99-2	Benzo(b)Fluoranthene	10U	
			207-08-9	Benzo(k)Fluoranthene	10U	
			50-32-8	Benzo(a)Pyrene	10U	
			193-39-5	Indaro(1,2,3-od)Pyrene	10U	
			53-70-3	Dibenzo(a,h)Anthracene	10U	
			191-24-2	Benzo(g,h,i)Perylene	100	

(1) Cannot be separated frcm diphenylamine

Date Reported: 10/16/86

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* *
****

S.C. McLendon, P.E.
Laboratory Director

305

NJ DEP Sample #: SW-1

ORGANICS ANALYSIS DATA SHEET
(Page 41

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob FIT	% Prob RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown	-		145	10J
2.	123795	Dioctyl ester hexanedioic acid	76		1451	68J
3.						
4.						
5.						
6.						
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29.						
30.						

JMSlan

HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS
575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Sample Lab No. 660552
Date Extracted: 9/18/86
Date Analyzed: 9/30/86
Type: Misc. - Tier I
Point: SW-1
Collected By: CL 99

ANALYSIS FOR PESTICIDES/PCB's

C.A.S. No.	Compound	ug/l
319-84-6	Alpha-BHC	0.05U
319-87-7	Beta-BHC	0.06
319-86-8	Delta-BHC	0.05U
58-89-9	Gamma-BHC (Lindane)	0.05U
76-44-8	Heptachlor	0.05U
309-00-2	Aldrin	0.05U
1024-57-3	Heptachlor Epoxide	0.05U
959-98-8	Endosalfan I	0.05U
60-57-1	Dieldrin	0.10U
72-55-9	4,4'-DDE	U.10U
72-20-8	Endrin	0.10U
33213-65-9	Endosulfan II	0.10U
72-54-8	4,4'-CUD	0.10U
1031-07-8	Endosulfan Sulfate	0.10U
50-29-3	4,4'-DDT	0.10U
72-43-5	Methoxychlor	0.50U
53494-70-5	Endrin Ketone	0.10U
57-74-9	Chlordane	0.500
8001-35-2	Toxaphene	1.0U
12674-11-2	Aroclor 1016	0.500
11104-28-2	Aroclor 1221	0.500
11141-16-5	Aroclor 1232	0.50U
53469-21-9	Aroclor 1242	0.50U
12672-29-6	Aroclor 1248	0.50U
11097-69-1	Aroclor 1254	1.0U
11096-82-5	Aroclor 1260	1.0U

Vi = Volume of extract injected (uL)
Ws = Weight of sample extracted (g)
Vs = 1000 mL Vt = 3 mLs
Date Reported: 10/17/86

Vs = Volume of water extracted (mL)
Vt = Volume of Total extract (mL)
Vi = 5 uL

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* *
* *
****
S.C. McLendan, P.E.
Labaratary Director

30

Lab Name : H2M LABS

ORGANICS ANALYSIS DATA SHEET

Sample Number
660552

NJDEP #CD910-SW1

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Probability Fit	% Probability K.E.T	RT or Scan Number	Estimated Concentration (ug/L or ug/kg)
1.		No Unknowns Found > 0.5 ug/l				
2.						
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30.						

Date Reported 10-17-86

S.C. McLendon, P.E.
Laboratory Director

H2M
Environmental Engineers & Scientists
HOLZMACHER, McLENDON and MURRELL, P.C.
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
WATER RESOURCES • WATER SUPPLY & TREATMENT • SEWERAGE & TREATMENT • ECOLOGICAL & IMPACT STUDIES
MODEL STUDIES • PILOT PLANT STUDIES • WATERWASTE WATER LABORATORY AND ANALYTICAL SERVICES

LABORATORY REPORT

LAB NO. 660553

PROJECT NO. 2C

CLIENT'S NAME AND ADDRESS
NEW JERSEY D.E.P.
65 PROSPECT ST.
TRENTON, NJ 08618

TYPE OF SAMPLE - MISCELLANEOUS
DATE COLLECTED - 9/11/86
NJDEP SAMPLE #CD 910-SW-1
NJDEP SAMPLE POINT I.D. #SW-1
AQUEOUS SAMPLE

COLLECTED BY CL 99
DATE RECEIVED: 9/12/86

PARAMETER	RESULT	PARAMETER	RESULT
ANTIMONY	<60.0#	SELENIUM	<5.00#
ARSENIC	11.8# ★	SILVER	<10.0#
BERYLLIUM	<5.00# N	THALLIUM	<10.0# N
CADMIUM	9.00#	ZINC	197.#
CHROMIUM	12.0#	PHENOLE	<1.00# N
COPPER	80.0# N	CYANIDE	<10.0#
LEAD	135.0# N		
MERCURY	<0.20#		
NICKEL	<40.0#		

ALL RESULTS IN MG/L EXCEPT AS NOTED BY # (UG/L) OR % PERCENT AND
T.COLI BACT. & FECAL COLI (MPN/100ML)
COLOR, ODOR, TURBIDITY & PH (UNITS)
FEC & FECAL STREP (COUNTS/ML)
SPEC. COND. (UMHOS) SETT. SOLIDS (ML/L)

DATE REPORTED: 10/6/86

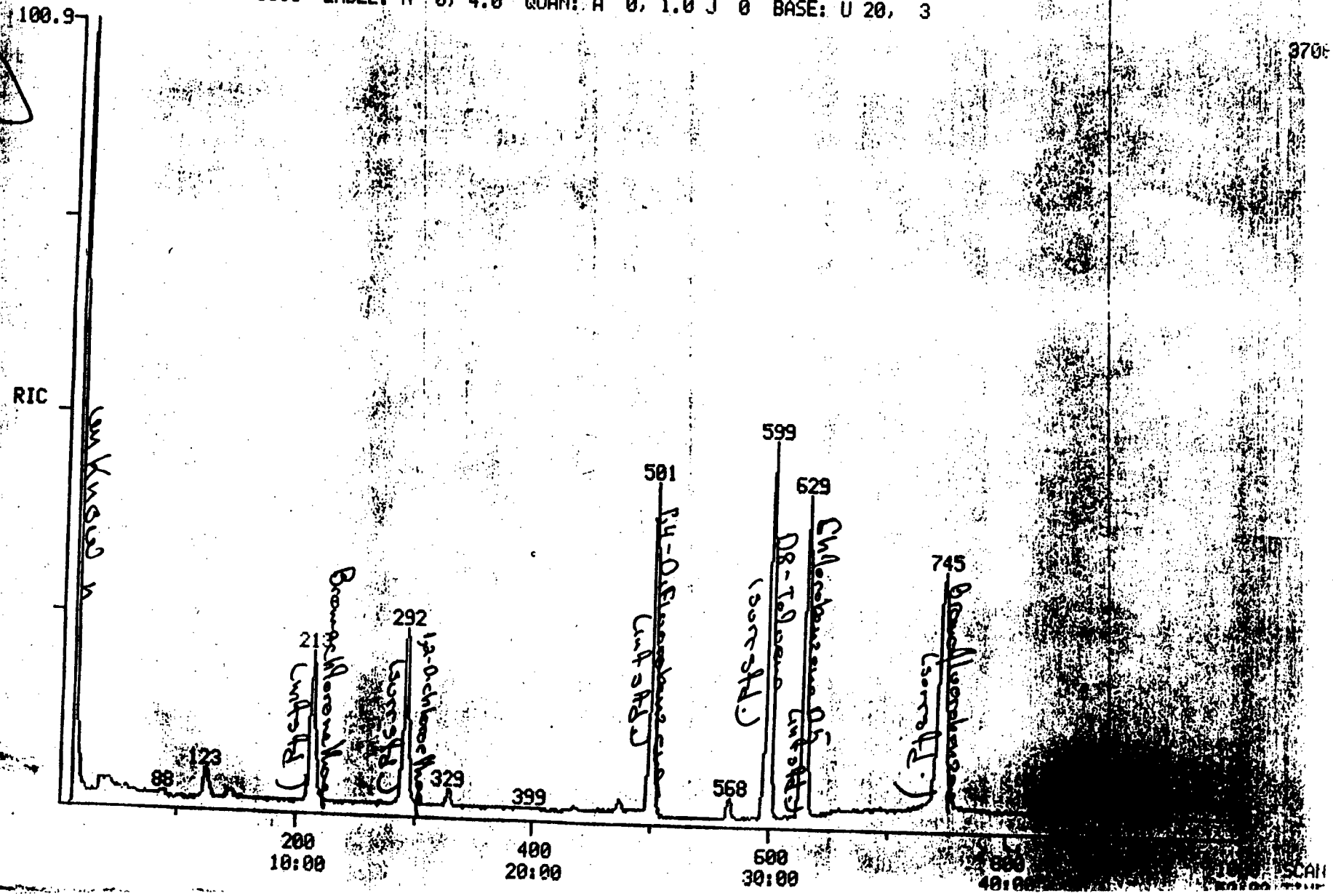
S.C. McLENDON, P.E., LABORATORY DIRECTOR

THE LIABILITY OF H2M CORP. SHALL BE LIMITED TO THE PRICE OF THE SERVICE RENDERED AND PAID.

PIC
05/24/06 11:26:00
SAMPLE: 5ML 660550
CONDS.:
RANGE: G 1,1000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: PU6394 #1
CALI: PU6394 #2

SCANS 1 TO 1000



ICA FINISHED, 8 FOUND
FINISHED AT: 9/24/86 15:13:51

[illegible]TATION REPORT [illegible]06394

[illegible]06394.TT
[illegible]6 11:26:00
[illegible]: 5ML 660550
[illegible]:
[illegible]TTED BY: NJDEP [illegible]ALYST: CC

[illegible]EA [illegible] [illegible]EA * RESP FACT)

[illegible]

[illegible]BROMOCHLOROME[illegible]E (INT. STD.)
2 1,2-DICHLOROETHANE D4 (SURR. STD)
3 CHLOROMETHANE
4 BROMOMETHANE
5 VINYL CHLORIDE
6 CHLOROETHANE
7 HETHYLENE CHLORIDE (C)
8 ACETONE
9 CARBON DISULPHIDE
10 I,1-DICHLOROETHENE (B)
11 1,1-DICHLOROETHANE(E)
12 TRANS -1,2-DICHLOROETHENE (D)
13 CHLOROFORM
14 1,2-DICHLOROETHANE(H)
15 TRICHLOROFLUOROMETHANE
16 DICHLOROFLUOROMETHANE
17 ACROLEIN
18 ACRYLONITRILE
19 1,4-DIFLUOROBENZENE(INT. STD)
20 2-BUTANONE (MEK)
21 1,1,1-TRICHLOROETMANE (I)
22 CARBON TETRA CHLORIDE
23 BROMODICHLOROMETHANE(L)
24 1,2-DICHLOROPROPANE(X)
25 TRANS-1,3-OICHLOROPROPENE (AA)
26 TRICHLOROETHENE(K)
27 DIBROMOCHLOROMETHANE(O)
28 1,1,2-TRICHLOROETANE(M)
29 BENZENE(BEN)
30 CIS-1,3-OICHLOROPROPENE(Z)
31 2-CHLOROETHYLVINYLETHER(NN)
32 BROMOFORM(P)
33 CHLOROBENZENE-DS (INT. STD)
34 2-HEXANONE(MBK)
35 4-METHYL-2-PENTANONE(MIBK)
36 TETRACHLOROETHENE(N)
37 ETHANE, I,1,2,2-TETRACHLORO-
38 TOLUENE(TOL)
39 CHLOROBENZENE(Q)
40 ETHYLBENZENE(EB)
41 STYRENE
42 META-XYLENE
43 ORTHO/PARA-XYLENE
44 META-DICHLOROBENZENE(MDCB)
45 ORTHO-DICHLOROBENZENE(ODCB)
46 PARA-DICHLOROBENZENE(PDCB)
47 D8-TOLUENE(SURR. STD)
48 BROMOFLUORBENZENE(SURR. STO)

No. [illegible] Sample Ident. Re[illegible] PDT [illegible]

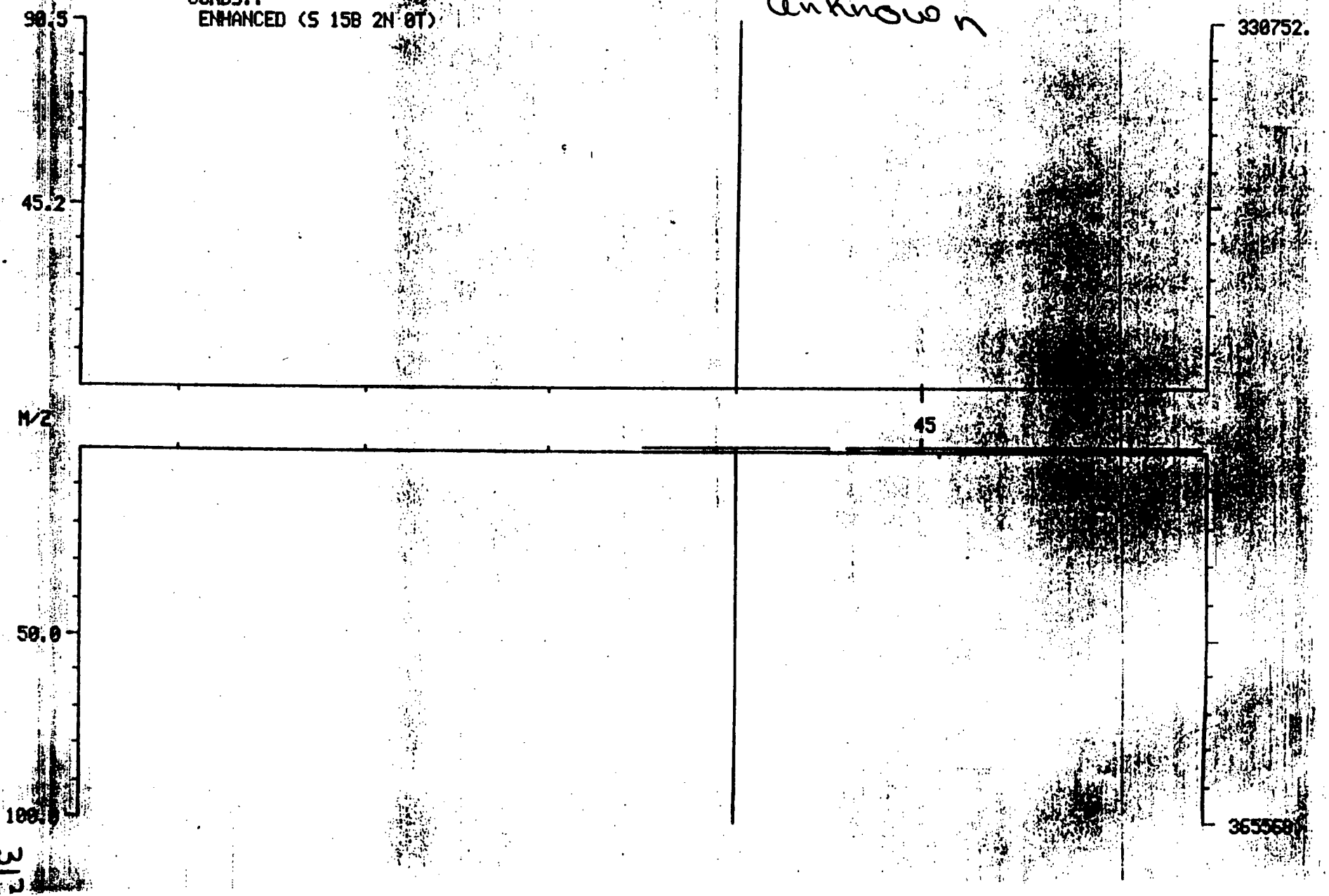
3	50	[illegible]	[illegible]	1	0.131	A BB	656.	1.333	NG	[illegible]
4	NOT FOUND									
5	NOT FOUND									
6	NOT FOUND									
7	84	123	6:09	1	[illegible]	A BB	[illegible]	[illegible]	BB NG	[illegible]
8	42	145	7:15	1	0.681	A*BV	[illegible]	[illegible]	5 NG	[illegible]
9	NOT FOUND									
10	NOT FOUND									
11	NOT FOUND									
12	NOT FOUND									
13	83	272	13:36	1	[illegible]	A BB	[illegible]	[illegible]	NG	[illegible]
14	62	294	14:42	1	[illegible]	A BB	[illegible]	[illegible]	NG	[illegible]
15	101	183	9:09	1	[illegible]	A BB	[illegible]	[illegible]	NG	[illegible]
16	NOT FOUND									
17	NOT FOUND									
18	NOT FOUND									
19	114	501	25:03	19	1.000	A BB	278593.	[illegible]	000 NG	7.64
20	43	297	14:51	19	0.593	A*BB	5474.	[illegible]	938 NG	2.11
21	97	330	16:30	19	0.659	A BB	7940.	[illegible]	404 NG	0.59
22	NOT FOUND									
23	NOT FOUND									
24	NOT FOUND									
25	NOT FOUND									
26	130	419	20:57	19	0.836	A BB	193.	0.346	NG	0.01
27	NOT FOUND									
28	NOT FOUND									
29	78	436	21:48	19	0.870	A BB	341.	0.225	NG	0.01
30	NOT FOUND									
31	NOT FOUND									
32	NOT FOUND									
33	117	629	31:27	33	1.000	A BB	214688.	290.000	NG	7.64
34	43	521	26:03	33	0.828	A BB	1917.	1372.550	NG	41.92
35	43	564	28:12	33	0.897	A*BB	1862.	401.602	NG	12.27
36	164	569	28:27	33	0.905	A BB	509.	1.013	NG	0.03
37	NOT FOUND									
38	92	603	30:09	33	0.959	A BB	872.	1.134	NG	0.03
39	NOT FOUND									
40	NOT FOUND									
41	NOT FOUND									
42	NOT FOUND									
43	NOT FOUND									
44	NOT FOUND									
45	NOT FOUND									
46	NOT FOUND									
47	100	599	29:57	33	0.952	A BB	190810.	232.804	NG	7.11
48	95	744	37:12	33	1.183	A BB	182493.	236.468	NG	7.22

DUAL MASS SPECTRUM
09/24/06 11:26:09 + 0:39
SAMPLE: 5ML 660550
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6394 #13
CALI: PU6394 #2

BASE M/Z: 44/ 44
RIC: 335071./ 370607.

unknown



312

LIBRARY SEARCH
09/24/36 11:26:00 + 0:39
SAMPLE: SML 660550
CONDS.1
ENHANCED (S 150 2N 0T)

DATA: PU6354 # 13
CALI: PU6394 # 2

RIC: 335871.

UNKNOWN

1018
SAMPLE

C.02
1018
M WT 44
B PK 44
RANK 1
31
FIT 1000

CARBON DIOXIDE (ACN)

0.N2
1018
M WT 44
B PK 44
RANK 2
36
FIT 1000

NITROGEN OXIDE (N20)

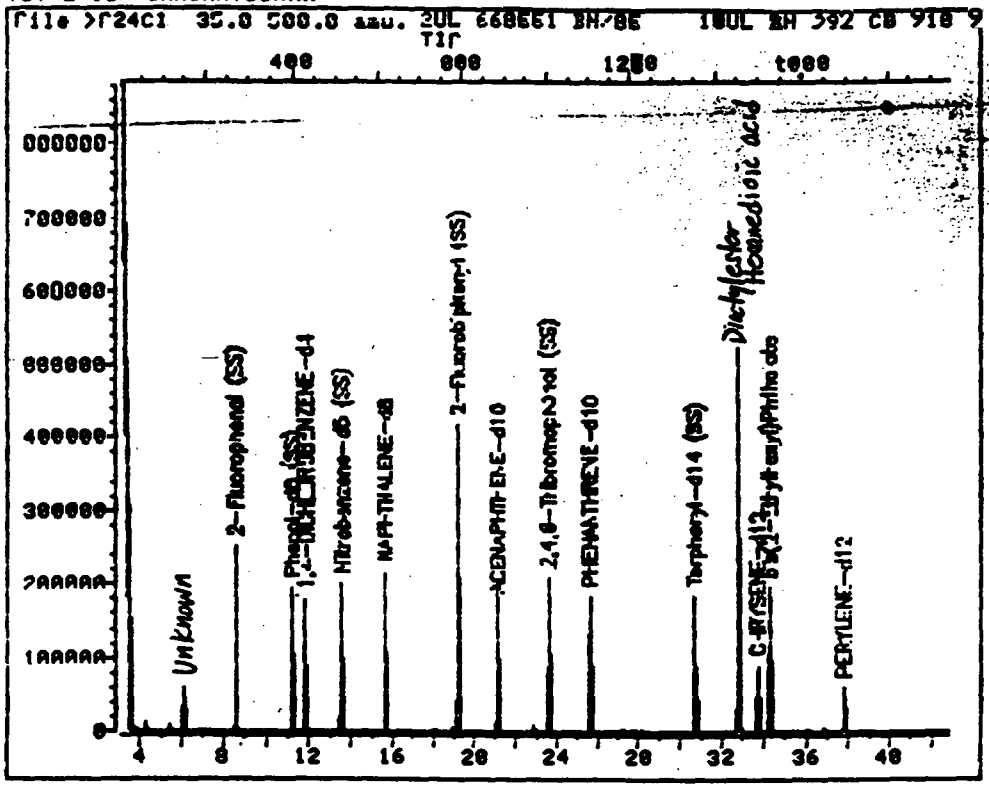
C.H6.02.N2
1018
M WT 78
B PK 17
RANK 1
359
FIT 1000

CARBAMIC ACID, MONOAMMONIUM SALT

M/Z
15 20 25 30 35 45

3/4

TOTAL ION CHROMATOGRAM



Data File: >P2461::D1
Name: 2UL 660991 BN/AE
Misc: 10UL BN 392 CD 910 SW1 BTL#93

Id File: !!DXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:19

Operator ID: STEVE
Quant Time: 860922 14:32
Injected at: 860922 13:39

QUANT REPORT

Operator ID: STEVE Quant Rev: 4 Quant Time: 660522 14:32
Output File: ^P2461::OP Injected at: 860522 13:35
Data File: >P2461::01 Dilution Factor: 1.00
Name: 2UL 660551 BN/AE
Misc: 10UL BN 352 CD 910 SU1 BTL#93

ID File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860522 14:15

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-d4	11.80	427	65703	40.00	NG	88
3)	2-Fluorophanol (SS)	8.53	267	157278	76.45	NG	81
7)	Phenol-d6 (SS)	11.16	356	184018	68.78	NG	83
15)	*NAPHTHALENE-d8	15.60	613	225363	40.00	NG	47
16)	Nitrobenzene-d5 (SS)	13.52	511	154355	57.52	NG	85
27)	*ACENAPHTHENE-d10	21.10	882	116056	40.00	NG	98
31)	2-Fluorobiphenyl (SS)	19.16	787	332251	62.74	NG	96
42)	2,4,6-Tribromophenol (SS)	23.54	1001	78400	50.52	NG	87
43)	*PHENANTHRENE-d10	25.58	1101	186542	40.00	NG	55
54)	*CHRYSENE-d12	33.68	1457	100372	40.00	NG	47
55)	Terphenyl-d14 (SS)	30.63	1348	175656	87.52	NG	37
61)	bis(2-Ethylhexyl)Phthalate	34.25	1525	128658	61.21	NG	54
63)	*PERYLENE-d12	37.73	1655	88725	40.00	NG	77

* Compound is ISTD

MS data file header from : >P2461

Sample: 2UL 660991 BN/AE Operator: STEVE MS 9/22/86 13:39
Misc : 10UL BN 392 CD 910 SU1 BTL#93
Sys. #: 1 MS model: 96 SU/HW rev.: CA ALS # : 0
Method file: EXTRII Tuning file: MT9301 No. of extra records: 1
Source temp.: 200 Analyzer temp.: 220 Transfer line temp. : 280

Chromatographic temperatures :	30.	300.	0.	0.	0.
Chromatographic times, min. :	4.0	9.0	0.0	0.0	0.0
Chromatographic rate, deg/min:	8.0	0.0	0.0	0.0	0.0

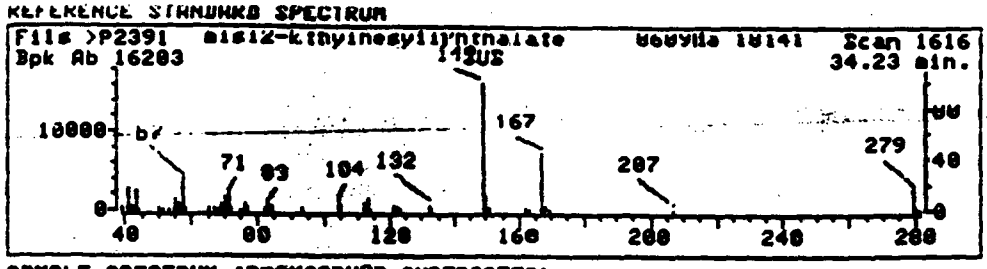
>P2461 2UL 660991 BN/AE 10UL BN 392 CD 910 SU1
39.01 500.0 CLP ADC TIC

Peak #	R.T. min.	first scan	max scan	last scan	peak height	raw area	corr. area	corr. % max.	% of total
1	6.031	142	145	147	60464	126661	126275	9.67	4.32
2	15.602	610	613	616	216041	504174	504174	38.63	17.26
3	25.582	1096	1101	1104	184230	496634	496035	38.00	16.98
4	32.740	1447	1451	1453	524130	1310877	1305296	100.00	44.69
9	33.681	1493	1497	1901	89939	268939	261197	20.01	8.94
6	37.731	1691	1695	1704	99141	247594	227500	17.43	7.79

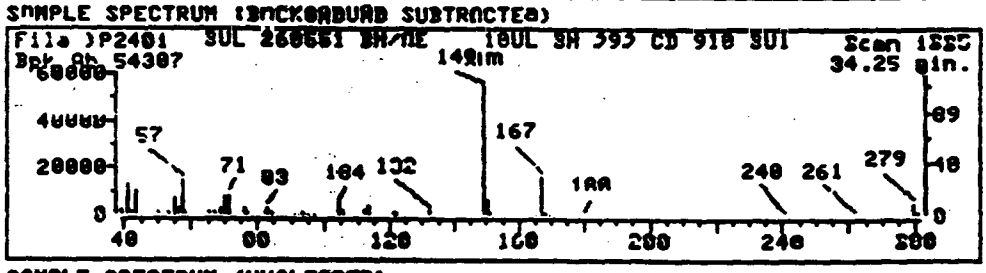
Sum of corrected areas: 2920477.

2:54 PM MON., 22 SEPT, 1986

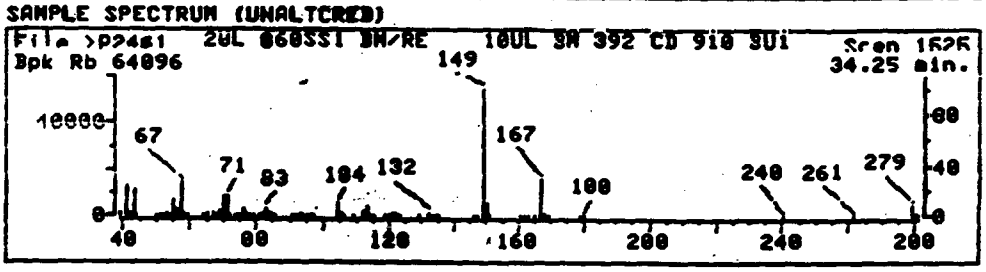
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



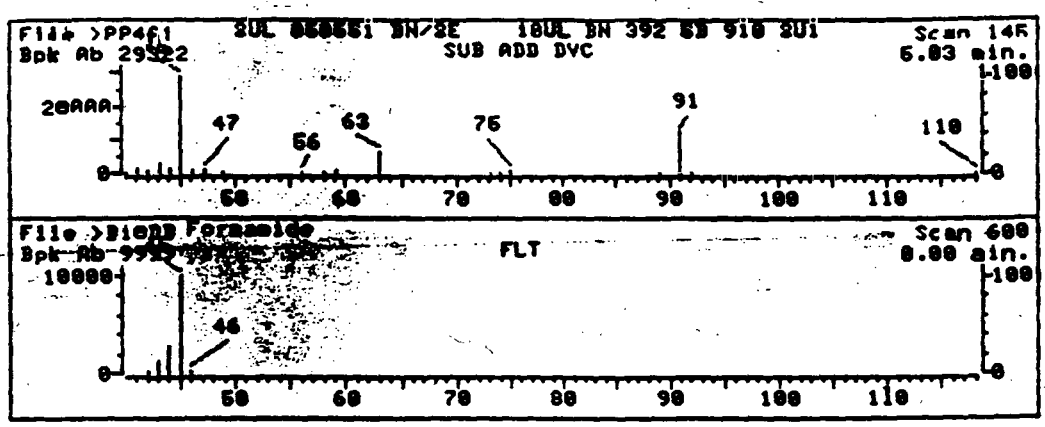
SAMPLE SPECTRUM (UNALTERED)



Data File: >P2461::D1
Name: 2UL 660991 BN/AE
Misc: 10UL BN 392 CD 910 SU1
Quant Time: 860922 14:32
Injected at: 860922 13:39

BTL#93

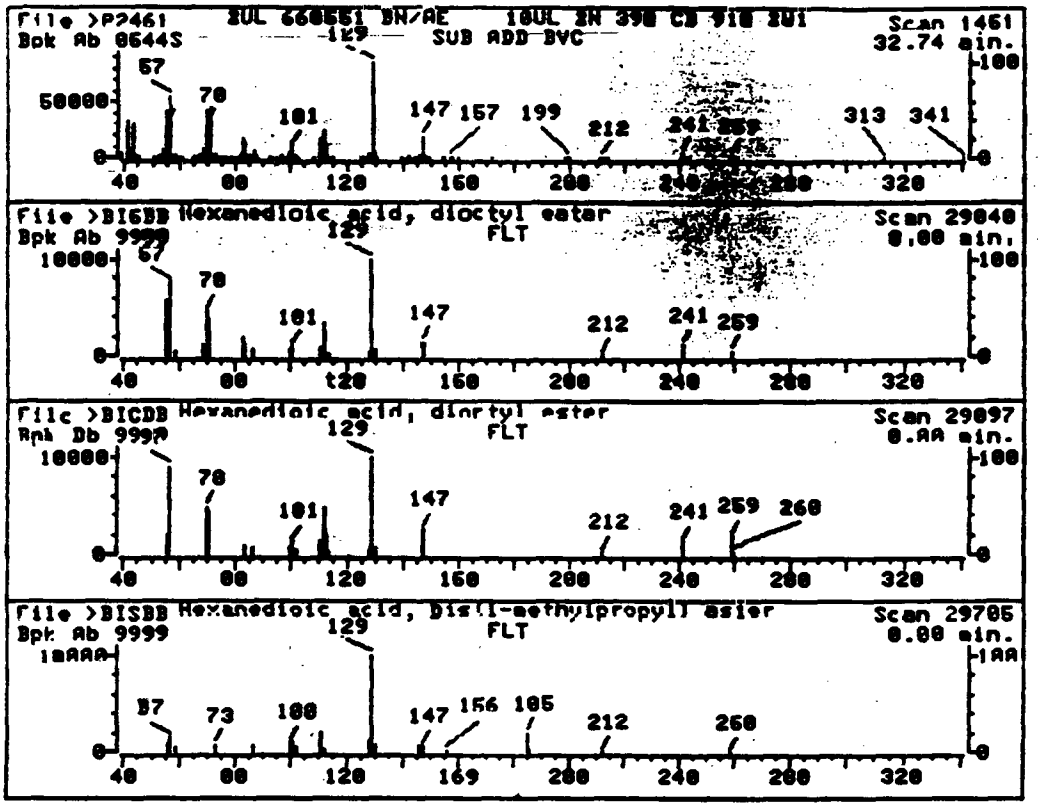
Compound No: 61
Compound Name: bis(2-Ethylhexyl)Phthalate
Scan Number: 1929
Retention Time: 34.25 min.
Area: 128698
Concentration: 61.21 NG
q-value: 94



1. Formamide 45 CH3NO

Sample file: >P2461 Spectrum #: 145
Search speed: 1 Tilting option: N No. of ion ranges searched: 44

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C_I	R_IV
1.	25*	75127	600	"BIGOB	21	30	1	0	88	48	7	14



1. Hexanedioic acid, dioctyl ester 370 C22H42O4

Sample file: >P2461 Spectrum #: 1491
Search speed: 1 Tilting option: N No. of ion ranges searched: 43

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C_I	R_IV
1.	76	123799	29840	"BIGDB	117	47	2	0	74	19	40	96

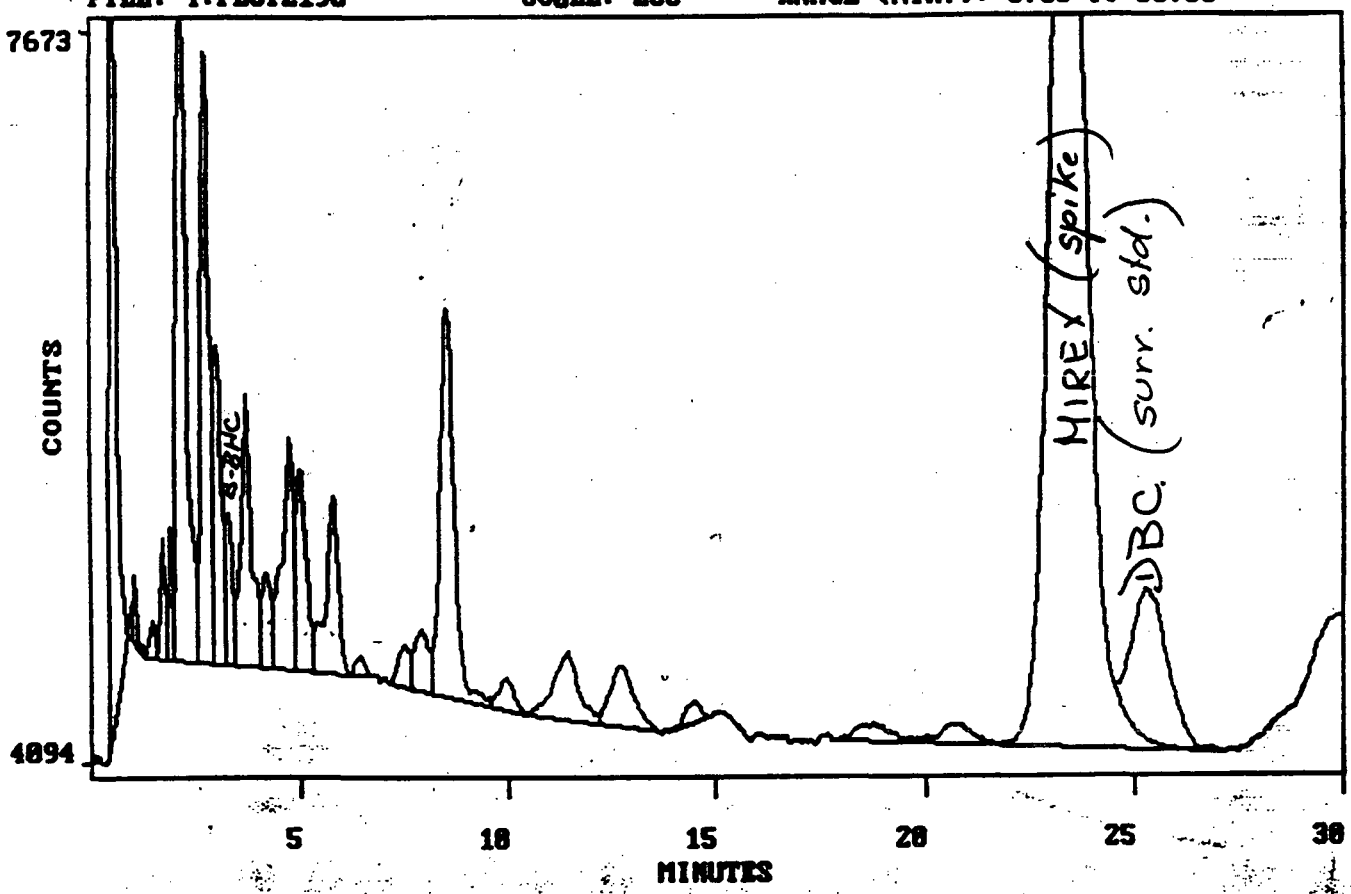
660552
CD910-SW1 PRIMARY COLUMN

RECONSTRUCT SCREEN DUMP
Date Acquisition

Time:17:26:11 Date:THU 02 OCT 86

Time:20:21:39 Date:TUE 30 SEP 86
Method:PEST2

FILE: I:PEST2190 SCALE: 200 RANGE (MIN.): 0.03 TO 30.00



1.8

Channel #.....4 Time:20:52:08 Date:TUE 30 SEP 86
Ran 83 of 100

Sample name.....NJDEP
Data file.....DAT256:PEST2190
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....C
Notes.....Primary Column Runs

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....20:21:39 Acq. date....TUE 30 SEP 86
Start PW.....20.00 sec. End PW.....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
8 peaks found..28
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.554			82.325	3213774	771427	BB
2	0.962			0.015	577	155	BV
3	1.073			0.042	1636	346	VB
4	t.308			0.042	1647	186	BV
9	1.742			0.141	5521	601	VV
6	1.935			0.107	4164	650	VV
7	2.189			1.492	58263	3526	VV
8	2.749			1.055	41293	3034	VV
9	3.029		Lindane	0.542 .109	21170/116 6	1362	VV
10	3.325		B-BHC	0.196 .055	7664/94	741	VV
11	3.729		S-BHC	0.505 .112	22840	1332	VV
12	4.200			0.101 .027	7064/156 3	463	VV
13	4.767			0.576	22401	1144	VV
14	5.014			0.396	15459	989	VV
15	5.776			0.447	17455	569	VB
16	6.433			0.037	1438	99	BB
17	7.530			0.118	4588	209	BV
18	7.931		Endo I	0.196 .049	7639/	301	VV
19	8.564		4,4'-DDE	1.145 .123	45483/2222	1897	VV
20	[illegible]			0.101	3951	151	VB
21	11.473			8.388 .097	13955/869	330	BV
22	12.758			0.314	12249/	298	VB

322

23	14.524		0.066	2570	91	BB
24	18.827		0.125	4886	85	BV
25	20.774		0.136	5323	95	VV
26	23.482	MIREX	8.101	316224	4983	VE
27	23.388	DBC	1.139	44457	734	EB
TOTALS			100.000	3903754		

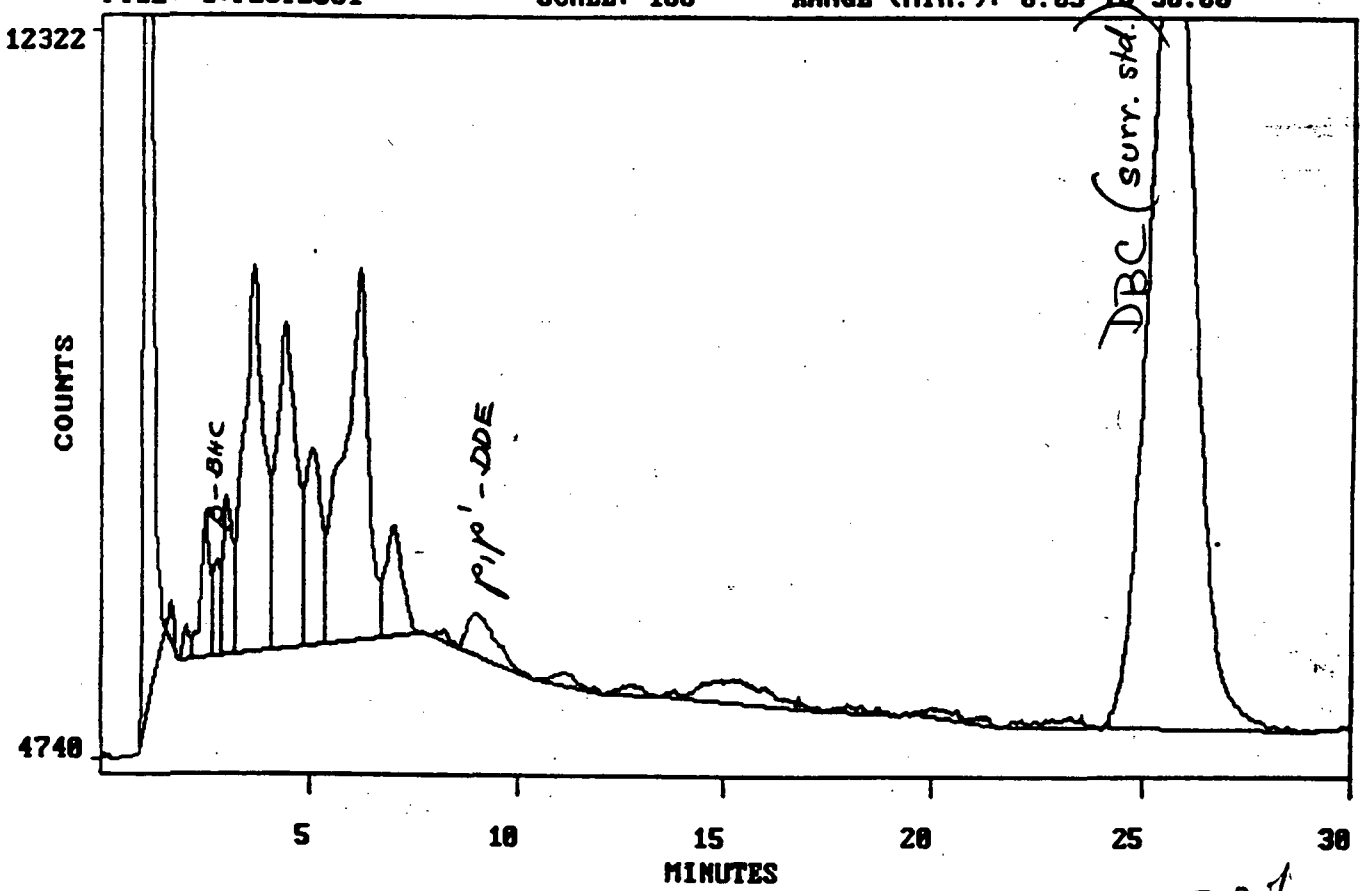
660552
CD910-SW1
CONFIRMATORY COLUMN

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:13:35:41 Date:THU 09 OCT 86

Time:13:01:31 Date:THU 09 OCT 86
Method:PEST2

FILE: I:PEST2301 SCALE: 100 RANGE (MIN.): 0.03 TO 30.00



2.3%

Channel #.....4 Time:13:32:13 Date:THU 09 OCT 86
Run #9 of 100

Sample name.....NJDEP
Data file.....DAT258:PEST2301
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....CV-2 3% SP2100 on 100/120 SUPELCOPORT
Notes.....~~Primary~~ Secondary Column Runs

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....13:01:31 Acq. data....THU 09 OCT 86
Start PW.....20.00 sec. End PW. .....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
peaks found..26
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

023891

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.106			0.007	333	55	BB
2	1.099			83.392	6623618	757057	BB
3	1.660			0.038	2998	406	BB
4	2.036			0.048	3784	347	BV
5	2.490			0.267	21223	1511	VV
6	2.759		B-BHC	0.146	11388	996	VV
7	3.003			0.343	27288	1629	VV
8	0.142 3.640			1.641	130383	3973	VV
9	0.171 4.399			1.373	109122	3351	VV
10	0.197 5.064			0.683	34260	2032	VV
11	0.240 6.164			1.936	155427	3819	VV
12	0.272 6.989			0.417	33129	1147	VB
13	0.3[illegible] 8.238			0.030	2362	123	BV
14	0.350 8.998		4,4'-DDE	0.267	21177	434	VB
13	0.434 11.143			0.074	5872	139	BB
16	0.498 12.800			0.051	4022	100	BB
17	0.553 13.820			0.021	1687	73	[illegible]
18	0.[illegible] 15.[illegible]			[illegible]	[illegible]	24[illegible]	[illegible]
19	0.[illegible] 18.[illegible]			0.030	2420	85	[illegible]
20	0.714 18.343			0.010	822	82	VB

23	21.213		0.021	1702	74	VB
24	22.170		0.035	2816	69	BV
25	23.310		0.064	5095	102	VB
26	25.702	DBC	8.634	687576	3826	BB
TOTALS			100.000	7945190		

III. 2. Reporting Package
NJ DEP I.D. # SW-2/SW2Q

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575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Lab No. 660554
Type: Misc. - Tier I
Point: SW2/SW20
Date Collected: 9/11/86
Date Received: 9/12/86
Collected By: CL 99

PRIORITY POLLUTANTS ANALYSIS - PURGEABLE ORGANICS

Scan No.	Cas Number	Compound	ug/l
	74-87-3	Chloromethane	10U
	74-83-9	Bromomethane	10U
	75-01-4	Vinyl chloride	10U
	75-00-3	Chloroethane	10U
131	75-09-2	Methylene chloride	15
	75-69-4	Trichlorofluoromethane	10U
	75-35-4	1,1-dichloroethene	10U
	75-34-3	1,1-dichloroethane	10U
	156-60-5	Cis/Trans-1,2-dichloroethene	10U
	67-66-3	Chloroform	10U
	107-06-2	1,2-dichloroethane	10U
331	71-55-6	1,1,1-Trichloroethane	3JB
	56-23-5	Carbon tetrachloride	10U
	75-27-4	Bromodichloromethane	10U
	79-34-5	1,1,2,2-Tetrachloroethane	10U
	70-87-5	1,2-dichloropropane	10U
	10061-02-6	Trans-1,3-dichloropropene	10U
	79-01-6	Trichloroethene	10U
	124-48-1	Dibromochloromethane	10U
	79-00-5	1,1,2-trichloroethane	10U
	71-43-2	Benzene	10U
	10061-01-5	cis-1,3-Dichloropropene	10U
	110-75-8	2-chloroethylvinyl ether	10U
	75-25-2	Bromoform	10U
	127-10-4	Tetrachloroethene	10U
604	106-88-3	Toluene	1J
	106-90-7	Chlorobenzene	10U
	100-41-4	Ethylbenzene	10U
	541-73-1	1,2-Dichlorobenzene	10U
	95-50-1	1,3-Dichlorobenzene	10U
	106-46-1	1,4-Dichlorobenzene	10U

Date Reported: 10/15/86

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* *
* *
****

[illegible], P.E.
[illegible] Director

NJ DEP Sample #: SW2/[illegible]Q

ORGANICS ANALYSIS DATA SHEET

(Page 4)

Tentatively Identified Compounds

C.A.S. Number	Compound Name	% Prob. (FIT / RFIT)	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.	Unknown (Carbon Dioxide)	- -	22	54B
2.				
3.				
4.				
5.				
6.				
7.				
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31.				

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575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

Lab Name: H2M labs
Concentration: Low

Sample Lab No. 660555 - SW-2 / SW-2Q

Date Extracted: 9/16/86 - 9/17/86
Date Analyzedr 9/22/86

Conc Factor: 1000:1

Semi-Volatile Compounds

C.A.S. Number		ug/l	C.A.S. Number		ug/l	Scan No.
65-75-9	N-Nitrosodimethylamine	10U	83-32-9	Acenaphthene	180	
108-95-2	Phenol	10U	51-28-5	2,4-Dinitrophenol	10U	
62-53-3	Aniline	10U	100-02-7	4-Nitrophenol	10U	
111-44-4	bis(2-Chloroethyl)Ether	10U	121-14-2	2,4-Dinitrotoluene	10U	
95-57-8	2-Chlorophenol	10U	606-20-2	2,6-Dinitrotoluene	10U	
541-73-1	1,3-Dichlorobenzene	10U	84-66-2	Diethylphthalate	10U	
106-46-7	1,4-Dichlorobenzene	10U	7005-72-3	4-Chlorophenyl-phenylether	10U	
95-50-1	1,2-Dichlorobenzene	10U	86-73-7	Fluorene	100	
39638329	bis(2-chloroisopropyl)ether	10U	534-52-1	4,6-Dinitro-2-Methylphenol	500	
621-64-7	N-Nitroso-Di-n-Propylamine	10U	86-30-6	N-Nitrosodiphenylamine (1)	10U	
67-72-1	Hexachloroethane	10U	101-55-3	4-Bromophenyl-phenylether	10U	
98-95-3	Nitrobenzene	10U	118-74-1	Hexachlorobenzene	100	
78-59-1	Isophorone	10U	87-86-5	Pentachlorophenol	500	
88-75-5	2-Nitrophenol	10U	85-01-8	Phenanthrene	100	
105-67-9	2,4-Dimethylphenol	10U	120-12-7	Anthracene	10U	
111-91-1	bis(2-Chloroethoxy)Methane	10U	84-74-2	Di-n-Butylphthalate	10U	
120-83-2	2,4-Dichlorophenol	10U	206-44-0	Fluoranthene	100	
120-82-1	1,2,4-Trichlorobenzene	10U	92-87-5	Benzidine	800	
91-20-3	Naphthalene	10U	129-00-0	Pyrene	10U	
87-68-3	Hexachlorobutadiene	10U	85-68-7	Butylbenzylphthalate	10U	
59-50-7	4-Chloro-3-Methylphenol	10U	91-94-1	3,3'-Dichlorobenzidine	200	
77-47-4	Hexachlorocyclopentadiene	10U	56-55-3	Benzo(a)Anthracene	10U	
88-06-2	2,4,6-Trichlorophenol	10U	117-81-7	bis(2-Ethylhexyl)Phthalate	2J	1523
91-58-7	2-Chloronaphthalene	10U	218-01-9	Chrysene	100	
131-11-3	Dimethyl Phthalate	10U	117-84-0	Di-n-Octyl Phthalate	10U	
208-96-8	Acenaphthylene	10U	205-99-2	Benzo(b)Fluoranthene	100	
			207-08-9	Benzo(k)Fluoranthene	10U	
			50-32-8	Benzo(a)Pyrene	10U	
			193-39-5	Indeno(1,2,3-cd)Pyrene	10U	
			53-70-3	Dibenzo(a,h)Anthracene	10U	
			191-24-2	Benzo(g,h,i)Perylene	100	

(1) Cannot be separated from diphenylamine

Date Reported: 10/16/86

S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: SW-2

ORGANICS ANALYSIS DATA SHEET
(Page 4)

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob FIT | RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown		144	11J
2.					
3.					
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30.					

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575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Sample Lab No. 660556
Date Extracted: 9/18/86
Date Analyzed: 9/30/86
Type: Misc. - Tier I
Point: SW2/SN2B
Collected By: CL 99

ANALYSIS FOR PESTICIDES/PCB's

C.A.S. No.	Compound	ug/l
319-84-6	Alpha-BHC	0.05U
319-87-7	Beta-BHC	0.05U
319-86-8	Delta-BHC	0.05U
58-89-9	Gamma-BHC (Lindane)	0.05U
76-44-8	Heptachlor	0.05U
309-00-2	Aldrin	0.05U
1024-57-3	Heptachlor Epoxide	0.05U
959-98-8	Endosulfan I	0.10U
60-57-1	Dieldrin	U.10U
72-55-9	4,4'-DDE	0.10U
72-20-8	Endrin	0.10U
33213-65-9	Endosulfan II	0.10U
72-54-8	4,4'-DDD	0.10U
1031-07-8	Endosulfan Sulfate	0.10U
50-29-3	4,4'-DDT	0.10U
72-43-5	Methoxychlor	0.50U
53494-70-5	Endrin Ketone	0.10U
57-74-9	Chlordane	0.50U
8001-35-2	Toxaphene	1.0U
12674-11-2	Aroclor 1016	0.50U
11104-28-2	Aroclor 1221	0.50U
11141-16-5	Aroclor 1232	0.50U
53469-21-9	Aroclor 1242	0.50U
12672-29-6	Aroclor 1248	0.50U
11097-69-1	Aroclor 1254	1.0U
11096-82-5	Aroclor 1260	1.0U

Vi = Volume of extract injected (uL)
Ws = Weight of sample extracted (g)
Vs = 1000 mL Vt = 3 mLs
Date Reported: 10/17/86

Vs = Volume of water extracted (mL)
Vt = Volume of Total extract (mL)
Vi = 5 uL

****
* *
* *
****
S.C. McLendon, P.E.
Laboratory Director

Lab Name : M2M LABS

Sample Number
660556

ORGANICS ANALYSIS DATA SHEET

NJDEP #910-SW2

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Probability Fit	% Probability Est Fit	RT or Scan Number	Estimated Concentration (ug/l) or ug/kg
1.		Unknown			2.19	0.55
2.						
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30.						

Date Reported: 10-17-86

S.C. McLendon, P.E.
Laboratory Director

H2M
Environmental Engineers & Scientists
HOLZMACHER, McLENDON and MURRELL, P.C.
579 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040

WATER RESOURCES • WATER SUPPLY & TREATMENT • SEWERAGE & TREATMENT • ECOLOGICAL & IMPACT STUDIES
STUDIES • PILOT PLANT STUDIES • WATER/WASTE WATER LABORATORY AND ANALYTICAL SERVICES

LABORATORY REPORT

LAB NO. 660887
PROJECT NO. 2C

CLIENT'S NAME AND ADDRESS

NEW JERSEY D.C.P.
65 PROSPECT ST.
TRENTON, NEW JERSEY 08618

TYPE OF SAMPLE - MISCELLANEOUS
COLLECTED BY CL 99
DATE COLLECTED - 9/11/86
DATE RECEIVED - 9/12/86

NJDEP SAMPLE #CD 910-SW2/SH2Q
NJDEP SAMPLE POINT I.D.#SW2/SW2Q
AQUEOUS SAMPLE

PARAMETER	RESULT	PARAMETER	RESULT
ANTIMONY	<60.0 #	SELENIUM	<5.00#
ARSENIC	<10.0 #	SILVER	<10.0 #
BERYLLIUM	<5.00# N	THALLIUM	<10.0 # N
CADMIUM	<8.00#	ZINC	21.0 #
CHROMIUM	<10.0 #	PHENOLS	<1.00# N E
COPPER	25.0 # N	CYANIDE	<10.0 #
LEAD	<20.0 # N E		
MERCURY	<0.20#		
NICKEL	<40.0 #		

ALL RESULTS IN (MG/L) EXCEPT AS NOTED BY # (UG/L) OR % (PERCENT) AND
T.COLI BACT. & FECAL COLI (MPN/100ML)
COLOR, ODOR, TURBIDITY & PH (UNITS)
FECAL STREP (COUNTS/
SPEC.COND. (UMHOS) SETT.SOLIDS(ML/L)

DATE REPORTED 10/ 8/86

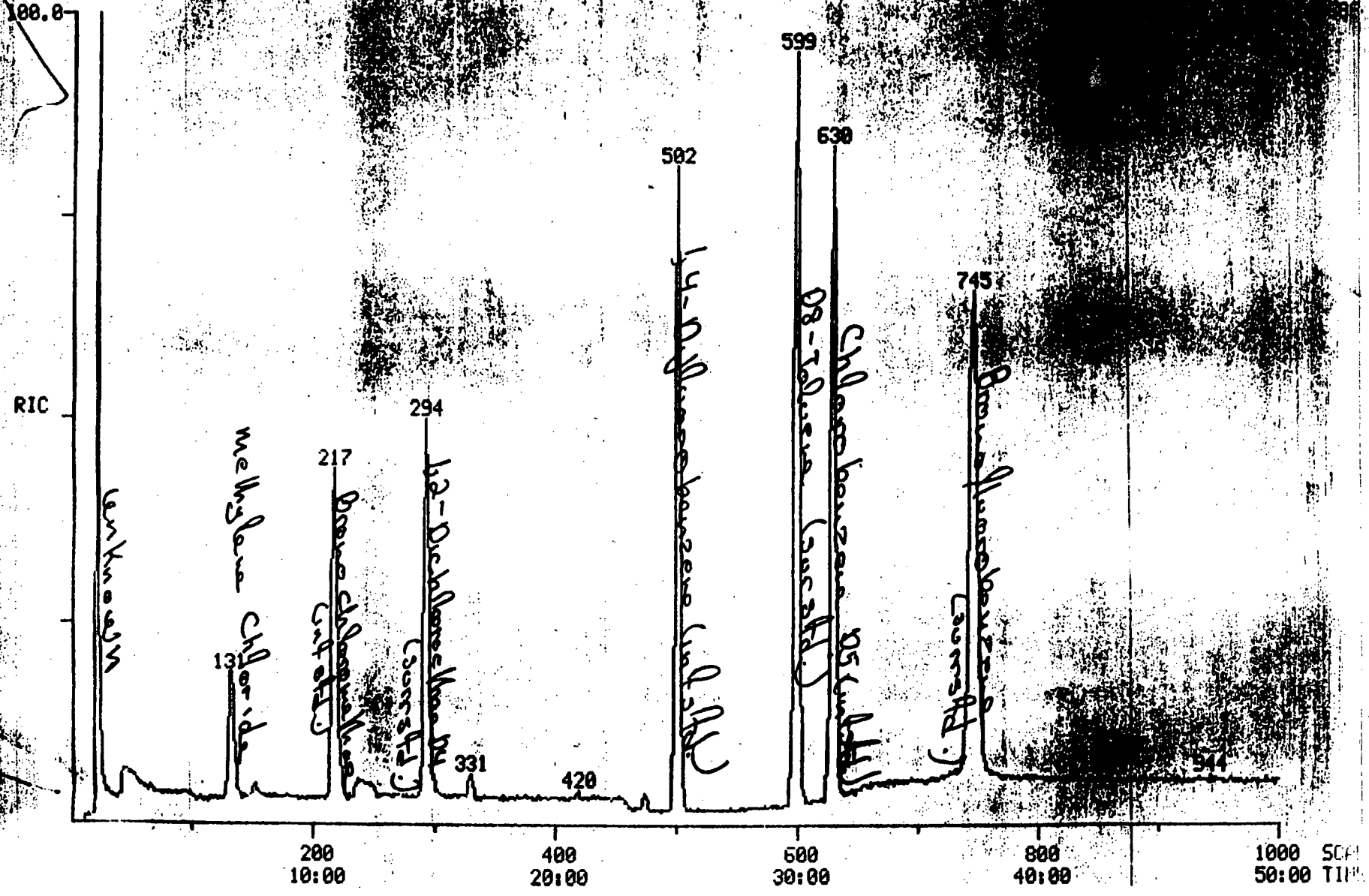
S. J. McLENDON, PM., LABORATORY DIRECTOR

THE LIABILITY OF H2M CORP. SHALL BE LIMITED TO THE PRICE OF THE SERVICE RENDERED AND PAID.

RIC
03/24/06 14:22:00
SAMPLE: 5ML 660554
CONDS.:
RANGE: G 1,1000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 207 3

DATA: PU6397 #1
CALI: PU6397 #2

SCANS 1 TO 1000



TCA FINISHED: 8 FOUND
FINISHED AT: 9/25/86 13:17:21

QUANTITATION REPORT FILE: PU6397

DATA: PU6397.TXT
09/24/8[illegible] 14:22:[illegible]
SAMPLE: SML 66[illegible]54
CONDS.
SUBMITTED BY: [illegible]DEP ANALYST: CC

AMOUNT=AREA * REF AMT/(REF AREA * RESP FACT)
RESP. FAC. FROM LIBRARY ENTRY

No	NAME
1	BROMOCHRLOROMETHANE (INT. STD.)
2	1,2-DICHLOROETHANE D4 (SURR. STD)
3	CHLOROMETHANE
4	BROMOMETHANE
5	VINYL CHLORIDE
6	CHLOROETHANE
7	METHYLENE CHLORIDE (C)
8	ACETONE
9	CARBON DISULPHIDE
18	I,I-DICHLOROETHENE (B)
11	1,1-DICHLOROETHANE(E)
12	TRANS -1,2-DICHLOROETHENE (D)
13	CHLOROFORM
14	1,2-DICHLOROETHANE(H)
15	TRICHLOROFLUOROMETHANE
16	DICHLOROFLUOROMETHANE
17	ACROLEIN
IS	ACRYLONITRILE
19	1,4-DIFLUOROBENZENE(INT. STD)
20	2-BUTANONE (MEK)
21	1,1,1-TRICHLOROETHANE (I)
22	CARBON TETRA CHLORIDE
23	BROMODICHLOROMETHANE(L)
24	1,2-DICHLOROPROPANE(X)
25	TRANS-1,3-DICHLOROPROPENE (AA)
26	TRICHLOROETHENE(K)
27	DIBROMOCHLORDMETHANE(O)
28	1,1,2-TRICHLOROETANE(H)
29	BENZENE(BEN)
30	CIS-1,3-DZCHLOROPROPENE(Z)
31	2-CHLOROETHYLVINYLETHER(NN)
32	BROMOFORM(P)
33	CHLOROBENZENE-D5 (INT. STD)
34	2-HEXANONE(MBK)
35	4-METHYL-2-PENTANONE(MIBK)
36	TETRACHLOROETHENE(N)
37	ETHANE, 1,1,2,2-TETRACHLORO-
38	TOLUENE(TOL)
39	CHLOROBENZENE(Q)
40	ETHYLBENZENE(EB)
41	STYRENE
42	META-XYLENE
43	ORTHO/PARA-XYLENE
44	META-DICHLOROBENZENE(MDCB)
45	ORTHO-DICHLOROBENZENE(ODCB)
46	PARA-DICHLOROBENZENE(PDCB)
47	D8-TOLUENE(SURR. STD)
48	BROMOFLUORBENZENE(SURR. STD)

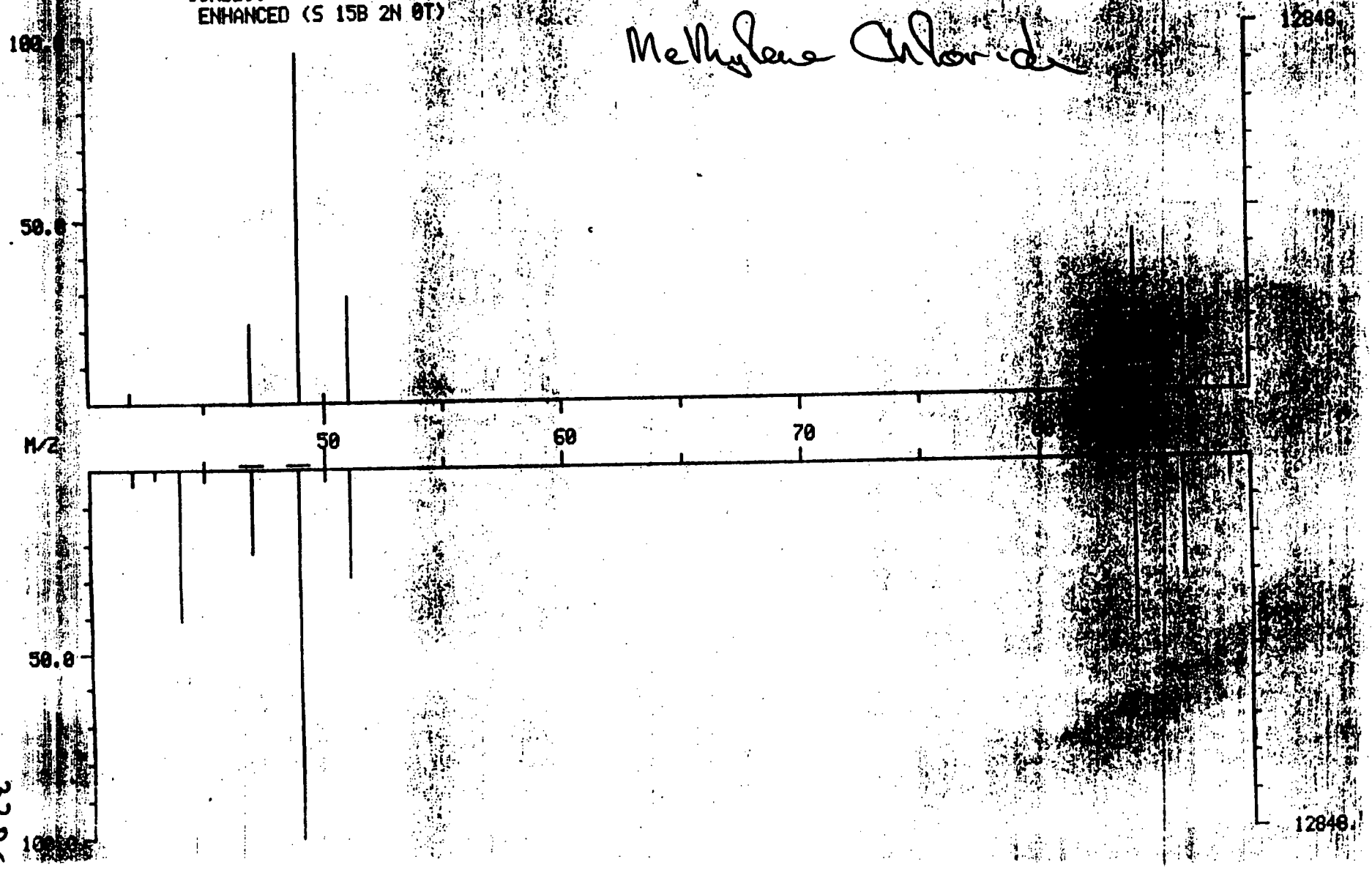
4	NOT FOUND									
5	NOT FOUND									
6	NOT FOUND									
7	[illegible]			1	0.604	A BB	32466.	74.283	NG	3.45
8	[illegible]			1	0.696	A BV	12583.	108.460	NG	5.04
9	NOT FOUND									
10	NOT FOUND									
11	NOT FOUND									
12	[illegible]			1	1.203	A BB	229.	0.743	NG	[illegible]
13	NOT [illegible]									
14	NOT [illegible]									
15	[illegible]									
16	NOT [illegible]									
17	NOT [illegible]									
18	NOT FOUND									
19	114	501	[illegible]	19	1.000	A BB	290358.	250.000	NG	11.61
20	43	300	[illegible]	19	0.599	A*BV	8641.	104.499	NG	4.83
21	97	331	[illegible]	19	0.661	A BB	6180.	14.481	NG	0.67
22	NOT FOUND									
23	NOT FOUND									
24	NOT FOUND									
25	NOT FOUND									
26	130	419	20:57	19	0.836	A BB	888.	1.527	NG	0.07
27	NOT FOUND									
28	NOT FOUND									
29	NOT FOUND									
30	NOT FOUND									
31	NOT FOUND									
32	NOT FOUND									
33	117	630	31:30	33	1.000	A BB	227069.	250.000	NG	11.61
34	43	525	26:13	33	0.833	A*BB	458.	310.044	NG	14.40
35	43	560	28:00	33	0.889	A*BB	1462.	298.135	NG	13.84
36	NOT FOUND									
37	NOT FOUND									
38	92	604	30:12	33	0.959	A BB	3414.	4.199	NG	0.20
39	NOT FOUND									
40	NOT FOUND									
41	NOT FOUND									
42	NOT FOUND									
43	NOT FOUND									
44	NOT FOUND									
45	NOT FOUND									
46	NOT FOUND									
47	100	599	29:57	33	0.951	A BB	202263.	233.322	NG	10.83
48	95	744	37:12	33	1.181	A BB	194126.	237.846	NG	11.04

DUAL MASS SPECTRUM
09/24/86 14:22:00 + 6:33
SAMPLE: 5ML 660554
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6397 #131
CALI: PU6397 #2

BASE M/Z: 49/ 49
RIC: 29439./ 36671.

Methylene Chloride

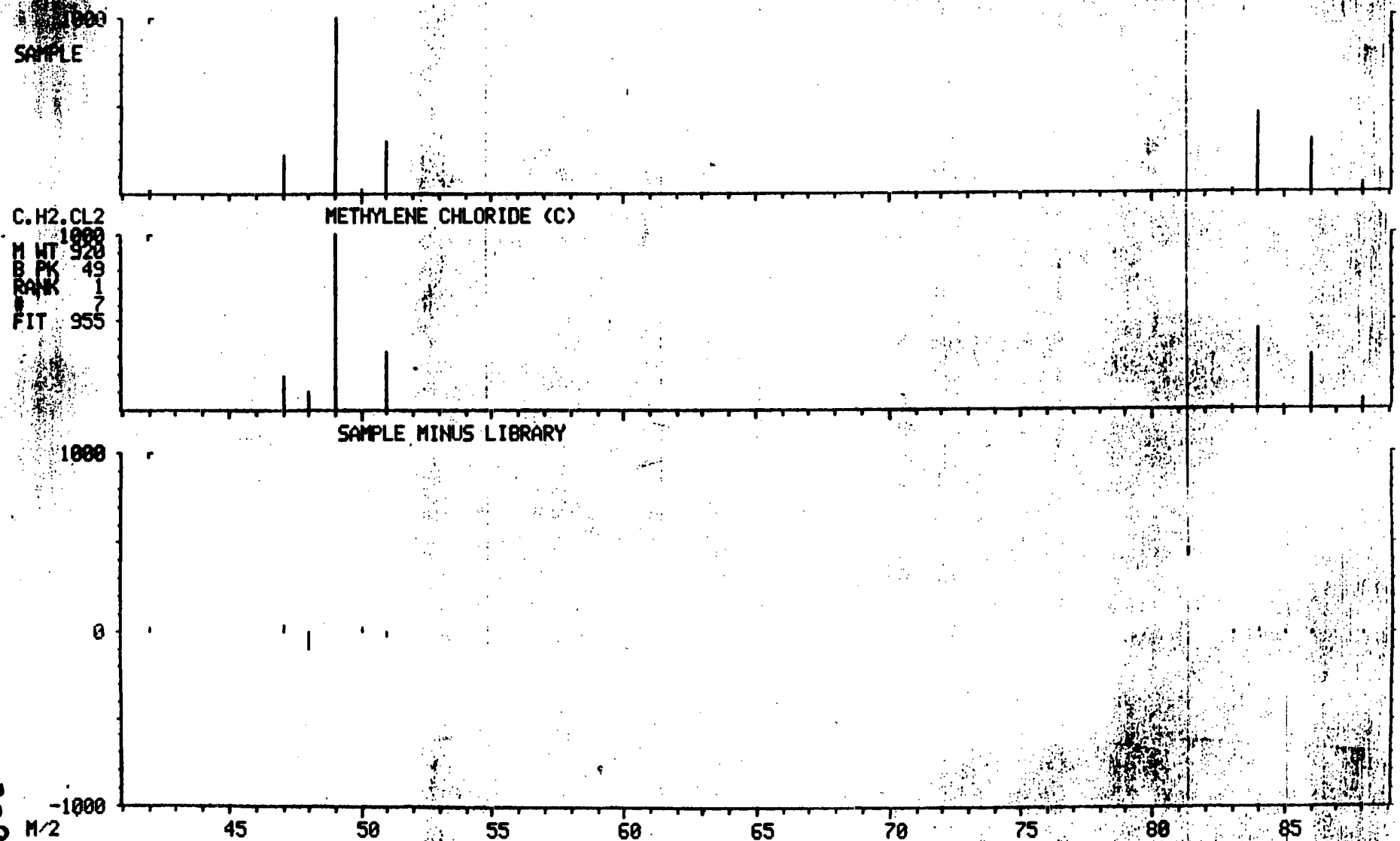


338

LIBRARY SEARCH
09/24/86 14:22:00 + 6:33
SAMPLE: SML 660554
CONDS.:
ENHANCED (S 158 2N BT)

DATA: PU6397 # 131
CALI: PU6397 # 2

BASE M/Z: 49
RIC: 29439.

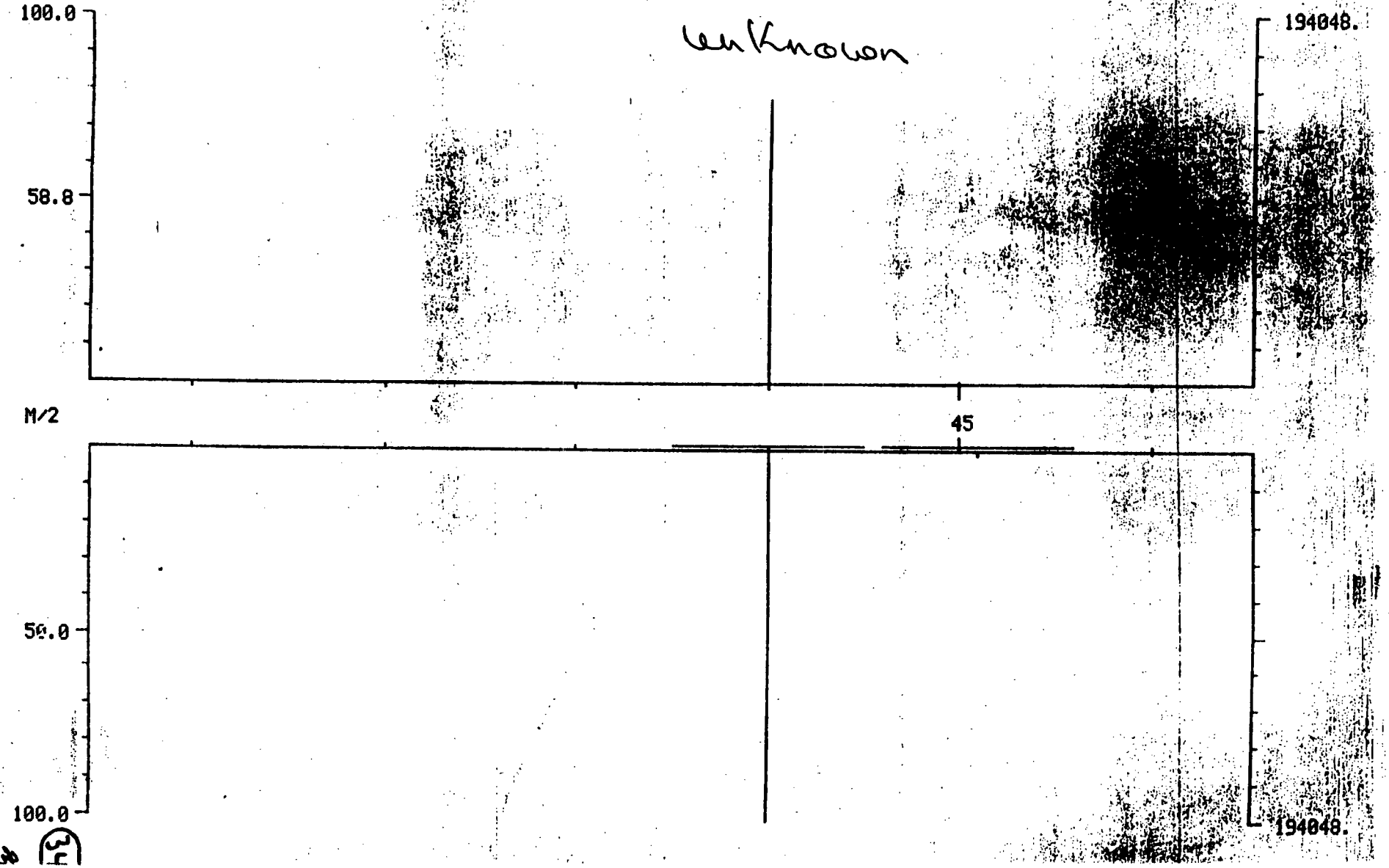


339

DUAL MASS SPECTRUM
09/24/86 14:22:00 + 1:06
SAMPLE: SML 660554
CONDS.:
ENHANCED (S 158 2N 0T)

DATA: PU6397 #22
CALI: PU6397 #2

BASE M/Z: 44/ 44
RIC: 153687./ 196863.

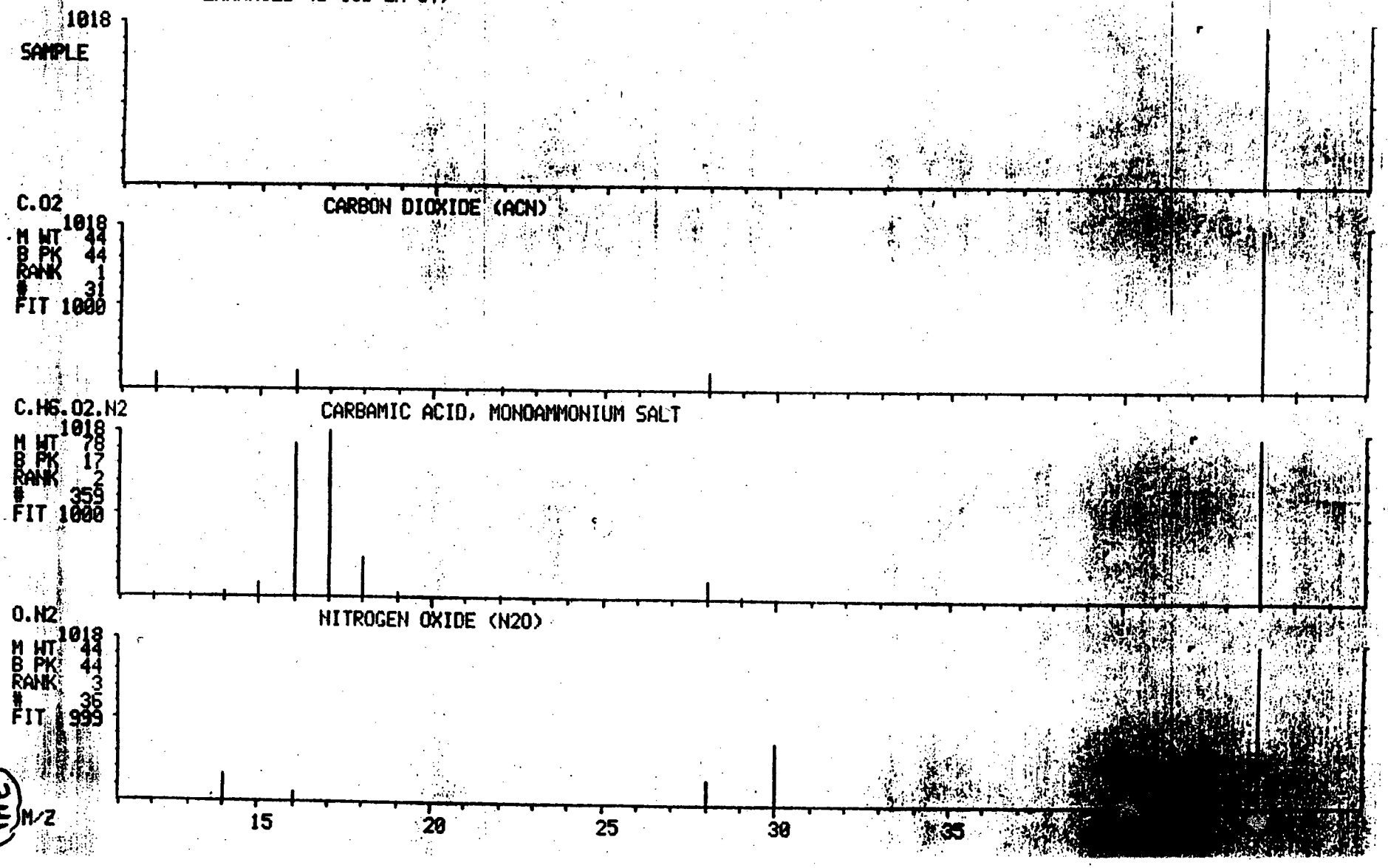


unknown

LIBRARY SEARCH
09/24/36 14:22:00 + 1:06
SAMPLE: SML 660554
CONDS.:
ENHANCED (S 15B 2N 0T)

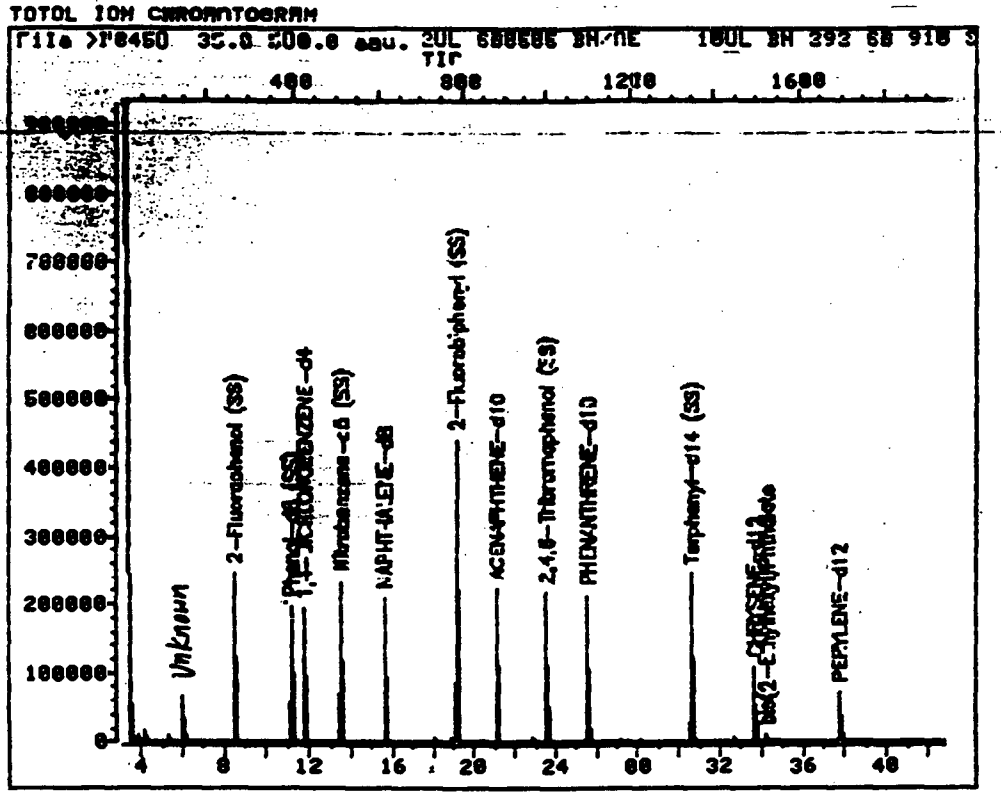
DATA: PU6397 # 22
CALI: PU6397 # 2

BASE M/Z: 44
RIC: 153007.



(34)

TOTOL ION CHROMATOGRAM



Data File: >P2498::D1
Name: 2UL 660999 BN/AE
Misc: 10UL BN 392 CD 910 SU2

BTL#90

Id File: iIDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:19

Operator ID: STEVE
Quant Time: 860922 14:24
Injected at: 860922 10:96

QUANT REPORT

Operator ID: STEVE Quant Rev: 4 Quant Time: 860922 14:24
Output File: ^P2458::OP Injected at: 860922 10:56
Data File: >P2458::D1 Dilution Factor: 1.00
Name: 2UL 660555 BN/AE
Misc: 10UL BN 352 CD 510 SW2 BTL#50

ID File: IIDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:15

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-d4	11.77	425	70627	40.00	NG	85
3)	2-Fluorophenol (SS)	8.50	265	145155	65.66	NG	55
7)	Phenol-d6 (SS)	11.14	354	131847	45.85	NG	82
15)	*NAPHTHALENE-d8	15.55	612	264455	40.00	NG	47
16)	Nitrobenzene-d5 (SS)	13.51	510	212110	68.54	NG	89
27)	*ACENAPHTHENE-d10	21.05	881	126812	40.00	NG	95
31)	2-Fluorobiphenyl (SS)	15.15	786	374680	64.79	NG	59
42)	2,4,6-Tribromophenol (SS)	23.53	1000	68858	72.80	NG	90
43)	*PHENANTHRENE-d10	25.57	1100	220087	40.00	NG	54
54)	*CHRYSENE-d12	33.67	1456	124071	40.00	NG	47
55)	Terphenyl-d14 (SS)	30.62	1347	262001	103.70	NG	37
61)	bis(2-Ethylhexyl)Phthalate	34.22	1523	6322	2.43	NG	85
63)	*PERYLENE-d12	37.74	1655	106588	40.00	NG	78

* Compound is ISTD

MS data file header from : >P2458

Sample: 2UL 660599 BN/AE Operator: STEVE MS 5/22/86 10:56
Misc 10UL BN 392 CD 510 SW2 BTL#50
Sys. #: 1 MS model: 56 SW/HW rev.: CA ALS # : 0
Method file: EXTRII Tuning file: MT9301 No. of extra records: 1
Source temp.: 200 Analyzer temp.: 220 Transfer line temp. : 280

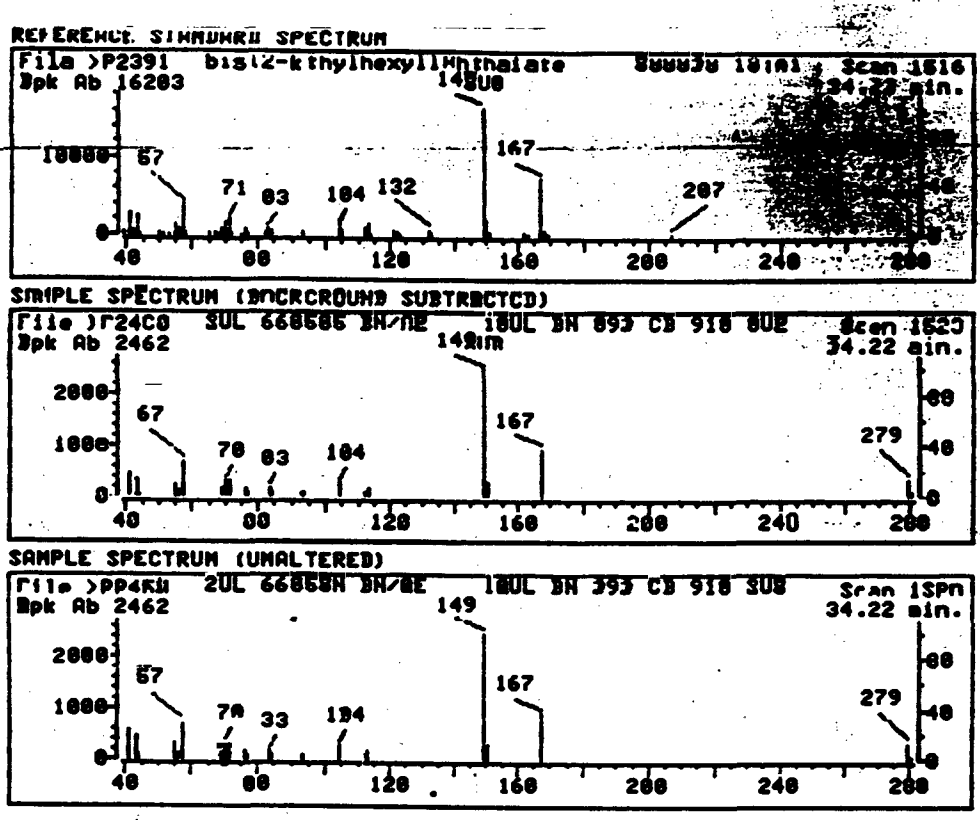
Chromatographic temperatures :	30.	300.	0.	0.	0.
Chromatographic times, min. :	4.0	5.0	0.0	0.0	0.0
Chromatographic rate, deg/min:	8.0	0.0	0.0	0.0	0.0

>P2458 2UL 660555 BN/AE 10UL BN 392 CD 510 SU2
35.01 500.0 CLP ADC TIC

Peak #	R.T. min.	first scan	max scan	last scan	peak height	raw area	corr. area	corr. % max.	% of total
1	6.025	142	144	147	67053	128355	128355	21.52	5.45
2	11.771	422	425	428	153759	467627	467627	79.85	20.01
3	15.554	605	612	615	210053	580748	580748	99.16	24.85
4	25.573	1095	1100	1103	213531	585654	585654	100.00	25.06
5	33.672	1452	1456	1459	107054	316583	314856	53.77	13.47
6	37.742	1651	1655	1659	70776	260071	258881	44.20	11.08

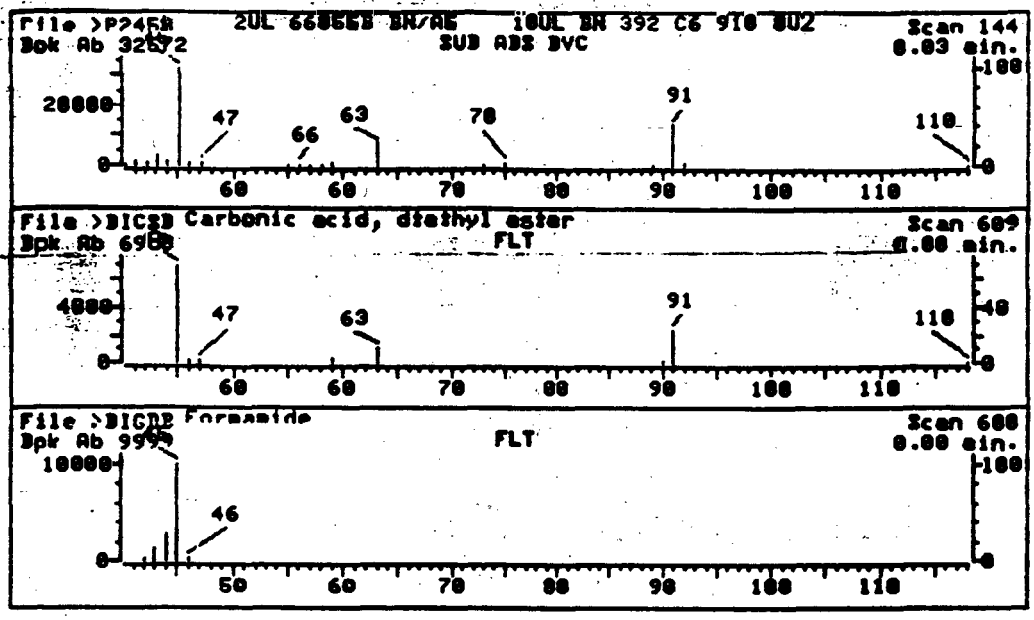
Sum of corrected areas: 2336205.

11:51 AM MON., 22 SEPT, 1986



Data File: >P2498::D1
Name: 2UL 660999 BN/AE
Misc: 10UL BN 392 CD 910 SU2 BTL#90
Quant Time: 860922 14:24
Injected at: 860922 10:96

Compound No: 61
Compound Name: bis(2-Ethylhexyl)Phthalate
Scan Number: 1923
Retention Time: 34.22 min.
Area: 6322
Concentration: 2.43 NG
q-value: 89



1. Carbonic acid, diethyl ester 118 C5H10O3

Sample file: >P2458 Spectrum #: 144
Search speed: 1 Tilting option: N No. of ion ranges searched: 44

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C_I	R_IV
1.	44*	105588	685	"BIGDB	27	70	1	0	105	25	17	15

QUANTITATION FOR HSL COMPOUNDS

AND TENTATIVELY ~~IDENTIFIED~~ COMPOUNDS

FOR WATER SAMPLES

$$\mu g/L = \frac{(A_x)\,(I_s)\,(V_t)}{(A_{IS})\,(RF)\,(V_o)\,(V_i)}$$

A_x = EICP AREA OF CHARACTERISTIC ION (FROM TABLES 4-6) FOR ANALYTIC*

A_{IS} = AREA OF CHARACTERISTIC ION OF ASSIGNED IS.

I_s = NG OF IS

V_o = VOLUME OF H_2O EXTRACTED IN ML.

V_i = VOUJME OF EXTRACT INJECTED IN μL.

V_t = TOTAL VOLUME OF EXTRACT (2000 μL. WHEN NO DILUTIONS)

*IF SECONDARY ION MUST BE USED BECAUSE OF INTERFERENCES A RF MUST BE GENERATED USING THE SECONDARY ION.

CD910SW2: Example Quantitation HSL compound. Compounds are quantified according to the formula shown at left.

bis(2-ethylhexyl)phthalate:

$$\frac{(6322)(80)(1000)}{(124071)(.838)(1000)(2.0)}$$

$= 2.4\ \mu g/L$

CD910SW2: Example quantitation HSL compound Unknown Scan 144:

$$\frac{(128399)(80)(1000)}{(467627)(1.00)(1000)(2.0)}$$

$= 11\ \mu g/L$

TIC quantitation: 1) Assumes a response factor of 1.0
2) Total corrected areas of TIC and nearest Internal Standard used in place of EICP areas.

660556
CD910-SW2/SW2Q

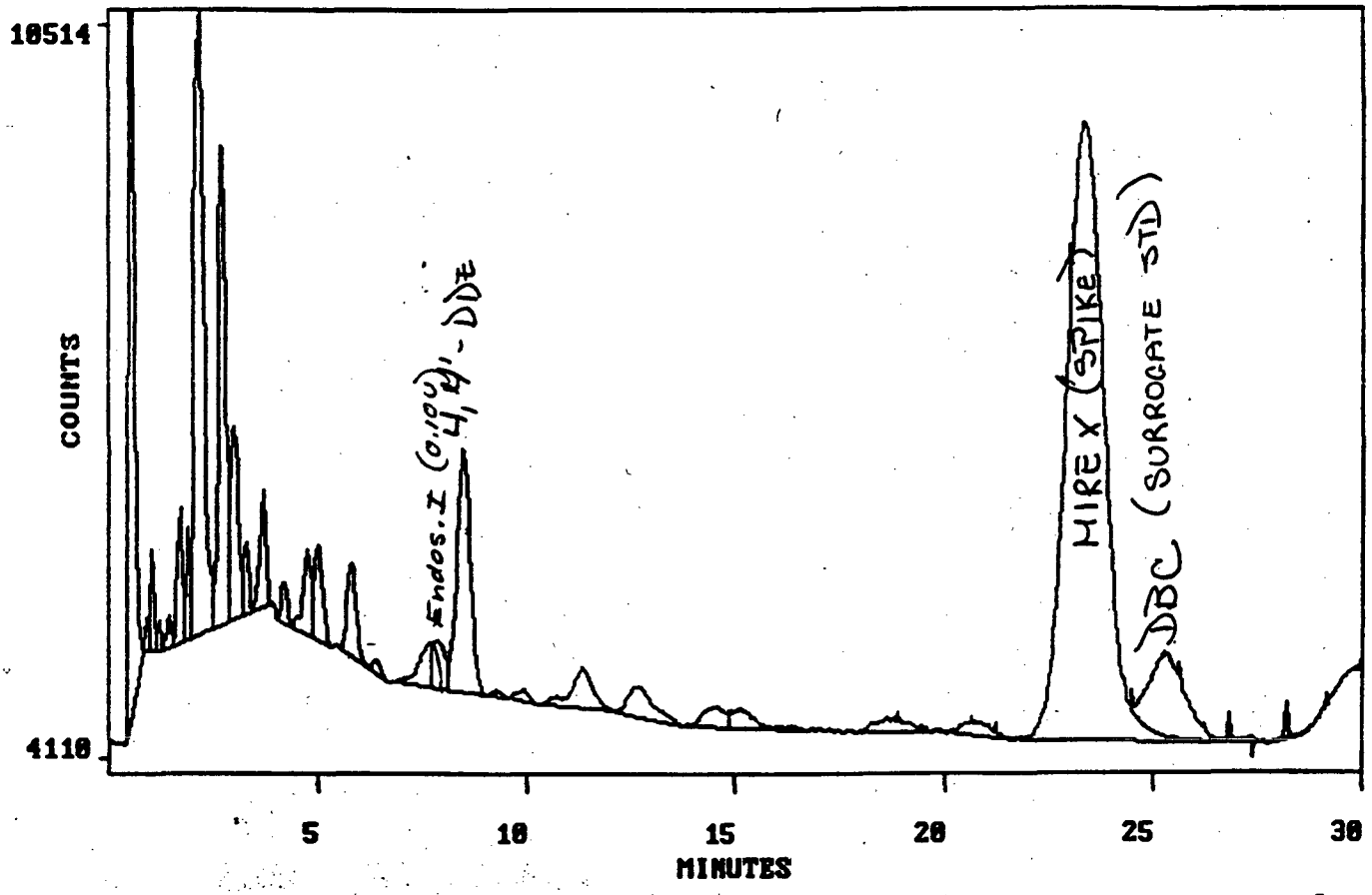
PRIMARY COLUMN

RECONSTRUCT SCREEN DUMP
Data Acqeisition

Time:17:20:27 Date:THU 02 OCT 86

Time:20:53:31 Date:TUE 30 SEP 86
Method:PEST2

FILE: 1:PEST2191 SCALE: 100 RANGE (MIN.): 0.03 TO 30.00



1.9

348

Channel #.....4 Time:21:24:03 Date:TUE 30 SEP 86
Run 84 of 100

Sample Name.....NJDEP
Data file.....DAT256:PEST2191
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....C
Notes.....Primary Column Runs

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....20:53:31 Acq. date....TUE 30 SEP 86
Start PV.....20.00 sec. End PV.....130.00 sec.
Actual PV....140.0
Slope sens.....0.75 av/sec.

Area reject....500
peaks found..30
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %		Area	Peak Ht.	BL
1	0.532			79.623		2940182	699631	BB
2	0.932			0.094		2009	339	BV
3	1.075			0.138		5878	904	VV
4	1.237			0.030		1091	284	VB
5	1.497			0.038		2127	284	BV
6	1.733			0.301		11116	1195	VV
7	1.932			0.178		6364	984	VV
8	2.193			2.383		87980	3618	VV
9	2.716			1.412		32142	4311	VV
10	3.027			0.339	.101	20634	1687	VV
11	3.326	Chlor		0.133	.036	3002	628	VV
12	3.711	Hept		0.274	.027	10123 / 222.2	1047	VB
13	4.214			0.094	.01	3466	362	BV
14	4.733			0.277		10243	754	VV
15	5.007			0.298		11002	829	VB
16	3.780			0.316		11632	798	BE
17	6.372			0.043		1606	119	EB
18	7.881		ENDOSULFAN I	0.494	.119	18233	413	BV
19	8.331		4,4'-DDE	1.292	.129	47704 222.2	2099	VB
20	9.312		DIELDRIN	0.019		692	53	BB
21	9.959			0.048		1776	97	BB
22	11.410		ENDRIN	0.343		12757 / EE	343	BB

23	12.710		0.292	.03 10774	258	BB
24	14.555		0.190	7000	177	BV
23	15.172		0.187	.04 6914	160	VB
26	18.691		0.177	6521	116	BB
27	20.749		0.166	6118	126	BB
28	23.432	HIREX	9.420	347848	5336	BE
29	25.384	DBC	1.159	42806	705	BB
30	28.351		0.039	1435	94	BB
TOTALS			100.000	3692637		

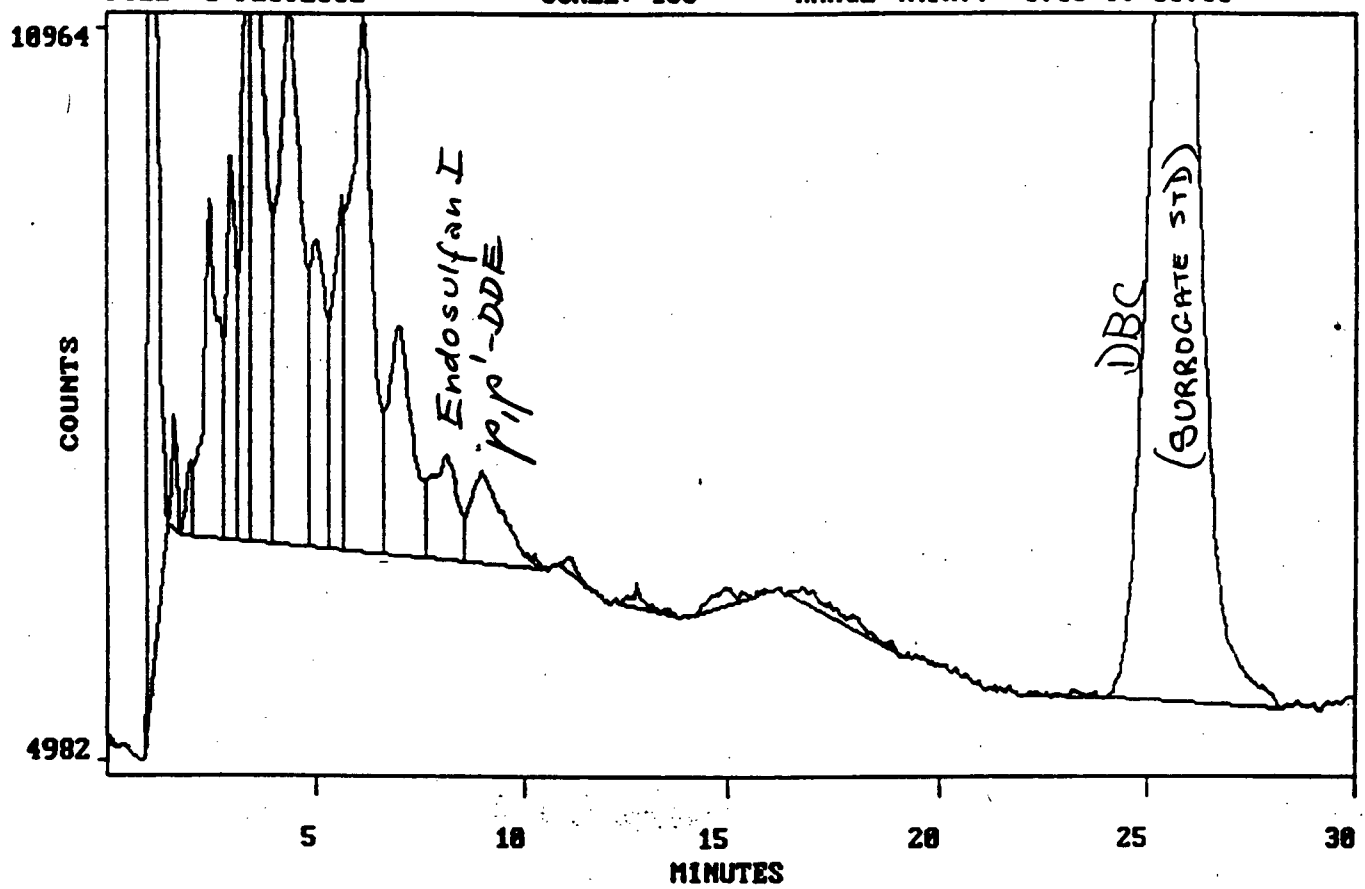
660556
CD910-SW2/SW2Q
CONFIRMATORY COLUMN

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:14:06:41 Date:THU 09 OCT 86

Time:13:33:43 Date:THU 09 OCT 86
Method:PEST2

FILE: 1:PEST2302 SCALE: 100 RANGE (MIN.): 0.03 TO 30.00



24

Channel #.....4 Time:14:04:27 Date:THU 09 OCT 36
Run 410 of 100

Sample name.....NJDEP
Data file.....DAT258:PEST2302
Method name.....PEST2

Author.....LAL
Instrument.....ECO
Column.....Y-2 3% SP-2100 on 100/120 SUPELCOPORT
Notes.....~~Primary~~ Column Runs
Confirmatory

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....13:33:43 Acq. date....THU 09 OCT 86
Start PW.....20.00 sec. End PW.....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
6 peaks found..24
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

0.00295

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	1.093			76.498	5324281	599547	BB
2	1.640			0.106	7367	947	BB
3	2.031			0.100	6966	612	BV
4	2.478			0.975	67833	2773	VV
5	2.985			0.764	53189	3137	VV
6	0.132 3.375			1.052	73191	5144	VV
7	0.141 3.613			1.782	124027	5455	VV
8	0.170 4.367			2.398	166884	4553	VV
9	0.195 5.001			0.941	65510	2519	VV
10	0.218 5.603			0.697	48536	2892	VV
11	0.232 6.116			2.312	160949	4392	VV
12	0.271 6.959			1.083	75403	1877	VV
13	0.317 8.129		ENDOSULFAN I	0.555	38606	858	VV
14	0.350 8.993		4,4'-DDE	0.583	40610	761	VE
15	0.400 10.266			0.012	865	78	EB
16	0.434 11.141			0.027	1898	123	BB
17	0.499 12.803			0.034	3733	131	BB
18	0.585 15.010			0.093	6465	137	BB
19	0.619 15.882			0.007	504	28	BB
20	0.644 16.780			0.146	10139	108	BB

35

23	25.671	DBC	9.773	680192	.8738	BB
TOTALS			100.000	6960028		

III. 2. Reporting Package
NJ DEP I.D. # TB- Trip Blank

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575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Lab No. 660558
Type: Misc. - Tier I
Point: Trip Blank
Date Collected: 9/11/86
Date Received: 9/12/86
Collected By: CL 99

PRIORITY POLLUTANTS ANALYSIS - PURGEABLE ORGANICS

Scan No.	Cas Number	Compound	ug/L
	74-87-3	Chloromethane	10U
	74-83-9	Bromomethane	10U
	75-01-4	Vinyl chloride	10U
	75-00-3	Chlorocethane	10U
135	75-09-2	Methylene chloride	15
	75-69-4	Trichlorofluoromethane	10U
	75-35-4	1,1-dichloroethene	10U
	75-34-3	1,1-dichloroethane	10U
	156-60-5	Cis/Ttans-1,2-dichloroethene	10U
	67-66-3	Chloroform	10U
	107-06-2	1,2-dichloroethane	10U
	71-55-6	1,1,1-Trichloroethane	10U
	56-23-5	Carbon tetrachloride	10U
	75-27-4	Bromodichloromethane	10U
	79-34-5	1,1,2,2-Tetrachloroethane	10U
	70-87-5	1,2-dichloropropane	10U
	10061-02-6	Trans-1,3-dichloropropene	10U
	79-01-6	Trichloroethene	10U
	124-48-1	Dibromochloromethane	10U
	79-00-5	1,1,2-trichloroethane	10U
	71-43-2	Benzene	10U
	10061-01-5	cis-1,3-Dichloropropene	10U
	110-75-8	2-chloroethylvinyl ether	10U
	75-25-2	Bromoform	10U
	127-10-4	Tetrachloroethene	10U
	106-88-3	Toluene	10U
	106-90-7	Chlorobenzene	10U
	100-41-4	Ethylbenzene	10U
	541-73-1	1,2-Dichlorobenzene	10U
	95-50-1	1,3-Dichlorobenzene	10U
	106-46-1	1,4-Dichlorobenzene	10U

Date Reported: 10/15/86

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* *
* *
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S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: Trip Blank

ORGANICS ANALYSIS DATA SHEET
(Page 41

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob. FIT	% Prob. RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown (Carbon Dioxide)			13	30B
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
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24.						
25.						
26.						
27.						
28.						
29.						
30.						

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Lab Name: H2M Labs Sample Lab No. 660559 - TB
Concentration: Low

Date Extracted: 9/16/86 - 9/17/86
Date Analyzed: 9/22/86 Conc Factor: 1000:1

Semi-Volatile Compounds

C.A.S. Number		ug/l	C.A.S. Number		ug/l
65-75-9	N-Nitrosodimethylamine	10U	83-32-9	Acenaphthene	10U
108-95-2	Phenol	10U	51-28-5	2,4-Dinitrophenol	10U
62-53-3	Aniline	10U	100-02-7	4-Nitrophenol	10U
111-44-4	bis(2-Chloroethyl)Ether	10U	121-14-2	2,4-Dinitrotoluene	10U
95-57-8	2-Chlorophenol	10U	606-20-2	2,6-Dinitrotoluene	10U
541-73-1	1,3-Dichlorobenzene	10U	84-66-2	Diethylphthalate	10U
106-46-7	1,4-Dichlarobenzene	10U	7005-72-3	4-Chlorophenyl-phenylether	10U
95-50-1	1,2-Dichlorobenzene	10U	86-73-7	Fluorene	10U
39638329	bis(2-chloroisopropyl)ether	10U	534-52-1	4,6-Dinitro-2-Methylphenol	50U
621-64-7	N-Nitroso-Di-n-Propylamine	10U	86-30-6	N-Nitrososdiphenylamine (1)	10U
67-72-1	Hexachloroethane	10U	101-55-3	4-Bromophenyl-phenylether	10U
98-95-3	Nitrobenzene	10U	118-74-1	Hexachlorobenzene	10U
78-59-1	Isophorone	10U	87-86-5	Pentachlorophenol	50U
88-75-5	2-Nitrophenol	10U	85-01-8	Phenanthrene	10U
105-67-9	2,4-Dimethylphenol	10U	120-12-7	Anthracene	10U
111-91-1	bis(2-Chloroethoxy)Methane	10U	84-74-2	Di-n-Butylphthalate	10U
120-83-2	2,4-Dichlorophenol	10U	206-44-0	Fluoranthene	10U
120-82-1	1,2,4-Trichlorobenzene	10U	92-87-5	Benzidine	80U
91-20-3	Naphthalene	10U	129-00-0	Pyrene	10U
87-68-3	Hexachlorobutadiene	10U	85-68-7	Butylbenzylphthalate	10U
59-50-7	4-Chlaro-3-Methylphenol	10U	91-94-1	3,3'-Dichlorobenzidine	20U
77-47-4	Hexachlorocyclopentadiene	10U	56-55-3	Benzo(a)Anthracene	10U
88-06-2	2,4,S-Trichlorophenol	10U	117-81-7	bis(2-Ethylhexyl)Phthalate	10U
91-58-7	2-Chloronaphthalene	10U	218-01-9	Chrysene	10U
131-11-3	Dimethyl Phthalate	10U	117-84-0	Di-n-Octyl Phthalate	10U
208-96-8	Acenaphthylene	10U	205-99-2	Benzo(b)Fluaranthene	10U
			207-08-9	Benzo(k)Fluoranthene	10U
			50-32-8	Benzo(a)Pyrene	10U
			193-39-5	Indeno(1,2,3-cd)Pyrene	10U
			53-70-3	Dibenzo(a,h)Anthracene	10U
			191-24-2	Benzo(g,h,i)Perylene	10U

(1) Cannot be separated from diphenylamine

Date Reported: 10/16/86

S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: FB

ORGANICS ANALYSIS DATA SHEET
(Page 4)

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob FIT	% Prob RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown	-	-	141	11J
2.						
3.						
4.						
5.						
6.						
7.						
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28.						
29.						
30.						

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N.J. CEP
65 Prospect St.
Trenton, NJ 08618

Sample Lab No. 660560
Date Extracted: 9/18/86
Date Analyzed: 10/6/86
Type: Misc. - Tier I
Point: TB
Collected By: CL 99

ANALYSIS FOR PESTICIDES/PCB's

C.A.S. No.	Compound	ug/l
319-84-6	Alpha-BHC	0.05U
319-87-7	Beta-BHC	0.05U
319-86-8	Delta-BHC	0.06B
58-89-9	Gamma-BHC (Lindane)	0.05U
76-44-8	Heptachlor	0.05U
309-00-2	Aldrin	0.05U
1024-57-3	Heptachlor Epoxide	0.05U
959-98-8	Endosulfan I	0.05U
60-57-1	Dieldrin	0.10U
72-55-9	4,4'-DDE	0.10U
72-20-8	Endrin	0.10U
33213-65-9	Endosulfan II	0.10U
72-54-8	4,4'-DDD	0.10U
1031-07-8	Endosulfan Sulfate	0.10U
50-29-3	4,4'-DDT	0.10U
72-43-5	Methoxychlor	0.50U
53494-70-5	Endrin Ketone	0.10U
57-74-9	Chlordane	0.50U
8001-35-2	Toxaphene	1.0U
12674-11-2	Aroclor 1016	0.50U
11104-28-2	Aroclor 1221	0.50U
11141-16-5	Aroclor 1232	0.50U
53469-21-9	Aroclor 1242	0.50U
12672-29-6	Aroclor 1248	0.50U
11097-69-1	Aroclor 1254	1.0U
11096-82-5	Aroclor 1260	1.0U

Vi = Volume of extract injected (uL)
Ws = Weight of sample extracted (g)
Vs = 1000 mL Vt = 3 mLs
Date Reported: 10/17/86

Vs = Volume of water extracted (mL)
Vt = Volume of Total extract (mL)
Vi = 5 uL

****
* *
* *
****
S.C. McLendon, P.E.
Laboratory Director

Lab Name : N2R LABS

ORGANICS ANALYSIS DATA SHEET

Sample Number
660560

NJDEP #CD910-TB

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Probability Fit	% Probability RFit	RT or Scan Number	Estimated Concentration (ug/L or ug/kg)
1.		Unknown			2.24	1.0
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
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21.						
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23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						

Date Reported 10-17-86

S.C. McLendon, P.E.
Laboratory Director

PAL- . D. -

H2M
Environmental Engineers & Scientists
HOLZMACHER, McLENDON and MURRELL, P.C.
579 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
WATER RESOURCES • WATER SUPPLY & TREATMENT • SEWERAGE & TREATMENT • ECOLOGICAL & IMPACT STUDIES
MODEL STUDIES • PILOT PLANT STUDIES • WATCRAVASTC WATER LABORATORY AND ANALYTICAL SERVICES

LABORATORY REPORT

LAB NO. 660561
PROJECT NO. 2C

CLIENT'S NAME AND ADDRESS

NEW JERSEY D.E.P.
65 PROSPECT ST.
TRENTON, NEW JERSEY 08625

TYPE OF SAMPLE - MISCELLANEOUS COLLECTED BY CL 99
DATE COLLECTED - 9/11/86 DATE RECEIVED - 9/12/86

NJDEP SAMPLE #CD 910-TB
NJDEP SAMPLE POINT I.D. #TRIP BLANK

PARAMETER	RESULT	PARAMETER	RESULT
ANTIMONY	<60.0 #	SELENIUM	<5.00#
ARSENIC	<10.0 #	SILVER	<10.0 #
BERYLLIUM	<8.00# K	THALLIUM	<10.0 # N
CADMIUM	<5.00#	ZINC	<20.0 #
CHROMIUM	<10.0 #	PHENOLS	<1.001 N
COPPER	<28.0 # N	CYANIDE	<10.0 #
LEAD	<2.00# N		
MERCURY	<0.20#		
NICKEL	<40.0 #		

ALL RESULTS IN (MG/L) EXCEPT AS NOTED BY # (UG/L) OR % (PERCENT) AND
T.COLI BACT. I FECAL COLI (MPM/100ML)
COLOR, ODOR, TURBIDITY & PH (UNITS)
APC & FECAL STREP (COUNTS/ML)
SPEC.COND. (UMHOS) SETT.SOLIDS(ML/L)

DATE REPORTED 10/ 8/86

S. J. McLENDON, P.E., LABORATORY DIRECTOR

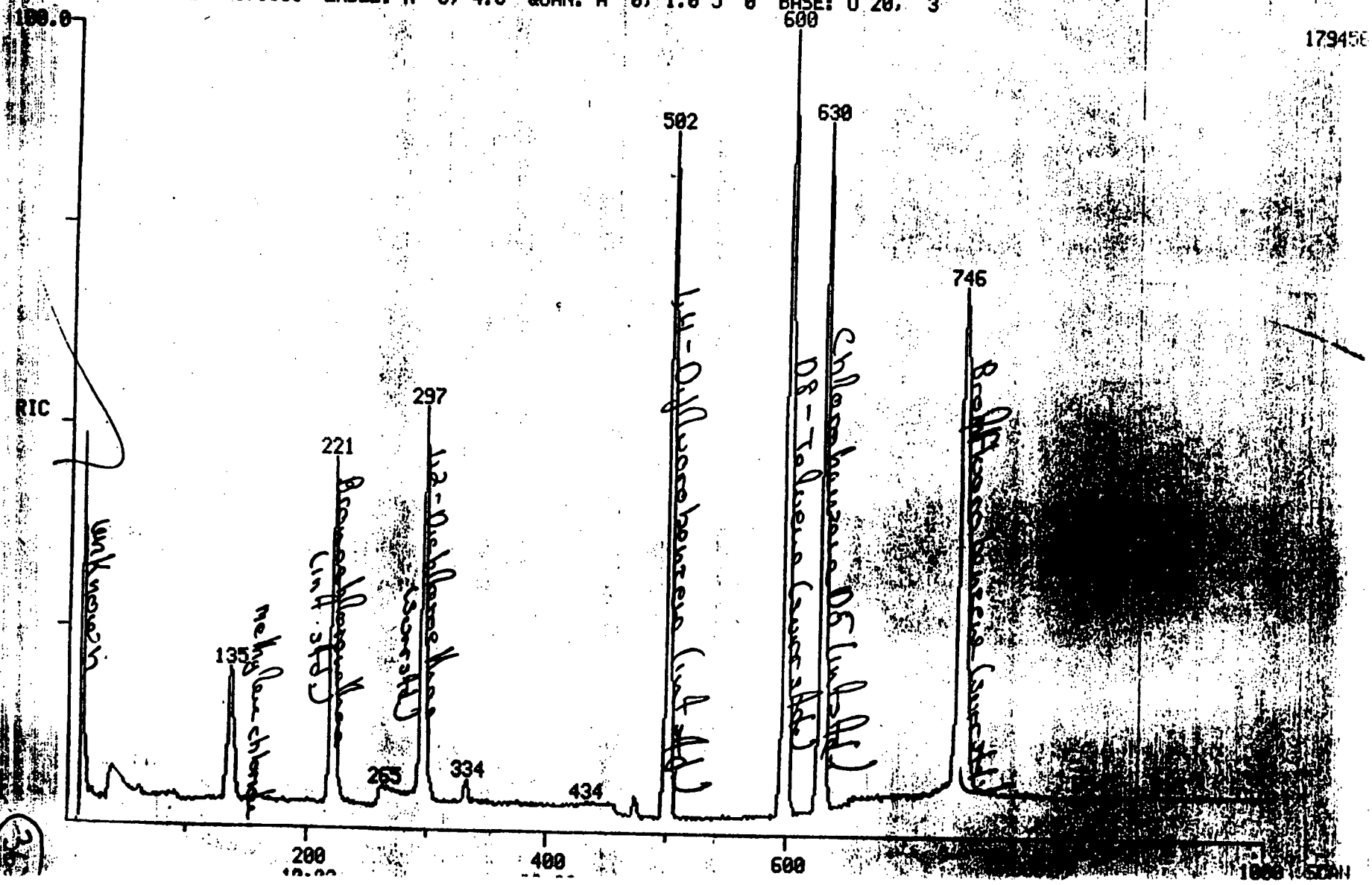
(361)

LIABILITY OF H2M CORP. SHALL BE LIMITED TO THE PRICE OF THE SERVICE RENDERED AND DUE

RIC
09/24/06 12:32:00
SAMPLE: 5ML 660550
CONDS.:
RANGE: G 1,1000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: PU6395 #1
CALI: PU6395 #2

SCANS 1 TO 1000



CA FINISHED, 7 FOUND
FINISHED AT: 9/25/86 12:52:08

QUANTITATION REPORT FILE: PU6395

DATA: PU6395.TI
09/24/86 12:32:08
SAMPLE: 5ML 668S58
ENDS:
SUBMITTED BY: NJOEP ANALYST: CC

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
RESP FAC. FROM LIBRARY ENTRY

	NAME
1	BROMOCHRLDROMETHANE (INT. STD.)
2	1,2-DICHLOROETHANE D4 (SURR. STD)
3	CHLOROMETHANE
4	BROMOMETHANE
5	VINYL CHLORIDE
6	CHLOROETHANE
7	METHYLENE CHLORIDE (C)
8	ACETONE
9	CARBON DISULPHIDE
10	1,1-DICHLOROETHENE (B)
11	1,1-DICHLOROETHANE(E)
12	TRANS -1,2-DICHLOROETHENE (D)
13	CHLOROFORM
14	1,2-DICHLOROETHANE(H)
15	TRICHLOROFLUOROMETHANE
16	DICHLOROFLUOROMETHANE
17	ACROLEIN
18	ACRYLONITRILE
19	1,4-DIFLUOROBENZENE(INT. STD)
20	2-BUTANONE (MEK)
21	1,1,1-TRICHLOROETHANE (I)
22	CARBON TETRA CHLORIDE
23	BROMODICHLOROMETHANE(L)
24	1,2-DICHLOROPROPANE(X)
25	TRANS-1,3-DICHLOROPROPENE (AA)
26	TRICHLOROETHENE(K)
27	DIBROMOCHLOROMETHANE(O)
28	1,1,2-TRICHLOROETANE(M)
29	BENZENE(BEN)
30	CIS-I,3-DICHLOROPROPENE(Z)
31	2-CHLOROETHYLVINYLETHER(NN)
32	BROMOFORM(P)
33	CHLOROBENZENE-D5 (INT. STD)
34	2-HEXANONE(MBK)
35	4-METHYL-2-PENTANONE(MIBK)
36	TETRACHLOROETHENE(N)
37	ETHANE, 1,1,2,2-TETRACHLORO-
38	TOLUENE(TOL)
39	CHLOROBENZENE(Q)
40	ETHYLBENZENE(EB)
41	STYRENE
42	META-XYLENE
43	ORTHO/PARA-XYLENE
44	META-DICHLOROBENZENE(MDCB)
45	ORTHO-OZCHLOROBENZENE(ODCB)
46	PARA-DICHLOROBENZENE(PDCB)
47	D8-TOLUENE(SORR. STD)
48	BROMOFLUORBENZENE(SURR. STD)

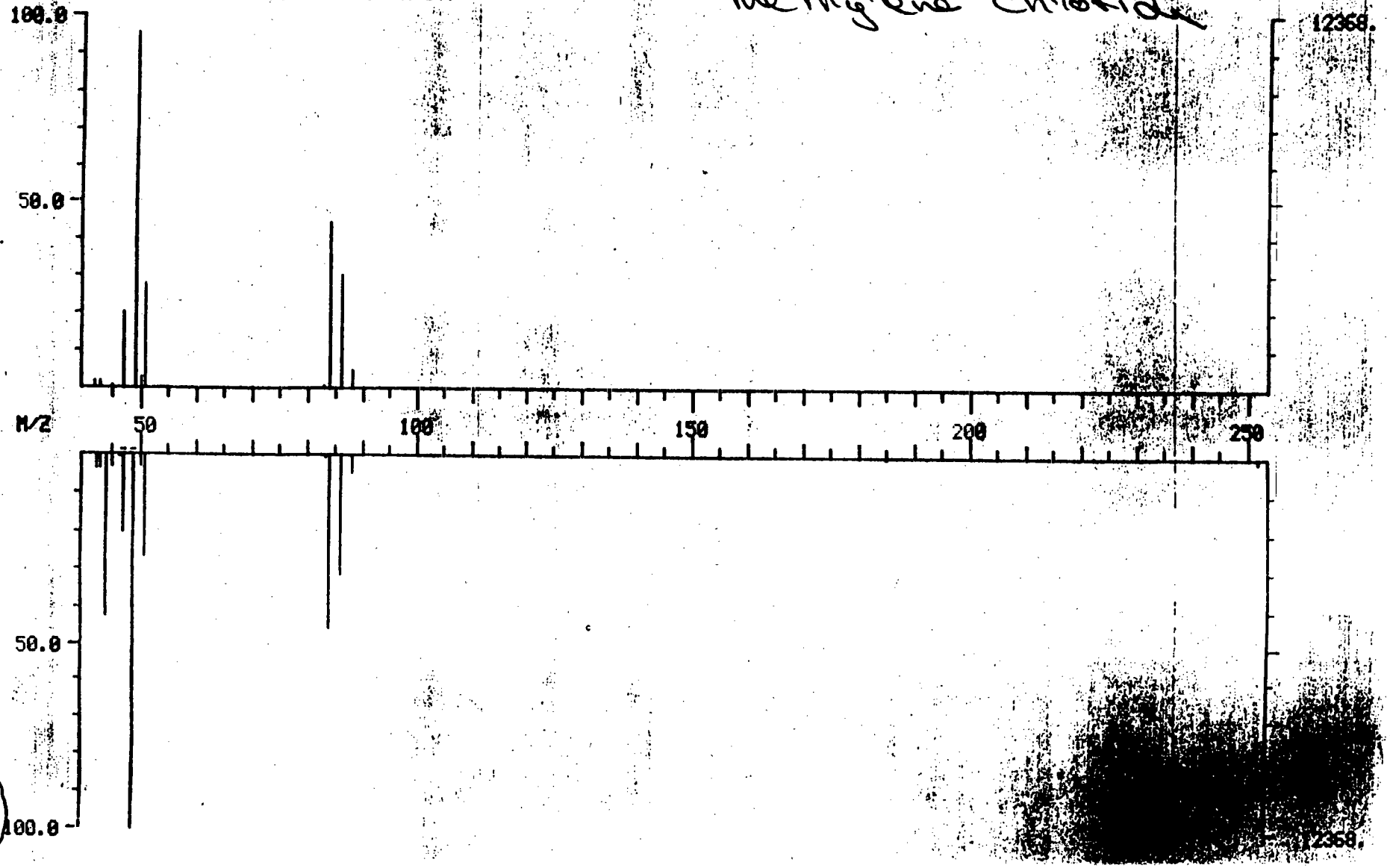
4	NOT	FOUND								
5	NOT	FOUND								
6	NOT	FOUND								
7	84	135	6:45	[illegible]	0.611	A BB	[illegible]	73.807	NG	3.50
8	43	163	8:09	1	0.738	A BV	1677.	15.091	NG	0.72
9	NOT	FOUND								
10	NOT	FOUND								
11	NOT	FOUND								
12	NOT	FOUND								
13	NOT	FOUND								
14	NOT	FOUND								
15	NOT	FOUND								
16	NOT	FOUND								
17	NOT	FOUND								
18	NOT	FOUND								
19	114	502	25:06	19	1.000	A BB	281482.	250.000	NG	11.85
20	43	303	15:09	19	0.604	A BB	5478.	68.386	NG	3.24
21	97	334	16:42	19	0.665	A BB	5095.	12.324	NG	0.88
22	NOT	FOUND								
23	NOT	FOUND								
24	NOT	FOUND								
25	NOT	FOUND								
26	NOT	FOUND								
27	NOT	FOUND								
28	NOT	FOUND								
29	78	438	21:54	19	0.873	A BB	163.	0.106	NG	0.01
30	NOT	FOUND								
31	NOT	FOUND								
32	NOT	FOUND								
33	117	630	31:30	33	1.000	A BB	219940.	250.000	NG	11.85
34	43	521	26:03	33	0.827	A BB	649.	453.582	NG	21.50
35	43	567	28:21	33	0.900	A*BV	1246.	262.323	NG	12.44
36	NOT	FOUND								
37	NOT	FOUND								
38	92	603	30:09	33	0.957	A BB	858.	1.090	NG	0.05
39	NOT	FOUND								
40	NOT	FOUND								
41	NOT	FOUND								
42	NOT	FOUND								
43	NOT	FOUNO								
44	NOT	FOUND								
45	NOT	FOUND								
46	NOT	FOUND								
47	100	600	30:00	33	0.952	A BB	196116.	233.564	NG	11.07
48	95	746	37:18	33	1.184	A BB	180129.	227.851	NG	10.80

DUAL MASS SPECTRUM
09/24/06 12:32:00 + 6:45
SAMPLE: 5ML 6E0558
COMDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6395 #135
CALI: PU6335 #2

BASE M/Z: 49/ 49
RIC: 20633./ 35519.

methylene chloride



365

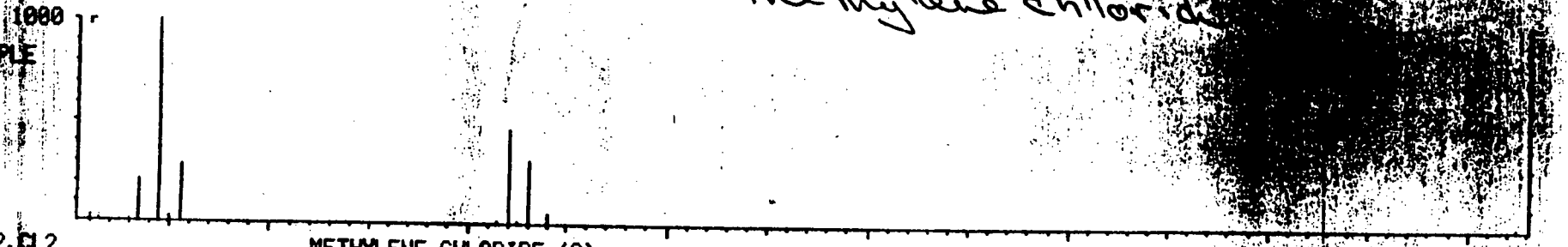
LIBRARY SEARCH
09/24/86 12:32:00 + 6:45
SAMPLE: 5ML 660558
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6395 # 135
CALI: PU6395 # 2

BASE M/Z: 49
RIC: 28639.

methylene chloride

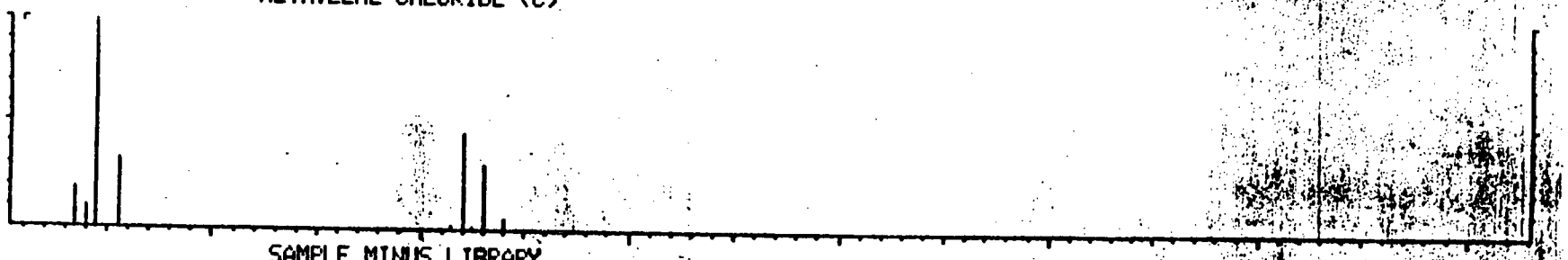
SAMPLE



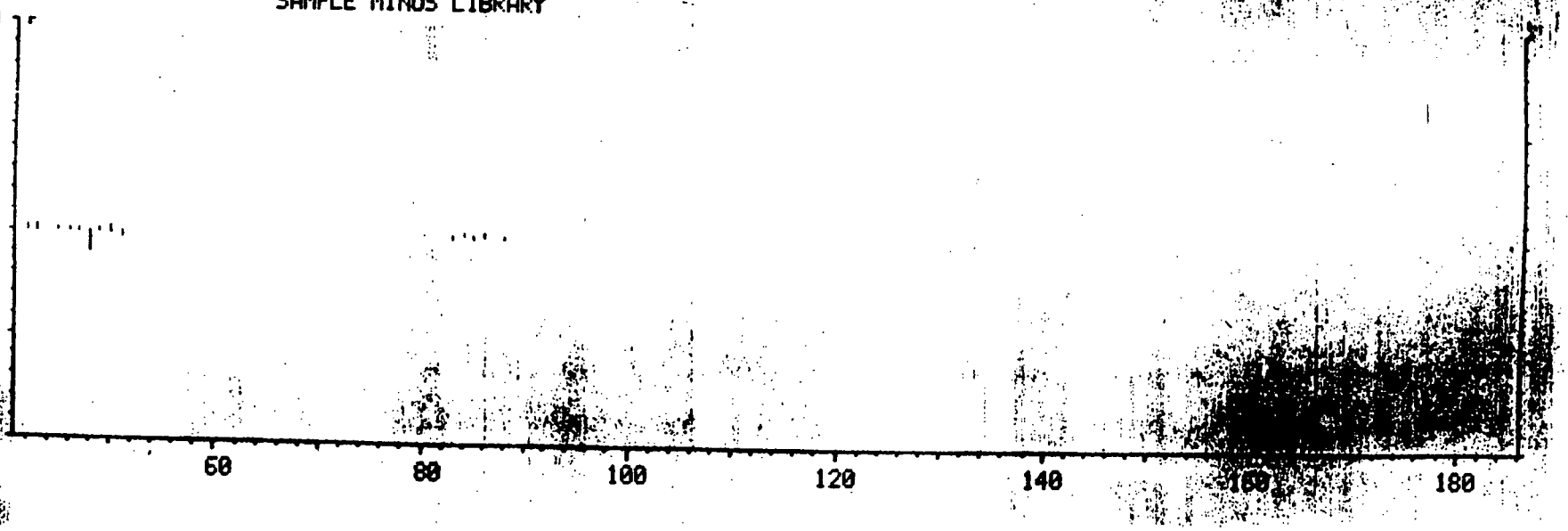
C.H2.CL2

METHYLENE CHLORIDE (C)

M HT 920
B PK 49
RANK 1
7
FIT 962



SAMPLE MINUS LIBRARY

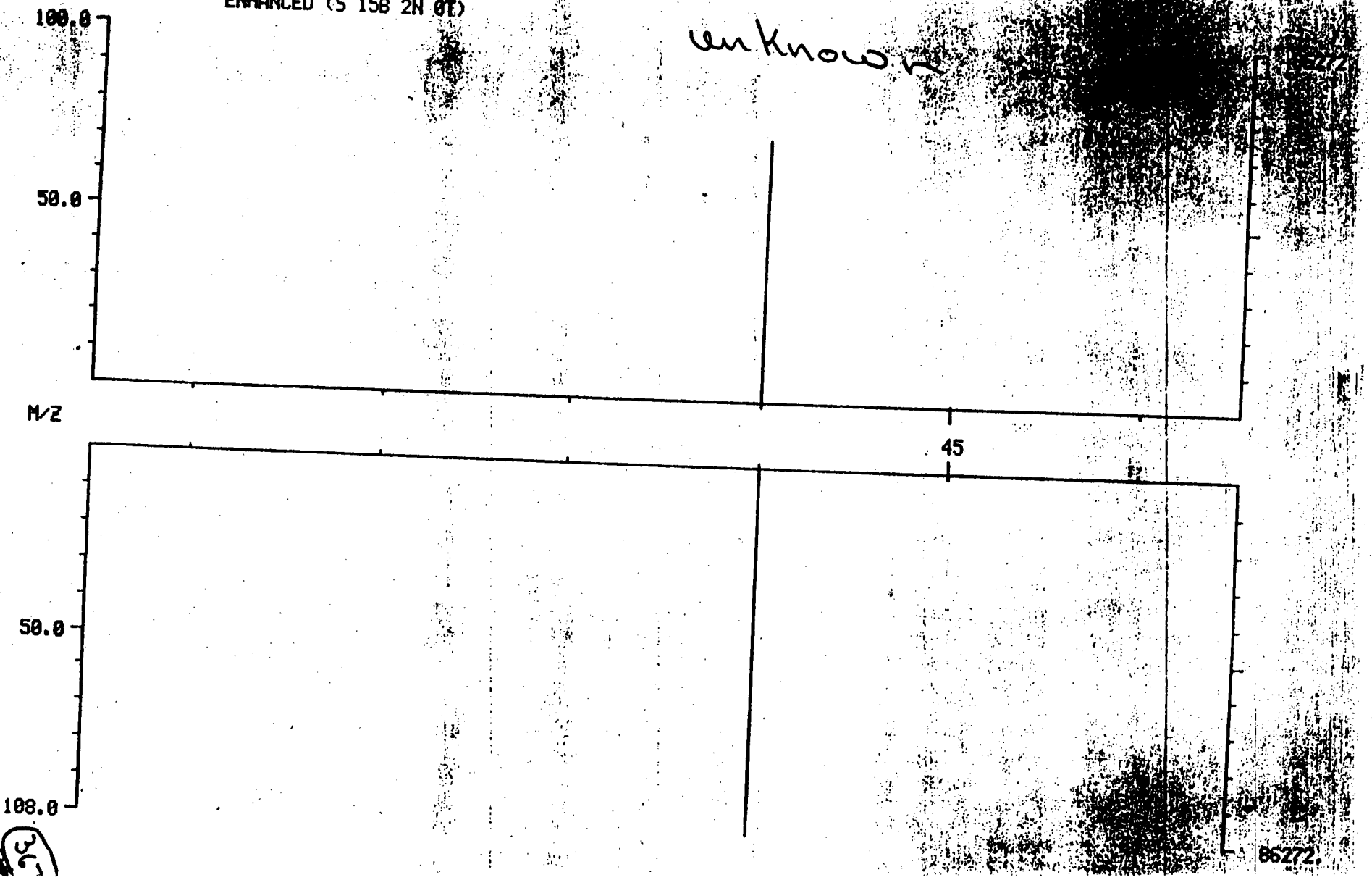


DUAL MASS SPECTRUM
09/24/86 12:32:00 + 0:39
SAMPLE: SML 660558
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6395 #13
CALI: PU6395 #2

BASE M/Z: 44/ 44
RIC: 53423./ 87295.

unknown

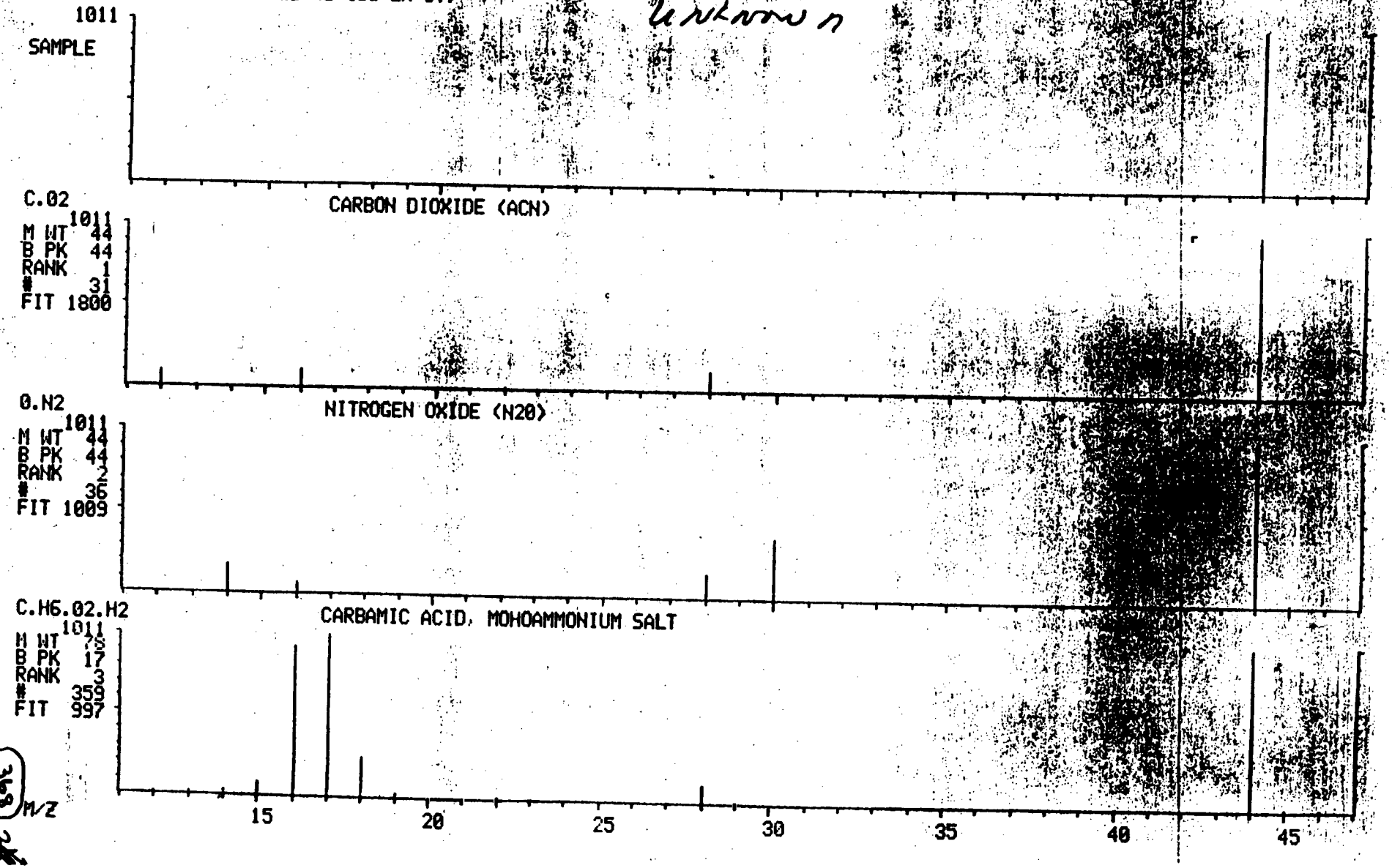


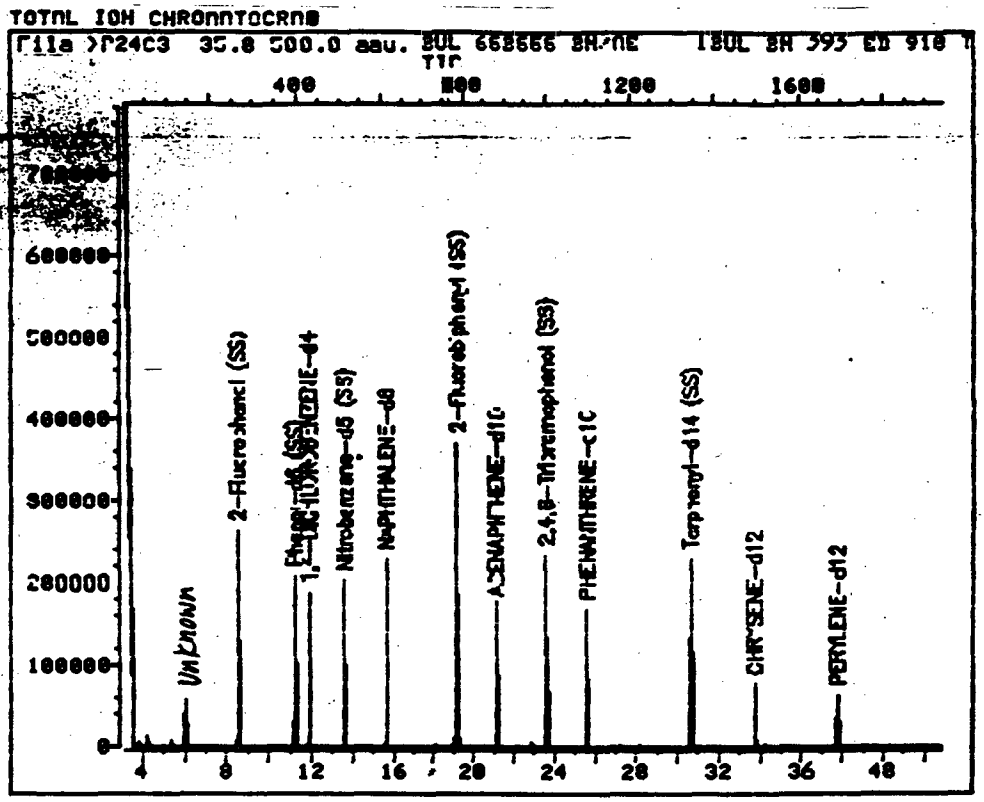
(32)

LIBRARY SEARCH
09/24/86 12:32:00 + 0:39
SAMPLE: SML 660558
CONDS.:
ENHANCED (S ISB 2N 0T)

DATA: PU6395 # 13
CALI: PU6395 # 2

BASE M/Z: 44
RIC: 63359.





Data File: >P2463::D1
Name: 2UL 660959 BN/AE
Miac: 10UL BN 392 CD 910 TB

BTL#95

Id File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:19

Operator ID: STEVE
Quant Time: 860922 16:08
Injected at: 860922 19:23

QUANT REPORT

Operator ID: STEVE
Output File: ^P2463::OP
Data File: >P2463::D1
Name: 2UL 660559 BN/AE
Misc: 10UL BN 392 CD 910 TB

Quant Rev: 4
Quant Time: 860922 16:08
Injected at: 860922 15:23
Dilution Factor: 1.00
BTL#95

ID File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:19

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-d4	11.82	426	64159	40.00	NG	88
3)	2-Fluorophenol (SS)	8.49	263	164219	81.75	NG	89
7)	Phenol-d6 (SS)	11.19	395	192862	73.83	NG	77
15)	*NAPHTHALENE-d8	15.60	611	221669	40.00	NG	48
16)	Nitrobenzene-d5 (SS)	13.54	510	172072	66.35	NG	92
27)	*ACENAPHTHENE-d10	21.10	880	109918	40.00	NG	95
31)	2-Fluorobiphenyl (SS)	19.14	784	327778	65.35	NG	99
42)	2,4,6-Tribromophenol (SS)	23.56	1000	77159	94.07	NG	88
43)	*PHENANTHRENE-d10	25.56	1098	201668	40.00	NG	51
54)	*CHRYSENE-d12	33.68	1495	106619	40.00	NG	45
55)	Terphenyl-d14 (SS)	30.61	1345	230452	106.15	NG	37
63)	*PERYLENE-d12	37.73	1693	86114	40.00	NG	79

* Compound is ISTD

MS data file header from : >P2463

Sample: 2UL 660559 BN/AE Operator: STEUE MS 9/22/86 15:23
Misc : 10UL BN 392 CO 910 TB BTL#95
Sys. #: 1 MS model: 96 SU/HU rev.: CA ALS # : 0
Method file: EXTRII Tuning file: MT9301 No. of extra records: 1
Spurce temp.: 200 Analyzer temp.: 220 Transfer line temp. : 280

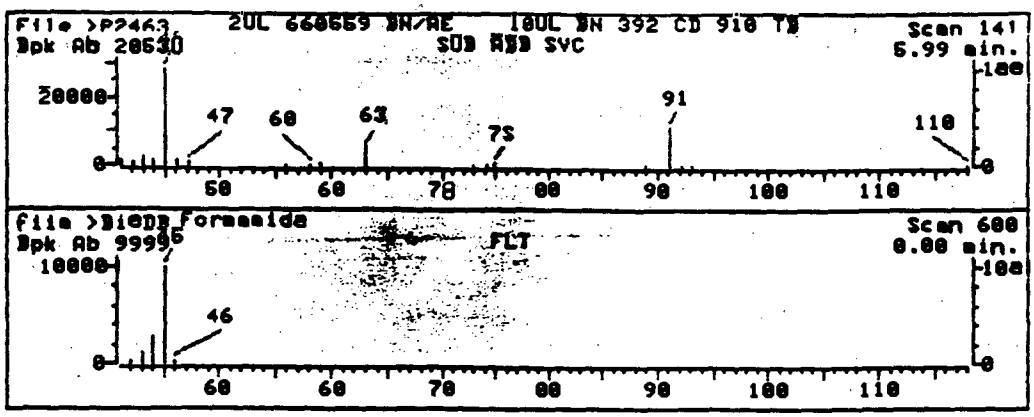
Chromatographic temperatures :	30.	300.	0.	0.	0.
Chromatographic times, min. :	4.0	5.0	0.0	0.0	0.0
Chromatographic rate, deg/min:	8.0	0.0	0.0	0.0	0.0

>P2463 2UL 660559 BN/AE 10UL BN 392 CO 910 TB
35.01 500.0 CLP ADC TIC

Peak #	R.T. min.	first scan	max scan	last scan	peak height	raw area	corr. area	corr. % max.	% of total
1	5.993	139	141	143	57880	129918	129348	24.46	8.08
2	15.604	607	611	614	227063	480288	480288	90.84	30.00
3	25.561	1094	1098	1101	167865	528736	528736	100.00	33.03
4	33.698	1491	1496	1499	78018	261419	261419	49.44	16.33
5	37.727	1689	1693	1700	62635	204189	200987	38.01	12.55

Sum of corrected areas: 1600778.

4:50 PM MON., 22 SEPT, 1986



1. Formamide 45 CH3NO

Sample file: >P2463 Spectrum #: 141
Search speed: 1 Tilting option: N No. of ion ranges searched: 45

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C_I	R_IV
1.	25*	75127	600	"BIGOB	21	30	1	0	86	48	7	14

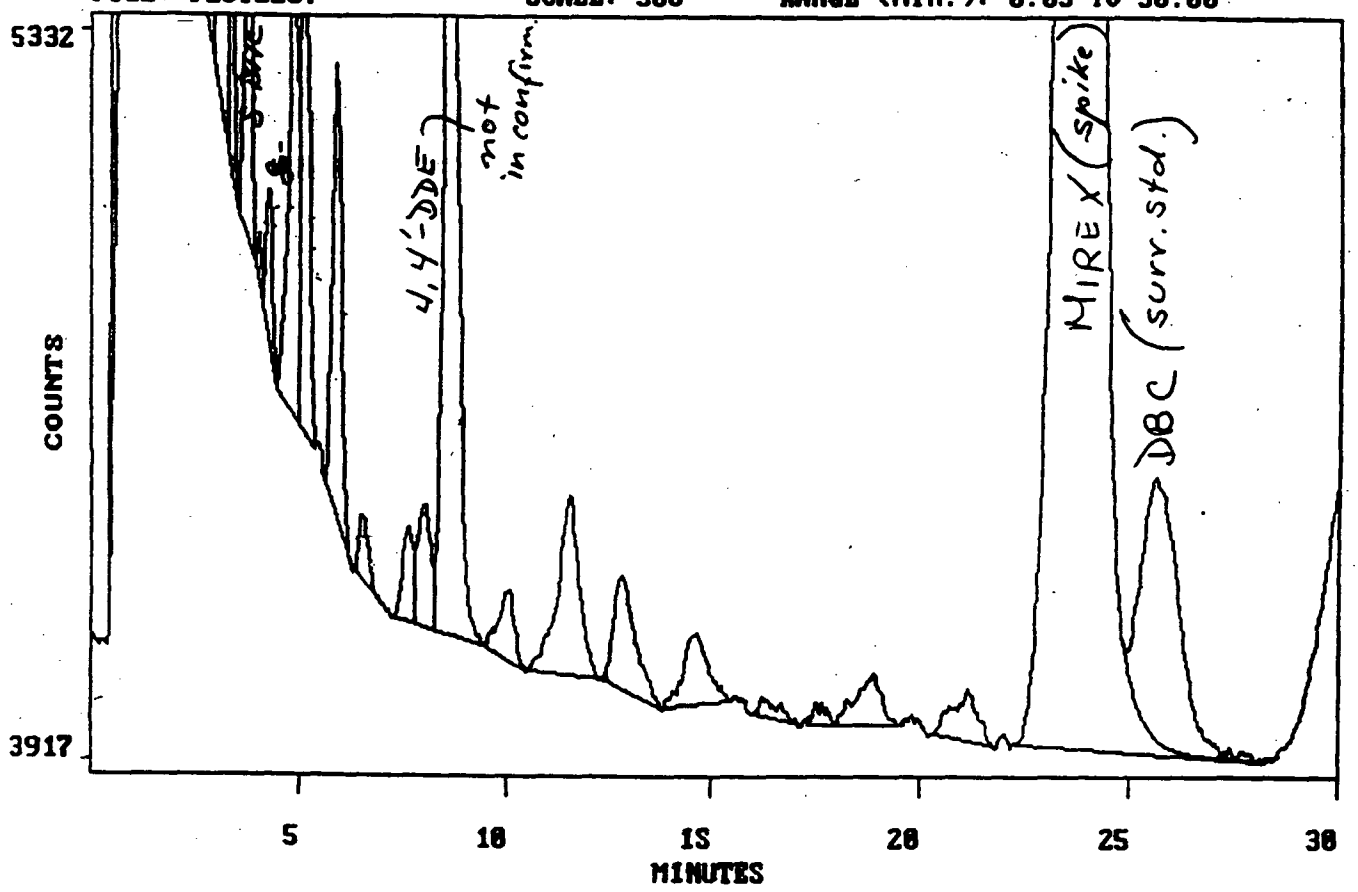
660560
CD910-TB
PRIMARY COLUMN

RECONSTRUCT SCREEN DUMP
Date Acquisition

Ttme:09:08:31 Oate:WED 08 OCT 86

Time:18:28:05 Date:MON 06 OCT 86
Method:PEST2

FILE: PE8T2257 SCALE: 500 RANGE (MIN.): 0.03 TO 30.00



Channel #.....4 Time:18:38:46 Date:MON 06 OCT 86
Run 83 of 100

Sampla nama.....
Data file.....DAT257:PEST2257
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....~~8~~ 1.5% OV-17 + 1.95% OV-210 on 100/120 CHROMOSORB WHP
Notes.....Primary Column Rana

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....18:28:05 Acq. date....MON 06 OCT 86
Start PW.....20.00 aac. End PW.....150.00 sac.
Actual PW....140.0
Slope sens.....0.73 uv/sec.

Area reject....500
peaks found..30
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Paak nama	Araa %	Araa	Peak Ht.	BL
1	0.557			79.277	3258106	734422	BB
2	0.925			0.152	6249	947	BV
3	1.095			0.676	27793	4243	VV
4	1.267			0.294	12067	1953	VV
5	1.392			0.638	26200	4031	VB
6	1.770			0.717	29455	3930	BV
7	2.236			4.051	166482	15483	VV
8	2.772			1.339	53040	4324	VV
9	3.067			0.719	29564	2408	VV
10	3.372			0.098	4027	398	VB
11	3.737		δ-BHC	0.303	12438	1303	BB
12	4.009			0.018	722	97	BV
13	4.249			0.070	2860	300	VB
14	4.820			0.359	14741	979	BV
15	5.080			0.345	14195	1062	VB
16	5.847			0.302	12423	856	BB
17	6.496			0.048	1958	125	BB
18	7.630			0.088	3607	186	BV
19	8.018			0.132	3437	238	VV
20	8.658		DDE 4,4-DDE	1.148	47191	2061	VB

37

23	12.858	0.193	8012	220	BB
24	14.640	0.147	6048	140	BB
25	16.341	0.026	1082	33	BB
26	17.693	0.025	1038	36	BV
27	18.947	0.098	4045	94	VB
28	21.195	0.097	4004	91	BB
29	23.771	7.442	305870	4760	BE
30	25.747	0.791	32491	505	EB
TOTALS		100.000	4109781		

660560
CD910 -TB

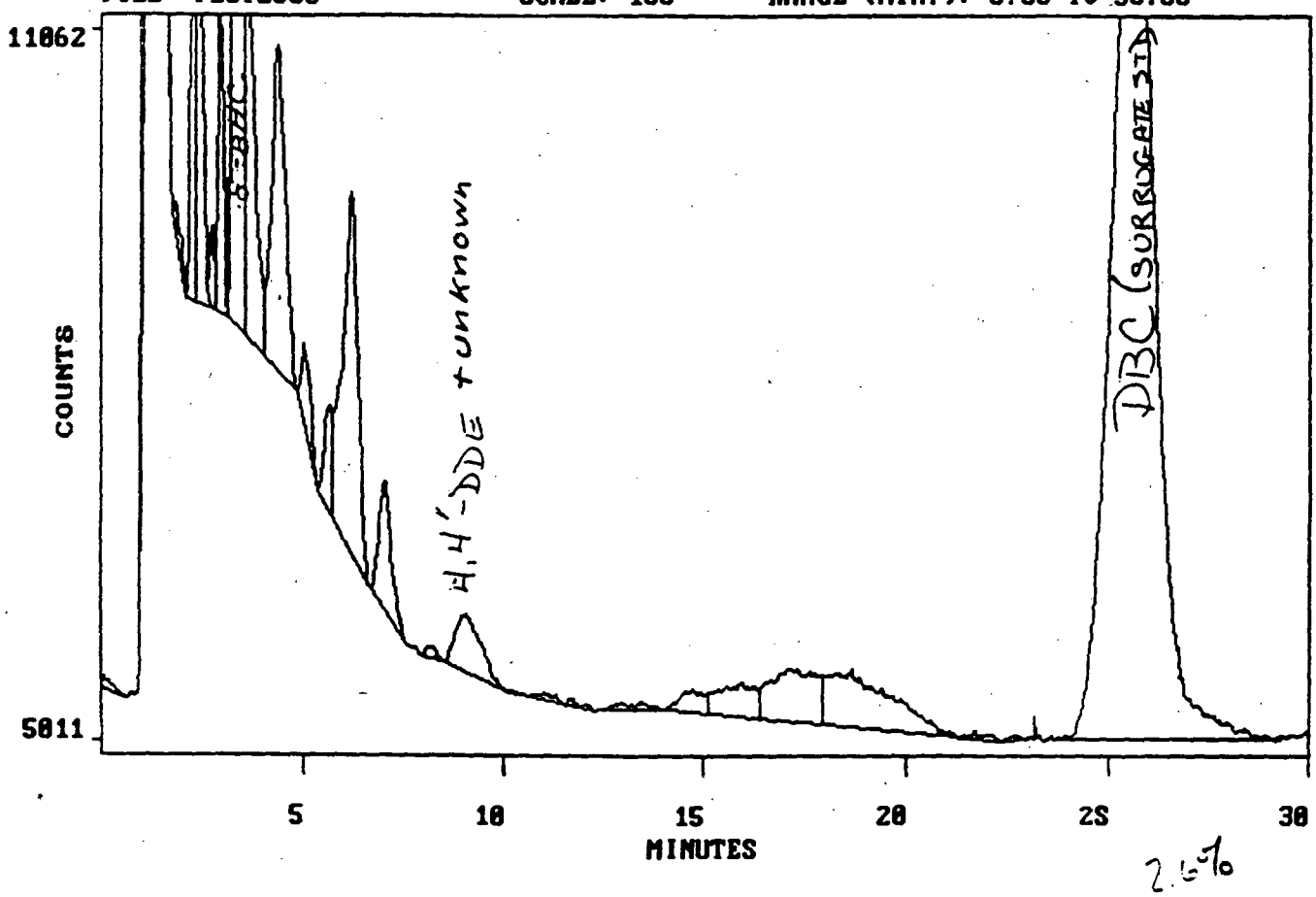
CONFIRMATORY COLUMN

Time:20:23:53 Date:THU 09 OCT 86

RECONSTRUCT SCREEM DUMP
Data Acquisition

Time:14:05:06 Date:THU 09 OCT 86
Method:PEST2

FILE: PEST2303 SCALE: 100 RANGE (MIN.): 0.03 TO 30.00



Channel #.....4 Time:14:35:47 Date:THU 09 OCT 86
Run #11 of 100

Sample name.....NJOEP
Data file.....DAT238:PEST2303
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....SY-2 3% SP2100 on 100/120 SUPELCOPORT
Notes.....~~Primary~~ Column Runs
CONFIRMATORY

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....14:03:06 Acq. date....THU 09 OCT 86
Start PW.....20.00 sec. End PW.....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
peaks found..29
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.101			0.024	1378	90	BB
2	1.100			79.353	3203824	598305	BB
3	1.337			0.292	19124	5293	BB
4	1.336			0.512	33317	4638	BB
5	1.868			0.044	2848	236	BB
6	2.340			0.582	38043	3985	BV
7	2.488			0.610	39886	4616	VE
8	2.768		E	0.080	3259	709	EV
9	2.990			0.415	27178	2935	VB
10	3.377		δ δ-BHC	2.630	172044	13051	BV
11	3.627			0.928	60734	4466	VV
12	4.398			0.971	63504	2779	VB
13	5.003			0.152	9974	679	BB
14	5.611			0.185	12075	895	BV
15	6.165			1.224	80087	3064	VB
16	6.980			0.370	24206	1092	BB
17	8.226		Peak 1	0.027	1786	103	BB
18	9.062		4,4'-DDE + unknown	0.324	21178	490	BB
19	11.090			0.043	2799	48	BB
20	13.029			0.031	2040	62	BV

37

23	15.970	[illegible]	0.290	18953	291	VV
24	17.223		0.564	36881	455	VV
23	18.331		0.807	32810	457	VB
26	21.727		0.027	1734	59	BB
27	22.746		0.010	646	39	BB
28	23.642	DBC	9.149	598474	7796	BB
TOTALS			100.000	6341343		

III. 2. Reporting Package
NJ DEP I.D. # FB-Field Blank

HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS
575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Lab No. 660562
Type: Misc. - Tier I
Point: Field Blank
Date Collected: 9/10/86
Date Received: 9/12/86
Collected By: CL 99

PRIORITY POLLUTANTS ANALYSIS - PURGEABLE ORGANICS

Scan No.	Cas Number	Compound	ug/l
	74-87-3	Chloromethane	10U
	74-83-9	Bromomethane	10U
	75-01-4	Vinyl chloride	10U
	75-00-3	Chloroethane	10U
128	75-09-2	Methylene chloride	10
	75-69-4	Trichlorofluoromethane	10U
	75-35-4	1,1-dichloroethene	10U
	75-34-3	1,1-dichloroethane	10U
	156-60-5	Cis/Trans-1,2-dichloroethene	10U
	67-66-3	Chloroform	10U
	107-06-2	1,2-dichloroethane	10U
332	71-55-6	1,1,1-Trichloroethane	4JB
	56-23-5	Carbon tetrachloride	10U
	75-27-4	Bromodichloromethane	10U
	79-34-5	1,1,2,2-Tetrachloroethane	10U
	70-87-5	1,2-dichloropropane	10U
	10061-02-6	Trans-1,3-dichloropropene	10U
	79-01-6	Trichloroethene	10U
	124-48-1	Dibromochloromethane	10U
	79-00-5	1,1,2-trichlocoethane	10U
	71-43-2	Benzene	10U
	10061-01-5	cis-1,3-Dichloropropene	10U
	110-75-8	2-chloroethylvinyl ether	10U
	75-25-2	Bromoform	10U
	127-10-4	Tetrachloroethene	10U
	106-88-3	Toluene	10U
	106-90-7	Chlarobenzene	10U
	100-41-4	Ethylbenzene	10U
	541-73-1	1,2-Dichlorobenzene	10U
	95-50-1	1,3-Dlchlorobenzene	10U
	106-46-1	1,4-Dichlorobenzene	10U

Date Reported: 10/15/86

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J.C. McLendon, P.E.
Laboratary Director

NJ DEP Sample #: Field Blank

ORGANICS ANALYSIS DATA SHEET
(Page 4)

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob FIT	% Prob RFIT	RT or Scan Number	Estimated Concentration (ug/L or ug/kg)
1.		Unknown (Carbon Dioxide)	-	-	13	33B
2.		Unknown	-	-	36	11
3.						
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HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS
575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

lab Name: H2M labs
Concentration: Low

Sample Lab No. 660563 - PB

Date Extracted: 9/16/86 - 9/17/86
Date Analyzed: 9/22/86

Conc Factor: 1000:1

Semi-Volatile Compounds

C.A.S. Number		ug/l	C.A.S. Number		ug/l
65-75-9	N-Nitrosodimethylamine	10U	83-32-9	Acenaphthene	10U
108-95-2	Phenol	10U	51-28-5	2,4-Dinitrophenol	10U
62-53-3	Aniline	10U	100-02-7	4-Nitrophenol	10U
111-44-4	bis(2-Chlaroethyl)Ether	10U	121-14-2	2,4-Dinitrotoluene	10D
95-57-8	2-Chlacophenol	10U	606-20-2	2,6-Dinitrotoluene	10D
541-73-1	1,3-Dichlorobenzene	10D	84-66-2	Diethylphthalate	10D
106-46-7	1,4-Dichlarobenzene	10U	7005-72-3	4-Chlorophenyl-phenylether	10U
95-50-1	1,2-Dichlorobenzene	10U	86-73-7	Fluorene	10U
39638329	bis(2-chloroisopropyl)ether	10U	534-52-1	4,6-Dinitro-2-Methylphenol	50U
621-64-7	N-Nitroso-Di-n-Propylamine	10U	86-30-6	N-Nitrososdiphenylamine (1)	10U
67-72-1	Hexachloroethane	10U	101-55-3	4-Bromophenyl-phenylether	10U
98-95-3	Nitrobenzene	10U	118-74-1	Hexachlorobenzene	10U
78-59-1	Isophorone	10U	87-86-5	Pentachlorophenol	50U
88-75-5	2-Nitrophenol	10U	85-01-8	Phenanthrene	10U
105-67-9	2,4-Dimethylphenol	10U	120-12-7	Anthracene	10U
111-91-1	bis(2-Chloroethoxy)Methane	10D	84-74-2	Di-n-Butylphthalate	10U
120-83-2	2,4-Dichlorophenol	10U	206-44-0	Fluoranthene	10U
120-82-1	1,2,4-Trichlorobenzene	10U	92-87-5	Benzidine	80U
91-20-3	Naphthalene	10U	129-00-0	Pyrene	10U
87-68-3	Hexachlorobutadiene	10U	85-68-7	Butylbenzylphthalate	10U
59-50-7	4-Chloro-3-Methylphenol	10U	91-94-1	3,3'-Dichlorobenzidine	20D
77-47-4	Hexachlorocyclopentadiene	10U	56-55-3	Benzo(a)Anthracene	10D
88-06-2	2,4,6-Trichlorophenol	10D	117-81-7	bis(2-Ethylhexyl)Phthalate	16
91-58-7	2-Chlaronaphthalene	10U	218-01-9	Chrysene	10D
131-11-3	Dimethyl Phthalate	10U	117-84-0	Di-n-Octyl Phthalate	10D
208-96-8	Acenaphthylene	10U	205-99-2	Benzo(b)Fluaranthene	10D
			207-08-9	Benzo(k)Fluaranthene	10U
			50-32-8	Benzo(a)Pyrene	10U
			193-39-5	Indeno(1,2,3-cd)Pyrene	10D
			53-70-3	Dibenzo(a,h)Anthracene	10U
			191-24-2	Benzo(g,h,i)Perylene	10U

(1) Cannot be separated from diphenylamine

Date Reported: 10/16/86

S.C. McLendon, P.E.
Laboratory Director

NJ DEP Sample #: FB

ORGANICS ANALYSIS DATA SHEET
(Page 4)

Tentatively Identified Compounds

	C.A.S. Number	Compound Name	% Prob FIT	% Prob RFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.		Unknown	-	-	143	10J
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JMSla

HOLZMACHER, McLENDON and MURRELL, P.C • CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS
575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

N.J. DEP
65 Prospect St.
Trenton, NJ 08618

Sample Lab No. 660564
Date Extracted: 9/18/86
Date Analyzed: 10/6/86
Type: Misc. - Tier I
Point: FB
Collected By: CL 99

ANALYSIS FOR PESTICIDES/PCB's

C.A.S. No.	Compound	ug/l
319-84-6	Alpha-BHC	0.05U
319-87-7	Beta-BHC	0.05D
319-86-8	Delta-BHC	0.05U
58-89-9	Gamma-BHC (Lindane)	0.05U
76-44-8	Heptachlor	0.05U
309-00-2	Aldrin	0.05U
1024-57-3	Heptachlor Epoxide	0.05U
959-98-8	Endosulfan I	0.05U
60-57-1	Dieldrin	0.10U
72-55-9	4,4'-DDE	0.10U
72-20-8	Endrin	0.10U
33213-65-9	Endosulfan II	0.10U
72-54-8	4,4'-DDD	0.10U
1031-07-8	Endosulfan Sulfate	0.10U
50-29-3	4,4'-DDT	0.10U
72-43-5	Methoxychlor	0.50U
53494-70-5	Endrin Ketone	0.10U
57-74-9	Chlordane	0.50U
8001-35-2	Toxaphens	1.0U
12674-11-2	Aroclor 1016	0.50U
11104-28-2	Aroclor 1221	0.50U
11141-16-5	Aroclor 1232	0.50U
53469-21-9	Aroclor 1242	0.50U
12672-29-6	Aroclor 1248	0.50U
11097-69-1	Aroclor 1254	1.0U
11096-82-5	Aroclor 1260	1.0U

Vi = Volume of extract injected (uL)
Ws = Weight of sample extracted (g)
Vs = 1000 mL Vt = 3 mLs
Date Reported: 10/17/86

Vs = Volume of water extracted (mL)
Vt = Volume of Total extract (mL)
Vi = 5 uL

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S.C. McLendon, P.E.
Laboratory Director

Lab Name : H2M LABS

Sample Number
660564

NJDEP #CD910-EB

ORGANICS ANALYSIS DATA SHEET

Tentatively Identified Compounds

C.A.S. Number	Compound Name	% Probability Fit	% Probability REFIT	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1.	Unknown			2.22	0.91
2.					
3.					
4.					
5.					
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Date Reported: 10-17-86

S.C. McLendon, P.E.
Laboratory Director

H2M
Environmental Engineers & Scientists
HOLZMACHER, McLENDON and MURRELL, P.C.
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
WATER RESOURCES • WATER SUPPLY & TREATMENT • WASTE WATER & TREATMENT • ECOLOGICAL & IMPACT STUDIES
MODEL STUDIES • PILOT PLANT STUDIES • WATER/WASTE WATER LABORATORY AND ANALYTICAL SERVICES

LABORATORY REPORT

LAB NO. 660565
PROJECT NO. 2C

CLIENT NAME AND ADDRESS

NEW JERSEY D.E.P.
68 PROSPECT ST.
TRENTON, NEW JERSEY 08618

TYPE OF SAMPLE - MISCELLANEOUS
COLLECTED BY CL 99
DATE COLLECTED - 9/10/86
DATE RECEIVED - 9/12/86

NJDEP SAMPLE #CD 910-FB
NJDEP SAMPLE POINT I.D. #FIELD BLANK

PARAMETER	RESULT	PARAMETER	RESULT
ANTIMONY	<60.0 #	SELENIUM	<5.00# N
ARSENIC	<10.0 #	SILVER	<10.0 #
BERYLLIUM	<8.00# N	THALLIUM	<10.0 # N
CADMIUM	<5.00#	ZINC	<20.0 #
CHROMIUM	<10.0 #	PHENOLS	<1.00# N
COPPER	<28.0 # N	CYANIDE	<10.0 #
LEAD	<2.00# N		
MERCURY	<0.20#		
NICKEL	<40.0 #		

ALL RESULTS IN (MG/L) EXCEPT AS NOTED BY # (UG/L) OR % (PERCENT) AND
COLI BACT. & FECAL COLI (MPN/100ML)
COLOR, ODOR, TURBIDITY (APHA UNITS)
TOTAL & FECAL STREP (COUNTS/ML)
SPEC.COND. (UMHOS) SETT.SOLIDS (ML/L)

DATE REPORTED 10/ 8/86

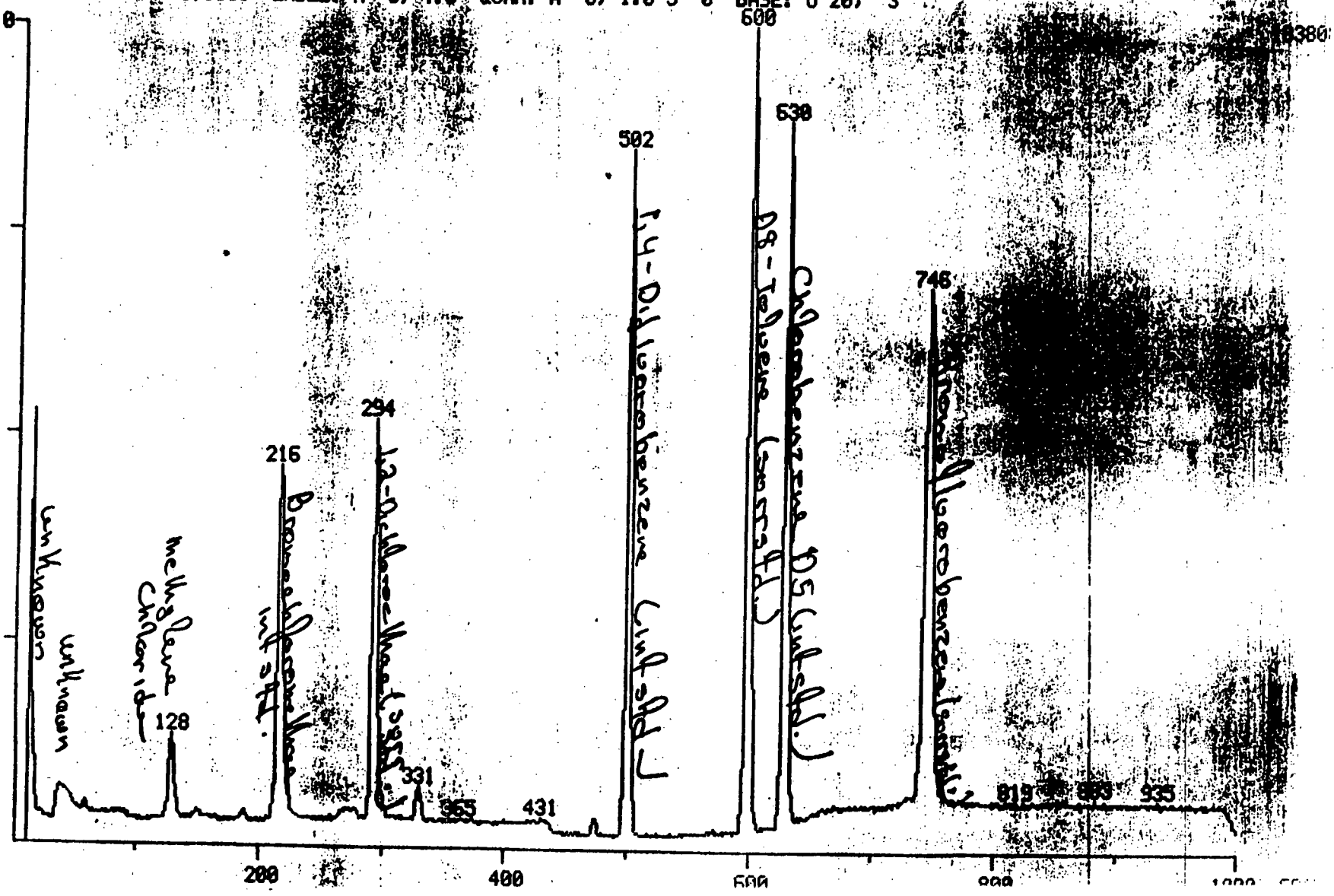
S. J. McLENDON, P.E., LABORATORY DIRECTOR

ANY LIABILITY OF MSM CORP. SHALL BE LIMITED TO THE PRICE OF THE SERVICE RENDERED AND PAID.

RIC
03/24/06 13:29:00
SAMPLE: SMLS 660562
CONDS.:
RANGE: G 1,1000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: PU6396 #1
CALI: PU6396 #2

SCANS 1 TO 1000



FINISHED ■ FOUND
ISHED AT: 9/25/86 13:04:58

39

QUANTITATION REPORT FILE: PU6396

DATA: PU6396.TI
09/24/86 13:29:80
SAMPLE: 5MLS 660562
CONDS.
SUBMITTED BY: N/DEP ANALYST: CC

AMOUNT=AREA * REF AMOUT/(REF AREA * RESP FACT)
RESP. FAC. FROM LIBRARY ENTRY

No	NAME
1	BROMOCHRLOROMETHANE (INT. STD.)
2	1,2-DICHLOROETHANE 04 (SURR. STD)
3	CHLOROMETHANE
4	BROMOMETHANE
5	VINYL CHLORIDE
6	CHLOROETHANE
7	METHYLENE CHLORIDE (C)
8	ACETONE
9	CARBON DISULPHIDE
10	1,1-DICHLOROETHENE (B)
11	1,1-DICHLOROETHANE(E)
12	TRANS -1,2-DICHLOROETHENE (D)
13	CHLOROFORM
14	1,2-DICHLOROETHANE(H)
IS	TRICHLOROFLUOROHETHANE
16	DICHLOROFLUOROMETHANE
17	ACROLEIN
18	ACRYLONITRILE
19	1,4-DIFLUOROBENZENE(INT. STD)
20	2-BUTANONE (MEK)
21	1,1,1-TRICHLOROETHANE (I)
22	CARBON TETRA CHLORIOE
23	BROMOOZCHLOROMETHANE(L)
24	1,2-DICHLDROPROPANE(X)
25	TRANS-1,3-DICHLDROPROPENE (AA)
26	TRICHLOROETHENE(K)
27	DIBROMOCHLOROMETHANE(O)
28	1,1,2-TRICHLOROETANE(M)
29	BENZENE(BEN)
30	CIS-1,3-DICHLOROPROPENE(Z)
31	2-CHLOROETHYLVINYLETHER(NN)
32	BROMOFORM(P)
33	CHLORDBENZENE-D5 (INT. STO)
34	2-HEXANONE(MBK)
35	4-METHYL-2-PENTANONE(MIBK)
36	TETRACHLOROETHENE(N)
37	ETHANE, 1,1,2,2-TETRACHLORO-
38	TOLUENE(TOL)
39	CHLOROBENZENE(Q)
40	ETHYLEENZENE(EB)
41	STYRENE
42	META-XYLENE
43	ORTHO/PARA-XYLENE
44	META-DICHLOROBENZENE(MDCB)
45	ORTHO-DICHLOROBENZENE(ODCB)
46	PARA-DICHLOROBENZENE(PDCB)
47	D8-TOLUENE(SURR. STD)
48	BROMOFLUOROBENZENE(SURR. STD)

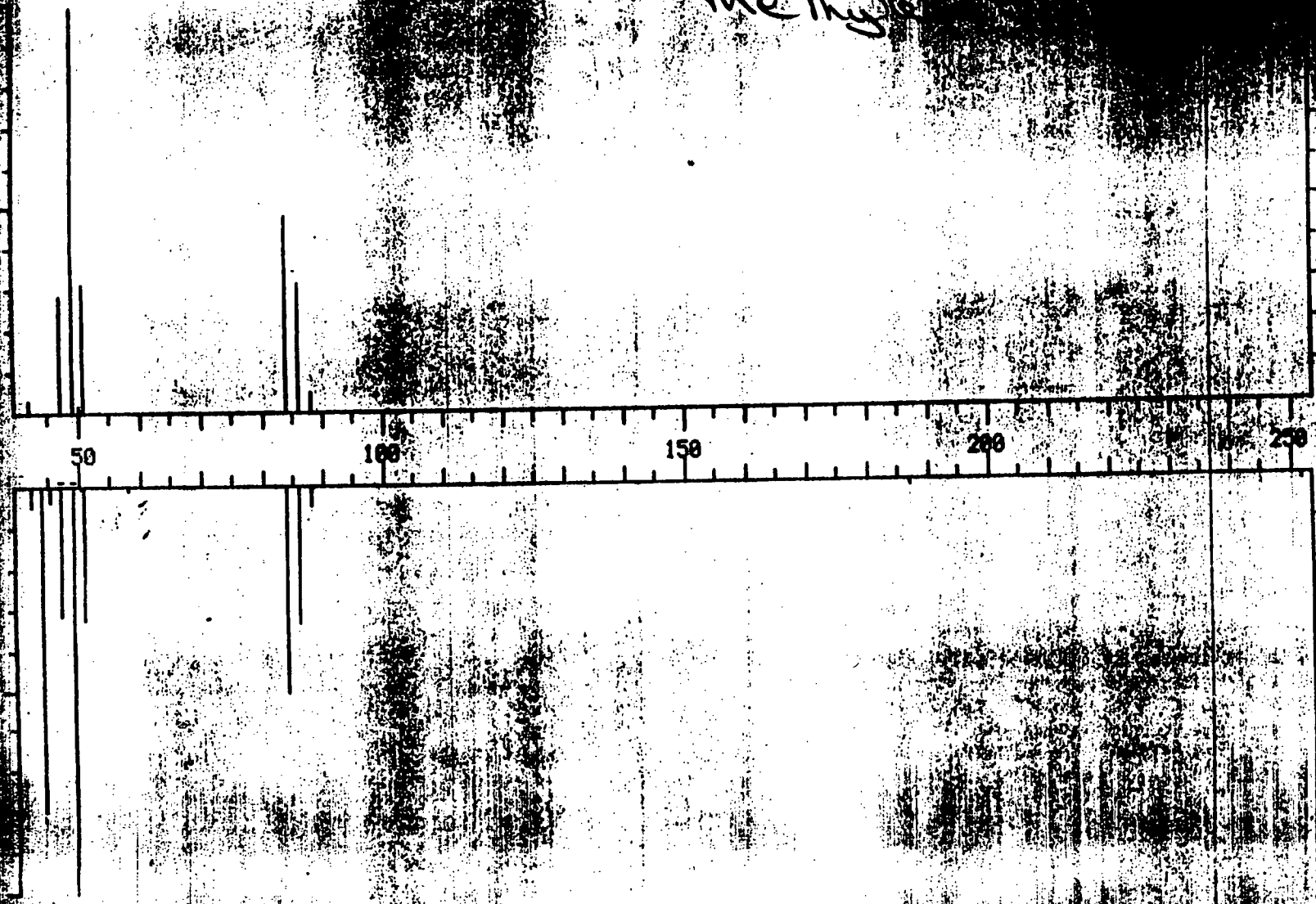
4	NOT FOUND									
5	NOT FOUND									
6	NOT FOUND									
7	84	128	[illegible]	1	0.593	A BB	19545.	50.830	NG	[illegible]
8	43	150	[illegible]	1	0.694	A*BB	4540.	44.483	NG	
9	NOT FOUND									
10	NOT FOUND									
11	NOT FOUND									
12	NOT FOUND									
13	NOT FOUND									
14	NOT FOUND									
15	101	187	[illegible]	1	0.866	A BB	5494.	10.444	NG	
16	NOT FOUND									
17	NOT FOUND									
18	NOT FOUND									
19	114	502	[illegible]	19	1.000	A BB	285313.	250.000	NG	[illegible]
20	43	303	[illegible]	19	0.604	A BB	7631.	93.910	NG	[illegible]
21	97	332	16:36	19	0.661	A BB	7731.	18.435	NG	0.89
22	NOT FOUND									
23	NOT FOUND									
24	NOT FOUND									
25	NOT FOUND									
26	NOT FOUND									
27	NOT FOUND									
28	NOT FOUND									
29	78	435	21:45	19	0.867	A BB	214.	0.138	NG	0.01
30	NOT FOUND									
31	NOT FOUND									
32	NOT FOUND									
33	117	630	31:30	33	1.000	A BB	221166.	250.000	NG	12.12
34	43	522	26:06	33	0.829	A BB	296.	205.726	NG	9.98
35	43	562	28:06	33	0.892	A*BB	1799.	376.649	NG	18.27
36	NOT FOUND									
37	NOT FOUND									
38	92	605	30:15	33	0.960	A BB	892.	1.126	NG	0.05
39	NOT FOUND									
40	NOT FOUND									
41	NOT FOUND									
42	NOT FOUND									
43	NOT FOUND									
44	NOT FOUND									
45	NOT FOUND									
46	NOT FOUND									
47	100	599	29:57	33	0.951	A BB	202543.	239.881	NG	11.63
48	95	746	37:18	33	1.184	A BB	191927.	241.428	NG	11.71

DUAL MASS SPECTRUM
09/24/86 13:29:00 + 6:24
SAMPLE: SMLS 660562
CONDS.:
ENHANCED (S 15B 2N 0)

DATA: PU6396 #128
CALI: PU6396 #2

BASE M/Z: 49/ 49
RIC: [illegible] 24895

methyl

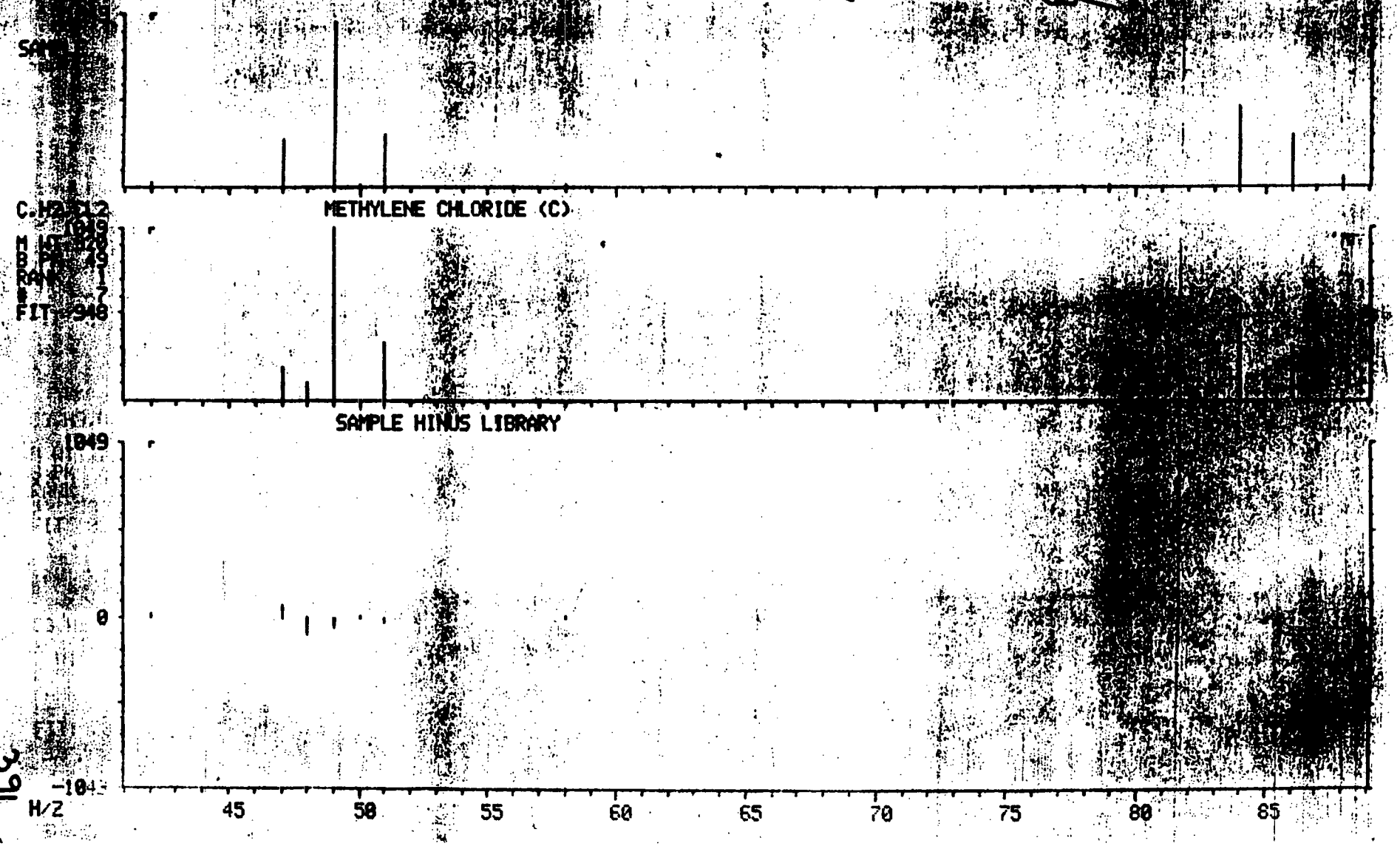


LIBRARY SEARCH
09/24/86 13:29:00 + 6/24
SAMPLE: 5MLS 660562
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6396 # 120
CALI: PU6396 # 2

BASE M/Z: 49
RIC: 18015.

Methylene chloride

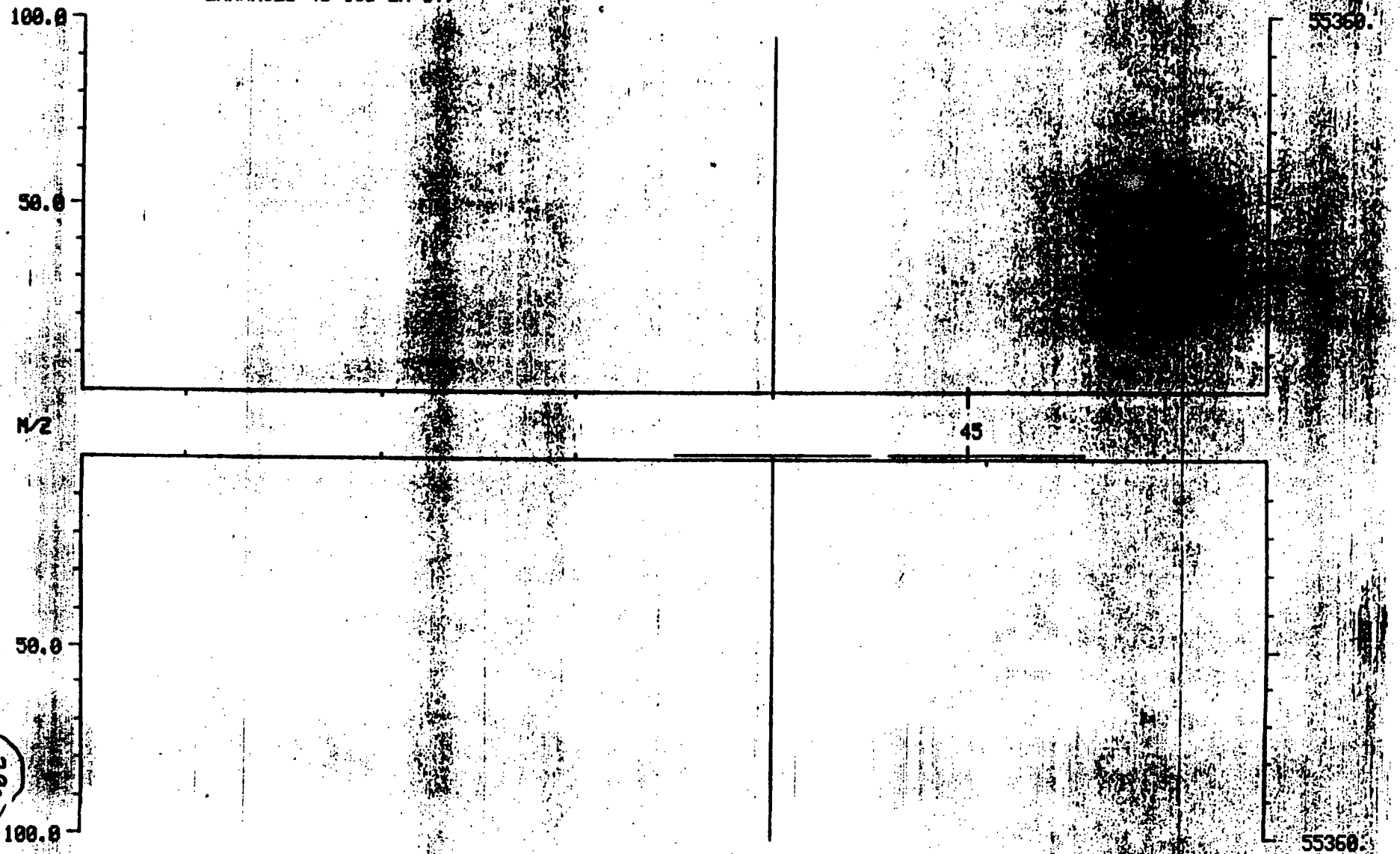


DUAL MASS SPECTRUM
09/24/06 13:29:00 + 0:39
SAMPLE: 5MLS 666562
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6396 #13
CALI: PU6396 #2

BASE M/Z: 44/ 44
RIC: 93119./ 55933.

Unknown



(39)

LIBRARY SEARCH
09/24/86 13:29:00 + 0:39
SAMPLE: 5MLS 660562
CONDS.:
ENHANCED (S 13B 2N 0T)

DATA: PU6396 # 13
CALI: PU6396 # 2

BASE:
RIC:

Unknown

SAMPLE

C.02 CARBON DIOXIDE (ACN)

M WT
B PK
RANK
#
FIT

0.N2 NITROGEN OXIDE (N20)

M WT
B PK
RANK
#
FIT

C.H6N2O2N2 CARBAMIC ACID, MONOAMMONIUM SALT

M WT
B PK
RANK
#
FIT

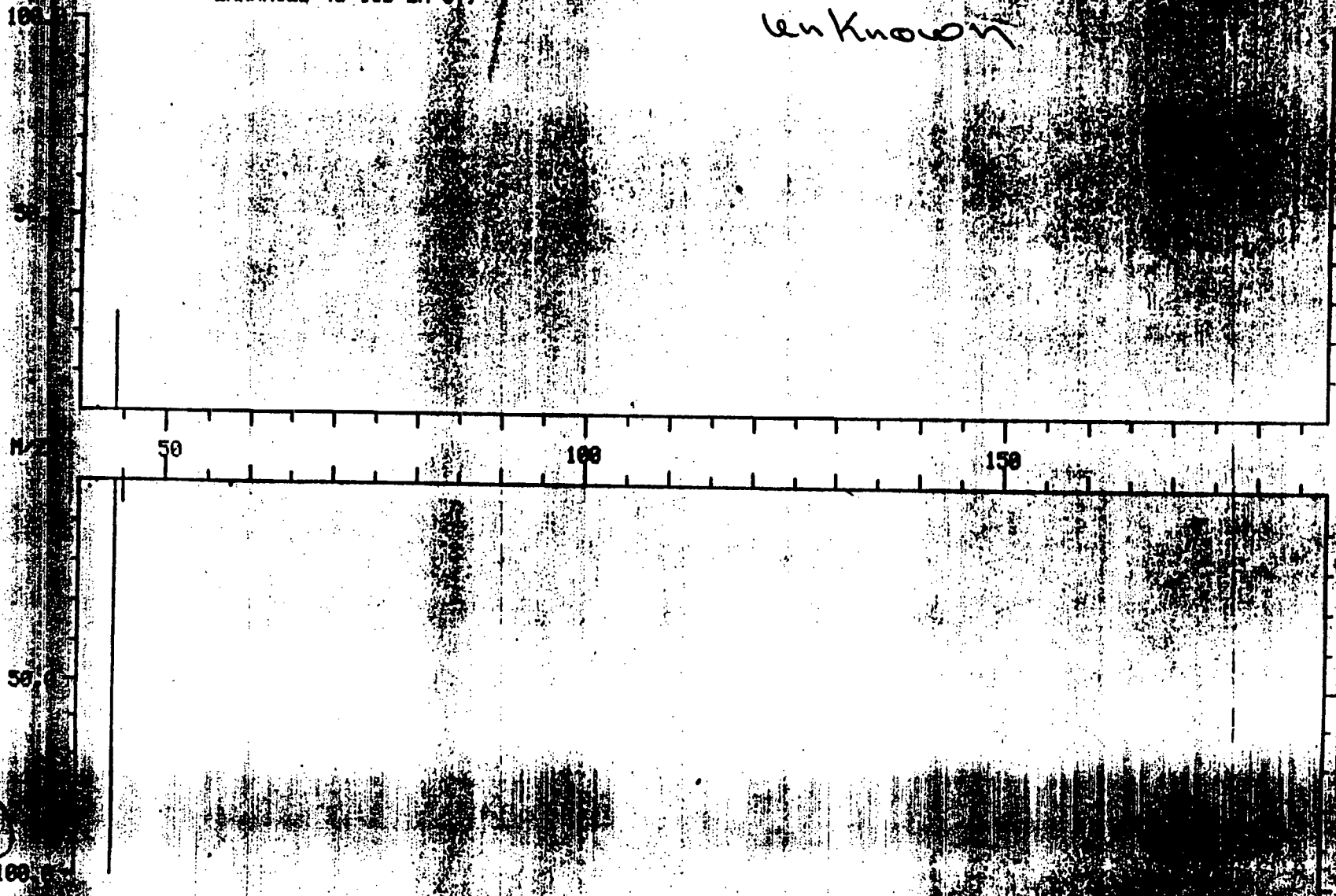
M/Z 15 20 25 30 35 40 45

(393)

DUAL MASS SPECTRUM
09/24/86 13:29:00 + 1:48
SAMPLE: 5MLS 660562
CONDS.:
ENHANCED (S 15B 2N 0T)

DATA: PU6396
CALI: PU6396

Unknown



LIBRARY SEARCH
09/24/86 13:29:00 + -1:48
SAMPLE: 5MLS 660562
CONDS.:
ENHANCED (S 158 2M 0T)

DATA: PU6396 # 36
CALI: PU6396 # 2

BASE M/Z: 44
RIC: 3051.

unknown

SAMPLE

2-BUTANAMINE

C4.H11.N
1000
M WT 73
B PK 44
RANK 1
283
FIT 830

1-PROPANOL, 2-AMINO-

C3.H9.O.N
1000
M WT 75
B PK 44
RANK 2
322
FIT 824

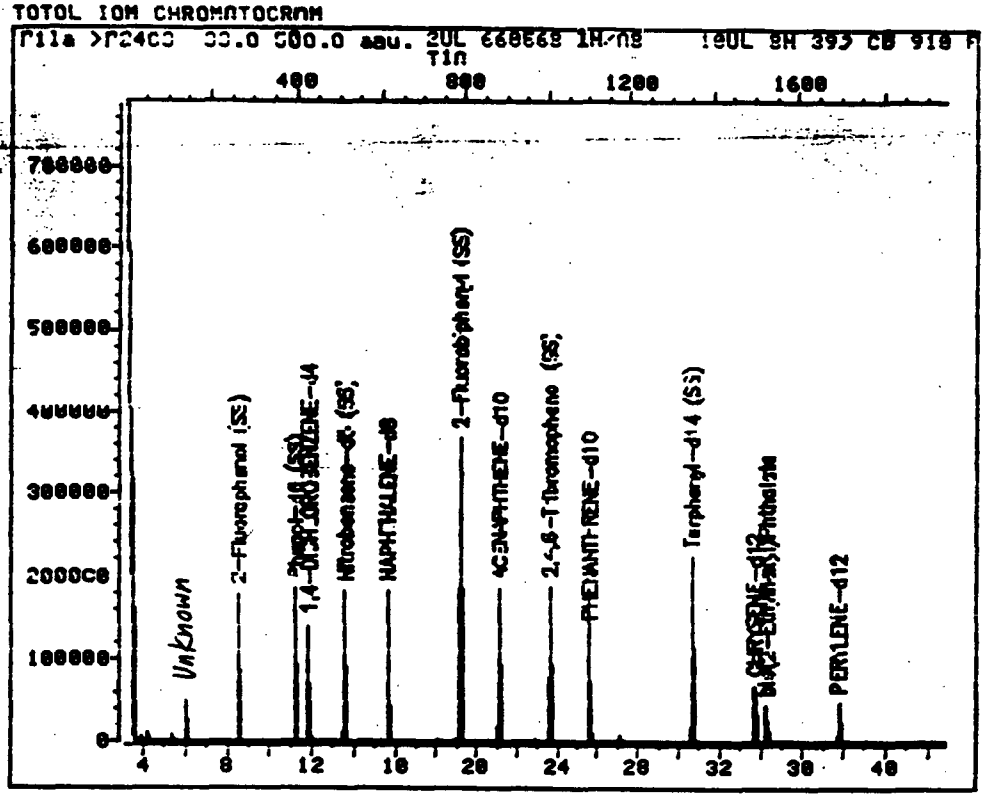
2-PROPANAMINE

C3.H9.N
1000
M WT 59
B PK 44
RANK 3
99
FIT 782

M/Z 20 30 40 50

395

TOTOL IOM CHROMATOGRAM



Data File: >P2462::D1
Name: 2UL 660963 BN/AE
Misc: 10UL BN 392 CO 910 FB

BTL#94

Id File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:19

Operator ID: STEVE
Quant Time: 860922 15:16
Injected at: 860922 14:31

QUANT REPORT

Operator ID: STEVE Quant Rev: 4 Quant Time: 860922 19:16
Output File: ^P2462::OP Injected at: 860922 14:31
Data File: >P2462::01 Dilution Factor: 1.00
Name: 2UL 660563 BN/AE
Misc: 10UL BN 392 CD 910 FB BTL#94

ID File: !IDXPP::SC
Title: PRIORITY POLLUTANTS
Last Calibration: 860922 14:19

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-d4	11.85	428	49758	40.00	NG	98
3)	2-Fluorophenol (SS)	8.49	264	124560	79.95	NG	95
7)	Phenol-d6 (SS)	11.19	396	145691	71.91	NG	81
15)	*NAPHTHALENE-d8	15.61	612	185336	40.00	NG	47
16)	Nitrobenzene-d5 (SS)	13.54	511	161360	74.42	NG	89
27)	*ACENAPHTHENE-d10	21.13	882	93758	40.00	NG	95
31)	2-Fluorobiphenyl (SS)	19.14	785	301113	70.38	NG	99
42)	2,4,6-Tribromophenol (SS)	23.56	1001	61120	87.35	NG	90
43)	*PHENANTHRENE-d10	25.56	1099	164113	40.00	NG	91
54)	*CHRYSENE-d12	33.68	1496	92880	40.00	NG	46
55)	Terphenyl-d14 (SS)	30.64	1347	210017	111.04	NG	37
61)	bis(2-Ethylhexyl)Phthalate	34.25	1524	30967	15.92	NG	86
63)	*PERYLENE-d12	37.73	1694	69454	40.00	NG	79

* Compound is ISTD

MS data file header from : >P2462

Sample: 2UL 660563 BN/AE Operator: STEVE IIS 9/22/86 [illegible]
Misc : 10UL BN 392 CD 910 FB BTL# [illegible]
Sys. #: 1 MS model: 96 SW/HW rev.: CA ALS # : 0
Method file: EXTRII Tuning file: MT9301 No. of extra records: [illegible]
Source temp.: 200 Analyzer temp.: 220 Transfer line temp.: [illegible]

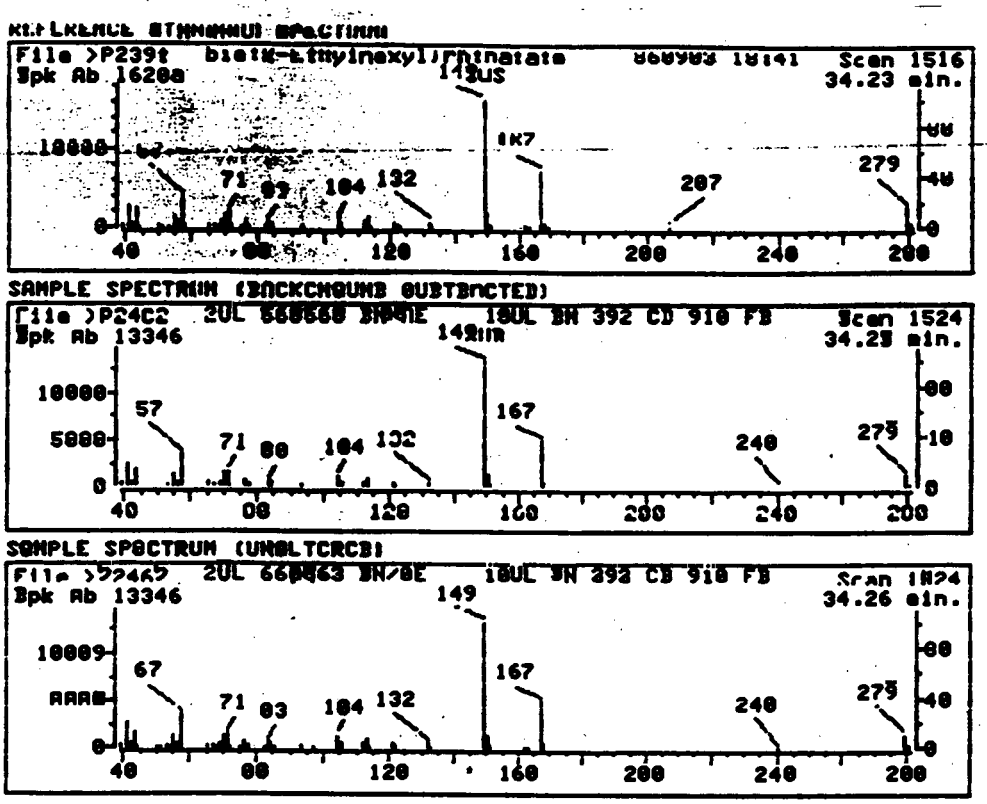
Chromatographic temperatures :	30.	300.	0.	0.	0.
Chromatographic times, min. :	4.0	5.0	0.0	0.0	0.0
Chromatographic rate, deg/min:	8.0	0.0	0.0	0.0	0.0

>P2462 2UL 660563 BN/AE 10UL BN 392 CD 910 FB
35.01 500.0 CLF AOC TIC

Peak #	R.T. min.	first scan	max scan	last scan	peak height	raw area	corr. area	corr. % max.	% of total
1	6.017	141	143	145	49864	107060	107060	24.52	7.99
2	15.607	609	612	615	182501	408571	408571	93.59	30.50
3	25.585	1096	1100	1103	148150	437165	436572	100.00	32.59
4	33.682	1493	1496	1500	67853	223241	223241	51.13	16.66
5	37.731	1690	1694	1702	46649	168100	163959	37.56	12.24

Sum of corrected areas: 1339403.

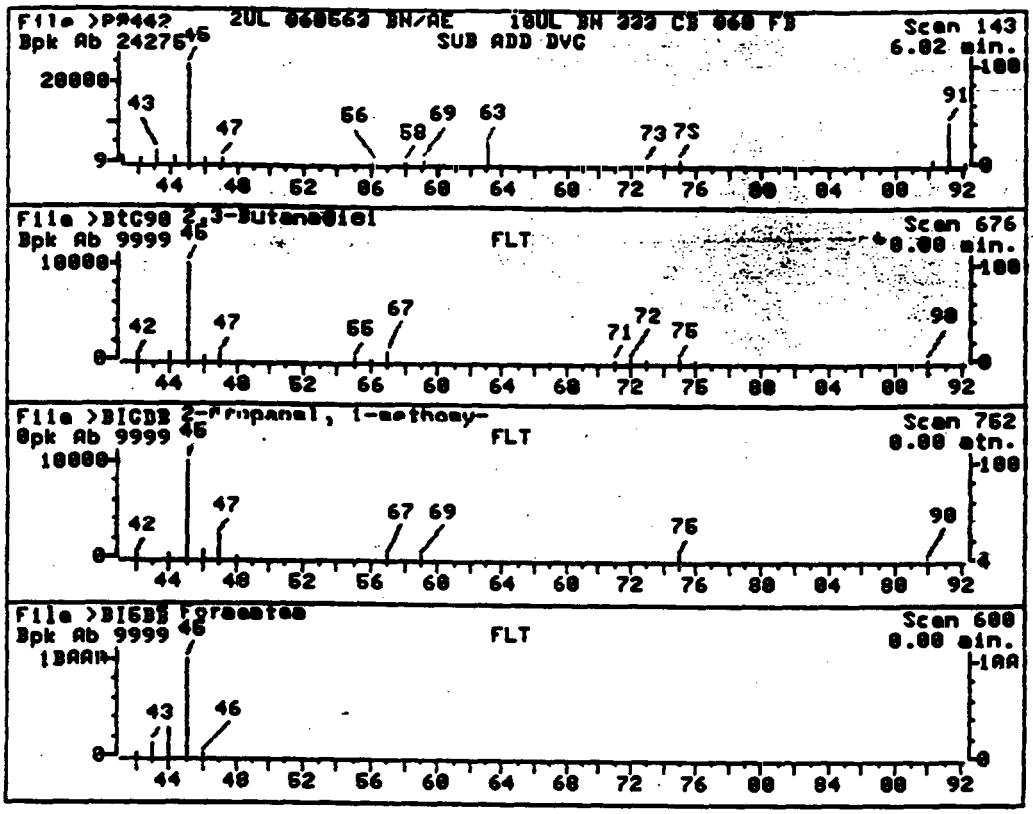
3:34 PM MON., 22 SEPT, 1986



Data File: >P2462::D1
Name: 2UL 660563 BN/AE
Misc: 10UL BN 392 CD 910 FB
Quant Time: 860922 15:16
Injected at: 860922 14:31

BTL#94

Compound No: 61
Compound Name: bis(2-Ethylhexyl)Phthalate
Scan Number: 1524
Retention Time: 34.25 min.
Area: 30967
Concentration: 15.92 NG
q-value: 86



1. 2,3-Butanediol 90 C4H10O2

Sample file: >P2462 Spectrum #: 143
Search speed: 1 Tilting option: N No. of ion ranges searched: 45

	Prob.	CAS #	CON #	ROOT	K	DK	#FLG	TILT	%	CON	C_I	R_IV
1.	28*	513859	675	"BIGDB	26	49	2	0	100	40	10	14

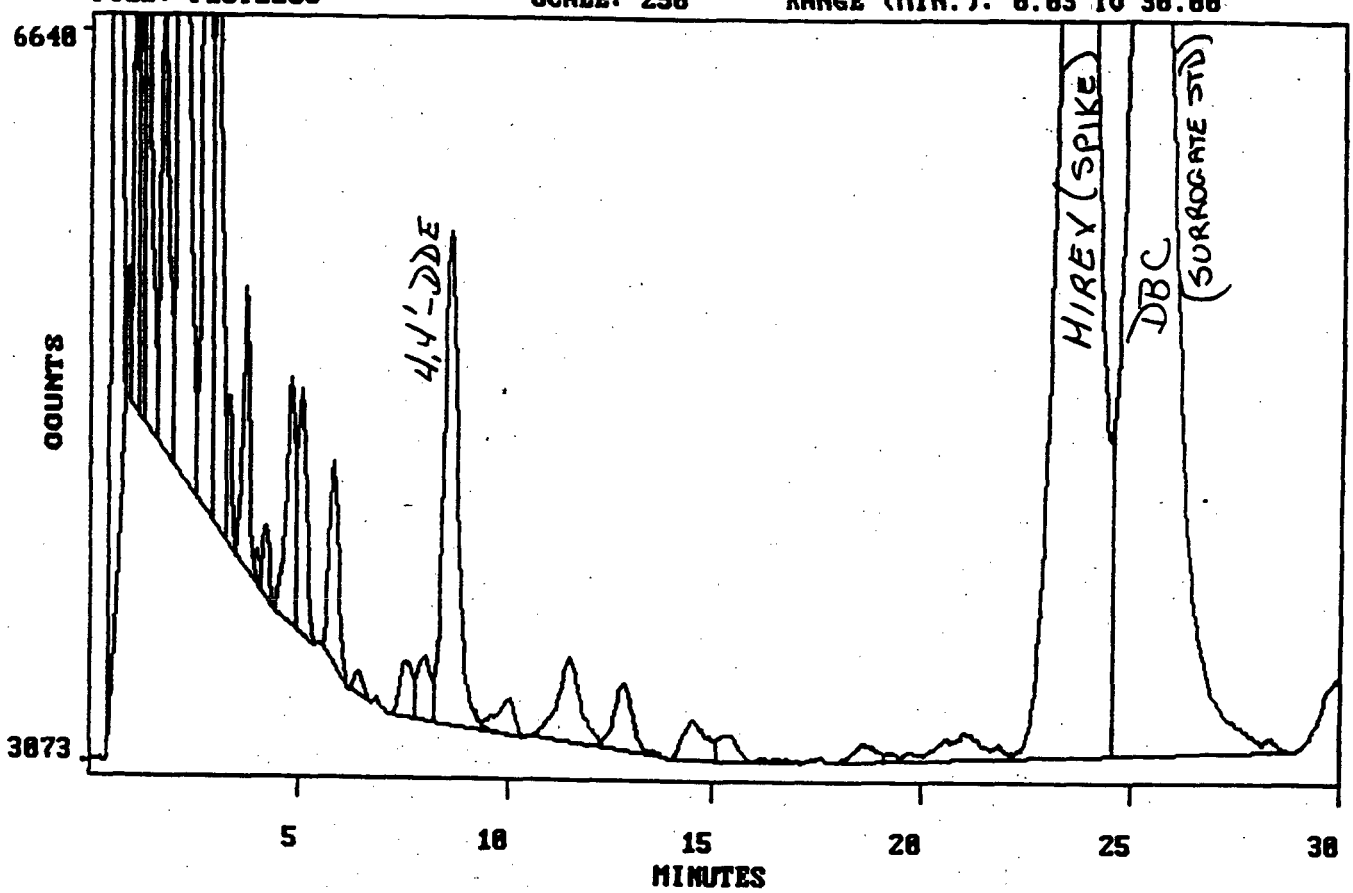
660564
CD-910-FB
PRIMARY COLUMN

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:09:11:03 Date:WED 08 OCT 86

Time:19:04:57 Date:MON 06 OCT 86
Method:PEST2

FILE: PEST2250 SCALE: 250 RANGE (MIN.): 0.03 TO 30.00



1.3

401

Channel #.....4 Time:19:35:30 Data:MON 06 OCT 86
Run 84 of 100

Sample name.....
Data file.....DAT257:PEST2258
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....≈ 1.5% OO-17 + 1.95% OO-210 on 100/120 CHROMOSORB WHP
Notes.....Primary Column Runs

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....19:04:57 Acq. date....MON 06 OCT 86
Start PW.....20.00 sec. End PW.....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
8 peaks found..30
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Conc.	Area %	Area	Peak Ht.	BL
1	0.555				73.042	3128940	737534	BB
2	0.936				0.096	4099	507	BV
3	1.080				0.516	22098	3100	VV
4	1.260				0.225	9639	1712	VV
5	1.374				0.583	24953	3091	VV
6	1.760				0.720	30827	3436	VV
7	2.223				3.531	151274	12736	VV
8	2.766				1.195	51181	3647	VV
9	3.052				0.690	29565	2253	VV
10	3.351				0.098	4188	581	VV
11	3.740				0.264	11302	1077	VE
12	3.996				0.026	1093	112	EV
13	4.229				0.065	2804	273	VB
14	4.798				0.325	13907	933	BV
13	3.033				0.298	12749	935	VB
16	5.828				0.264	11322	764	BB
17	6.426				0.030	1268	93	BB
18	7.568				0.109	4664	210	BV
19	8.004				0.126	5413	238	VV
20	8.620		$\frac{45165}{202.7} \times 3 / 5000 = 0.134$		1.054	45165	1854	VE

400

23	12.848 DDD	0.194	8311	232	VB
24	14.546	0.137	5861	145	BV
25	15.321	0.075	3212	95	VB
26	16.267	0.020	876	18	BB
27	18.690	0.065	2775	69	BV
28	21.127	0.565	24211	93	VV
29	23.698	7.180	307557	4814	VV
30	25.448	8.110	347421	4670	VB
TOTALS		100.000	4283749		

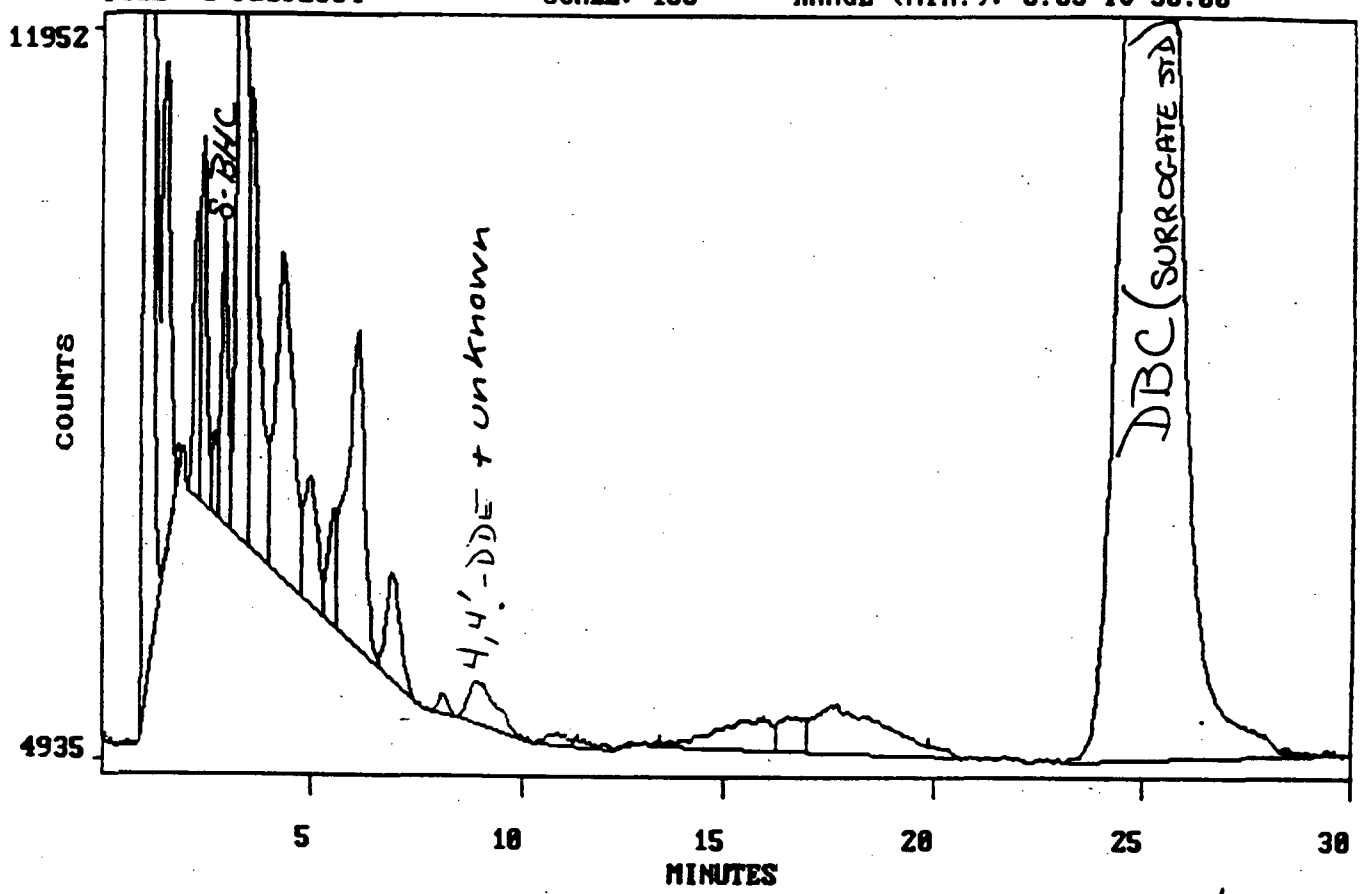
660564 CONFIRMATORY
CD910-FB COLUMN

Time:20:02:05 Date:THU 09 OCT 86

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:14:36:26 Date:THU 09 OCT 86
Mathod:PEST2

FILE: 1:PEST2304 SCALE: 100 RANGE (MIN.): 0.03 TO 30.00



4.3%

Channel #.....4 Time:15:07:05 Date:THU 09 OCT 86
Run #12 of 100

Sample name.....NJDEP
Data file.....DAT258:PES[illegible]304
Method name.....PEST2

Author.....LAL
Instrument.....ECD
Column.....II Y-2 3% SP2100 on 100/120 SUPELCOPORT
Notes.....~~Primary~~ Column Runs
CONFIRMATORY

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....14:36:26 Acq. date....THU 09 OCT 86
Start PW.....20.00 sec. End PW.....150.00 sec.
Actual PW....140.0
Slope sens.....0.75 uv/sec.

Area reject....500
peaks found..27
Vol. Inj.....5.0 ul Sample amount..1.000
Conv. factor...1.000

METHOD NOT CALIBRATED!

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Paak name	Area %	Area	Peak Ht.	BL
1	0.105			0.008	674	79	BB
2	1.093			74.908	6022423	703760	BE
3	1.552			1.046	84109	4603	EV
4	1.861			0.033	2820	290	EB
3	2.313			0.324	26075	2741	BV
6	2.463			0.402	32312	3492	VV
7	2.733			0.081	6547	796	VV
8	2.939			0.393	31620	2897	VV
9	3.342	δ		1.881	151204	10914	VV
10	3.391			0.855	68702	4385	VV
11	4.347			1.099	88382	3108	VV
12	4.996			0.333	26733	1238	VV
13	5.548			0.201	16187	1144	VV
14	6.094			1.051	84533	3044	VV
15	6.936			0.290	23338	1023	VB
16	8.124			0.036	2856	186	BB
17	8.942		DDE + unknown	0.237	19050	407	BB
18	10.837			0.045	3651	103	BV
19	11.356			0.031	2488	88	VB
20	12.692			0.011	846	36	BB

405

23	16.640	0.173	13889	333	VV
24	17.696	0.695	53876	462	VB
25	25.184	13.487	1245099	14900	BE
26	29.380	0.013	1064	37	EB
TOTALS		100.000	8039811		

Digestion Methods.

ICP/ Flame AA digestion according to NYS DEC Contract Lab Protocol.

100 ml of a well mixed and acid preserved sample is placed in a 250 ml Griffin beaker with 2 ml of (1+1) HNO_3 and 10 ml of (1+1) HCl. The sample is covered and heated (and not boiled) on a hot plate until the volume is reduced to between 25 and 50 ml. The sample is the cooled, filtered (if necessary), and the volume is adjusted to 100 ml. After mixing the sample is ready for analysis.

Furnace AA digestion according to NYS DEC Contract Lab Protocol.

1 ml of (1+1) HNO_3 and 2 ml of 30% H_2O_2 is added to a 100 ml of a well mixed sample in a 250 ml Griffin beaker. The sample is covered and heated at 95°C (avoiding boiling) for 2 hours or until the volume is reduced to between 25 and 50 ml. The sample is then cooled, filtered (if necessary), and the volume is adjusted to 100 ml with distilled, deionized water. After mixing the sample is ready for analysis.

Concentrations of Spiked Metals in Liquid Samples

These are the concentrations of metals spiked into sample digestions according to the instructions on the preceeding pages. All concentrations are in µg/L (ppb).

Flame Digestion Spikes

Al 2,000; Ba 2,000; Be 50; Cd 50; Ca 100,000; Cr 200; Co 500; Cu 250; Fe 1,000; Pb 500; Mg 50,000; Mn 200; Ni 400; K 50,000; Ag 50; Na 100,000; Sn 200 (furnace AA), 400 (flame AA); V 500; Zn 200; Sb 50 (furnace AA)*

* If 2.0 ml of solution #3 is used for an adequate flame spike for Sn, the Sb concentration will be 100 µg/L.

Furnace Digestion Spikes

As 20; Cd 5; Pb 20; Se 10; Tl 50.

Spiking Solutions

Solution #3

Use 1.0 ml* per 100 ml of liquid sample to be spiked for Furnace AA / Flame digestion. Make up using 1,000 ppm standards.

~~Sb~~ To make up 100 ml of solution #3 in 1% HCl use

Sb 0.5 ml

Sn 2.0 ml Dilute to 100 ml with 1% HCl.

*If Sn is to be read on Flame AA use 2 ml of solution #3 per 100 ml of sample.

To spike the alkali + alkaline earth metals (groups IA + IIA) add ~~use~~ the following volumes of 1,000 ppm standards directly to 100 ml of a liquid sample for Flame AA / Flame digestion.

Na 10 ml

K 5 ml

Ca 10 ml

Mg 5 ml

Spiking Solutions

Solution #1

Use ~~5.0 ml~~ 5.0 ml per 100 ml of liquid sample to be spiked for Flame AA/Flame digestion

Make up using 1,000 ppm standards.

To make 100 ml of sol'n #1 in 1% HNO_3 use:

Al	4.0 ml	Cr	0.4 ml
Ba	4 ml	Co	1.0 ml
Be	0.1 ml	Cu	0.5 ml
Cd	0.1 ml	Fe	2.0 ml
Pb	~~1 ml~~ 1.0 ml	Mn	0.4 ml
Ni	0.8 ml	Ag	0.1 ml
V	~~1 ml~~ 1.0 ml	Zn	0.4 ml

dilute to 100 ml with 1% HNO_3

Solution #2

Use 0.5 ml per 100 ml of liquid sample to be spiked for Furnace AA/Furnace digestion. Make up using 1,000 ppm standards

To make 100 ml of sol'n #2 in 1% HNO_3 use:

As	0.4 ml
Cd	0.1 ml
Pb	0.4 ml
Se	0.2 ml
Tl	1.0 ml

dilute to 100 ml with 1% HNO_3

DATE	ANALYST	SAMPLE #	DIGESTION TYPE	INITIAL MASS	INITIAL VOLUME	DILUTION VOLUME (FINAL VOLUME)	SPIKE	REMARK
9/23/86	US	Soil 660533	Flame/ICP	1.0g		200		
9/23/86	US	Soil 660533	FURN	1.0g		200		
9/23/86	US	BLANK	Flame	100		200		
9/23/86	US	Blank	FURN	100		200		
9/23/86	US	660537 Soil 2	Flame/ICP	1.0g		200		
9/23/86	US	Soil 2 660537	FUR	1.0g		200		
9/23/86	US	Soil 1 660541	Flame/ICP	1.0g		200		
9/23/86	US	Soil 1 660541	FUR	1.0g		200		
9/23/86	US	Soil 1 660541	Flame/ICP	1.0g		200	deplicate	
9/23/86	US	Soil 1 660541	FUR	1.0g		200	deplicate	
9/23/86	US	Soil 1 660541	ICP/Flame	1.0g		200	YES	
9/23/86	US	Soil 1 660541	FUR	1.0g		200	YES	
9/23/86	US	Soil 2 660545	Flame/ICP	1.0		200		
9/23/86	US	Soil 2 660545	FUR	1.0		200		
9/23/86	US	Background Soil 3 650549	Flame/ICP	1.0		200		Berryo
9/23/86	US	Background Soil 3 650549	FUR	1.0		200		
9/23/86	US	SW-1 650553	Flame/ICP	100		100		
9/23/86	US	SW-1 650553	FUR	100		100		
9/23/86	US	SW-2 SW-2Q 650557	Flame/ICP	100		100		
9/23/86	US	SW-2 SW-2Q 650557	FUR	100		100		
9/23/86	US	SW-2 SW-2Q 650557	ICP/Flame	100		100	deplicate	
9/23/86	US	SW-2 SW-2Q 650557	FUR	100		100	deplicate	
9/23/86	US	SW-2 SW-2Q 650557	Flame/ICP	100		100	YES	
9/23/86	US	SW-2 SW-2Q 650557	FUR	100		100	YES	
9/23/86	US	Trip Blank 650561	Flame/ICP	100		100		
9/23/86	US	Trip Blank 650561	FUR	100		100		
9/23/86	US	Field Blank 650565	Flame	100		100		
9/23/86	US	[illegible]	FUR	100		100		

CALCULATIONS SOIL

9-30-86
JMH

DILUTION FACTOR =

$$\frac{.2\,l}{.001\,kg} \div \%TS \times \frac{mg}{l}\ \text{result} = \frac{mg}{kg}\ \text{dry wt.}$$

660 533	200 ÷	.56	=	357
537	200 ÷	.70	=	286
541	200 ÷	.59	=	339
545	200 ÷	.93	=	215
549	200 ÷	.90	=	222

All raw data for these # samples is before this calculation. Except Hg -

DATE 10/3/86

TEST CODE Se

ANALYST [illegible]

LAB NO.	RESULT
660533	< 3.6 mg/Kgm
537	< 1.4 mg/Kgm
541	4.1 mg/Kgm
545	1.7 mg/Kgm
549	~~[illegible]~~ < .2 mg/Kgm
553	< 5*
557	< 5*
561	< 5*
565	< 5*

Tray No. II Test Se Pg No. — Date 12/2/86
Analyst [illegible]

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	660549	8.0	RPD		.008 CD 910-53
2	dup 549	7.0	±5		.007
3	+10 549	3.5		35% recov	.0105 - .007 = .0035
4	553	<5	RPD NC		CD 910 SW1
5	dup 553	<5			
6	+10 553	9.0	90% recov		.009
7	Cal blank	<5			
8	dig blank	<5			
9	557	<5	RPD NC		CD 910 SW2/SW2R
10	dup 557	<5			
11	+10 557	10.0	100% rec		.01
12	557	<5	RPD NC		
13	dup 557	<5			
14	+10 557	10.0	100% rec		.01
15	561	<5	RPD NC		CD 910-TB
16	dup 561	<5			
17	+10 561	10.0	100% rec		.01
18	565	<5	RPD NC		CD 910-FB
19	dup 565	<5			
20	+10 565	11.5	115% rec		.0115
21	Cal blank	<5			
22	dig blank	<5			
23	EMSL WP386	23.0	92% rec	T.V. = 25	.023
24	659412	23.0			.023
25	660653	10.5x2 = 21.0	2		.0105
26	655	<10	2		
27	+10 557	10.0	digested	100% rec	.01
28					
29					
30					

Tray No. III Test Se Pg No. — Date 10/3/86
Analyst Williams

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	Blank				
2	2 *				
3	6				
4	10				
5	20				
6	40				
7	50				
8	70				
9	Calblank	<5			
10	Ext std	24.2	96.8% rec.	Tr. 25	.0242
11	digblank	<5			
12	660533	<10	2	RPD NC	CD 910 SED 1
13	dup 533	<10	2		
14	+10 533	8.0	2	80% rec	.008
15	549	<10	2	RPD NC	CD 910 53
16	dup 549	<10	2		
17	+10 549	5.5	2	55% rec	.0055
18	541		MSA.		
19	+5 541				
20	+10 541				
21	+20 541				
22	541				
23	+5 541				
24	+10 541				
25	+20 541				
26	545				
27	+5 545				
28	+10 545				
29	+20 545				
30	Calblank	<5			
31	digblank	<5			

~~[illegible] ÷ 2~~ Se 10/3/86

~~549 ÷ 2~~

M.S.A.

~~[illegible]~~

541	32	slope 21
+5	51	correlate .999
+10	65	y intercept 32.1
+20	101	x = 9.5

(I) dup

541	32	slope = 21
+5	49	correlation coeff. .987
+10	55	y intercept 31
+20	94	x = 10.2

(II)

541	28	slope 21
+5	38	r .99
+10	45	y int 2
+20	66	x = 14.8

545	25	slope 21
+5	38	corr. coeff. .999
+10	55	y intercept 24.2
+20	85	x = 8.0

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KEUFFEL & ESSER CO. MADE IN U.S.A.

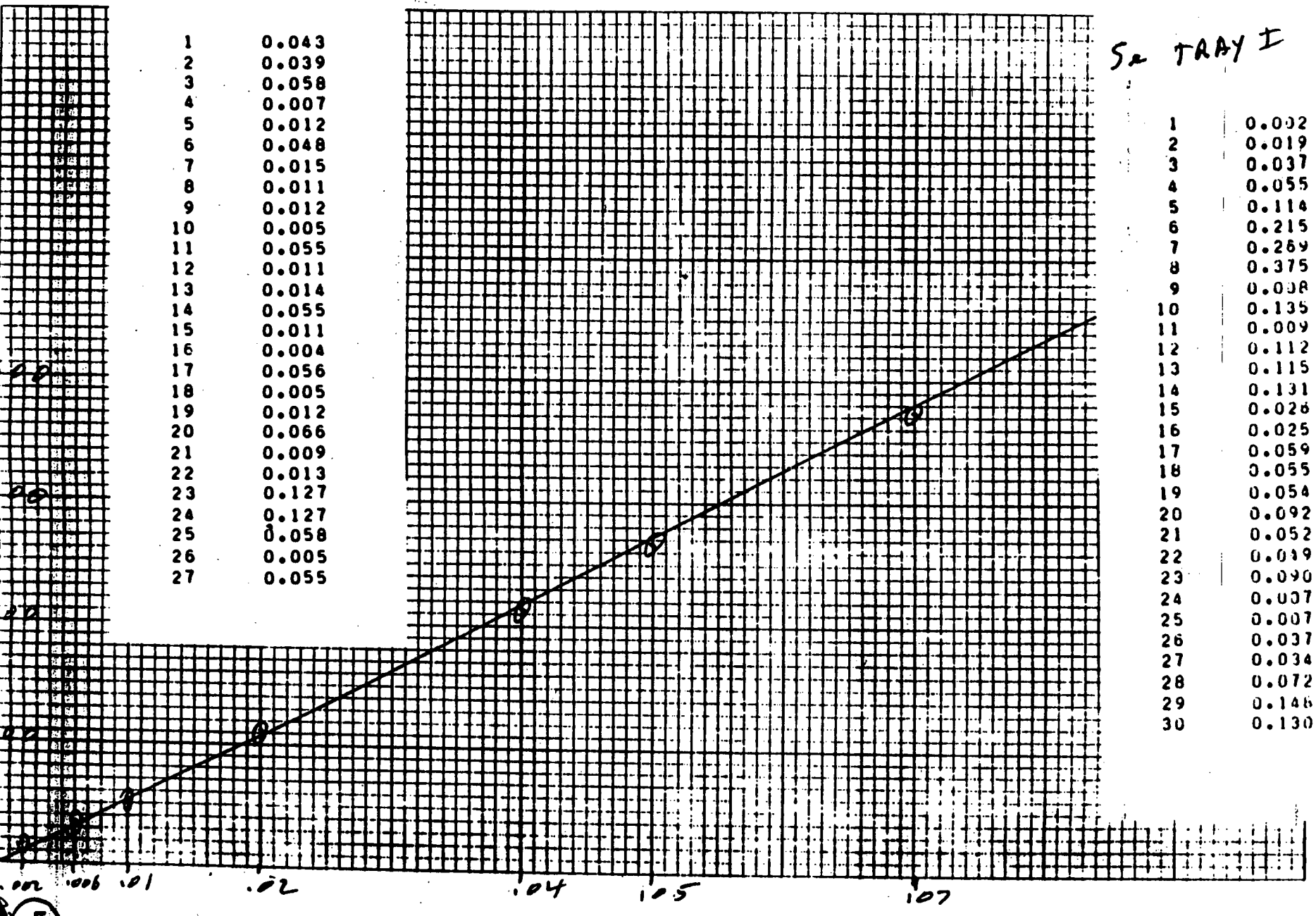
46 0700

Se 10/2/86

10/2/86

Se TRAY II

1	0.043
2	0.039
3	0.058
4	0.007
5	0.012
6	0.048
7	0.015
8	0.011
9	0.012
10	0.005
11	0.055
12	0.011
13	0.014
14	0.055
15	0.011
16	0.004
17	0.056
18	0.005
19	0.012
20	0.066
21	0.009
22	0.013
23	0.127
24	0.127
25	0.058
26	0.005
27	0.055



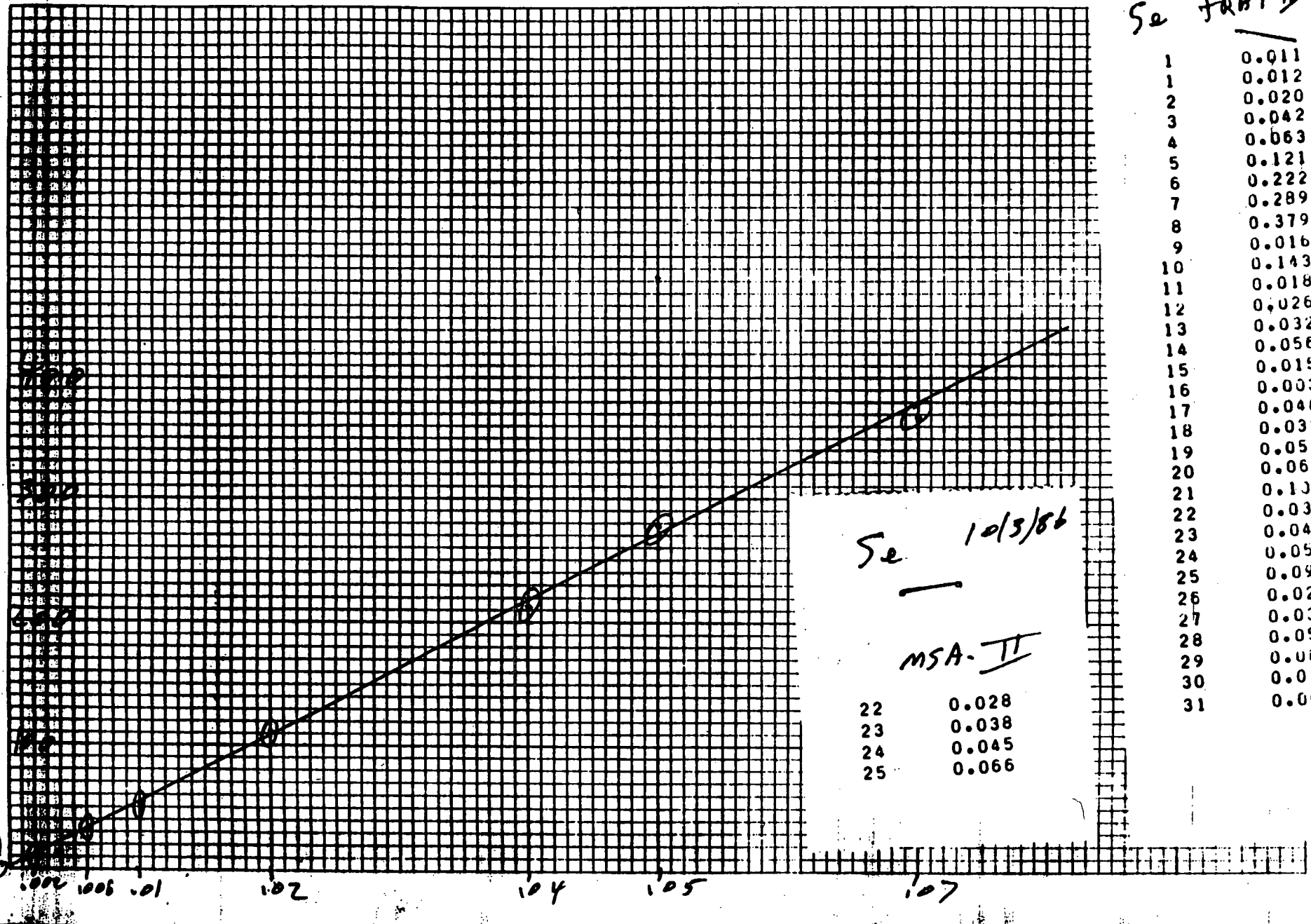
Se TRAY I

1	0.002
2	0.019
3	0.037
4	0.055
5	0.114
6	0.215
7	0.269
8	0.375
9	0.038
10	0.135
11	0.009
12	0.112
13	0.115
14	0.131
15	0.026
16	0.025
17	0.059
18	0.055
19	0.054
20	0.092
21	0.052
22	0.019
23	0.090
24	0.007
25	0.007
26	0.037
27	0.034
28	0.072
29	0.146
30	0.130

K+E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

Se

46 0700
10/3/86



Se 10/3/86

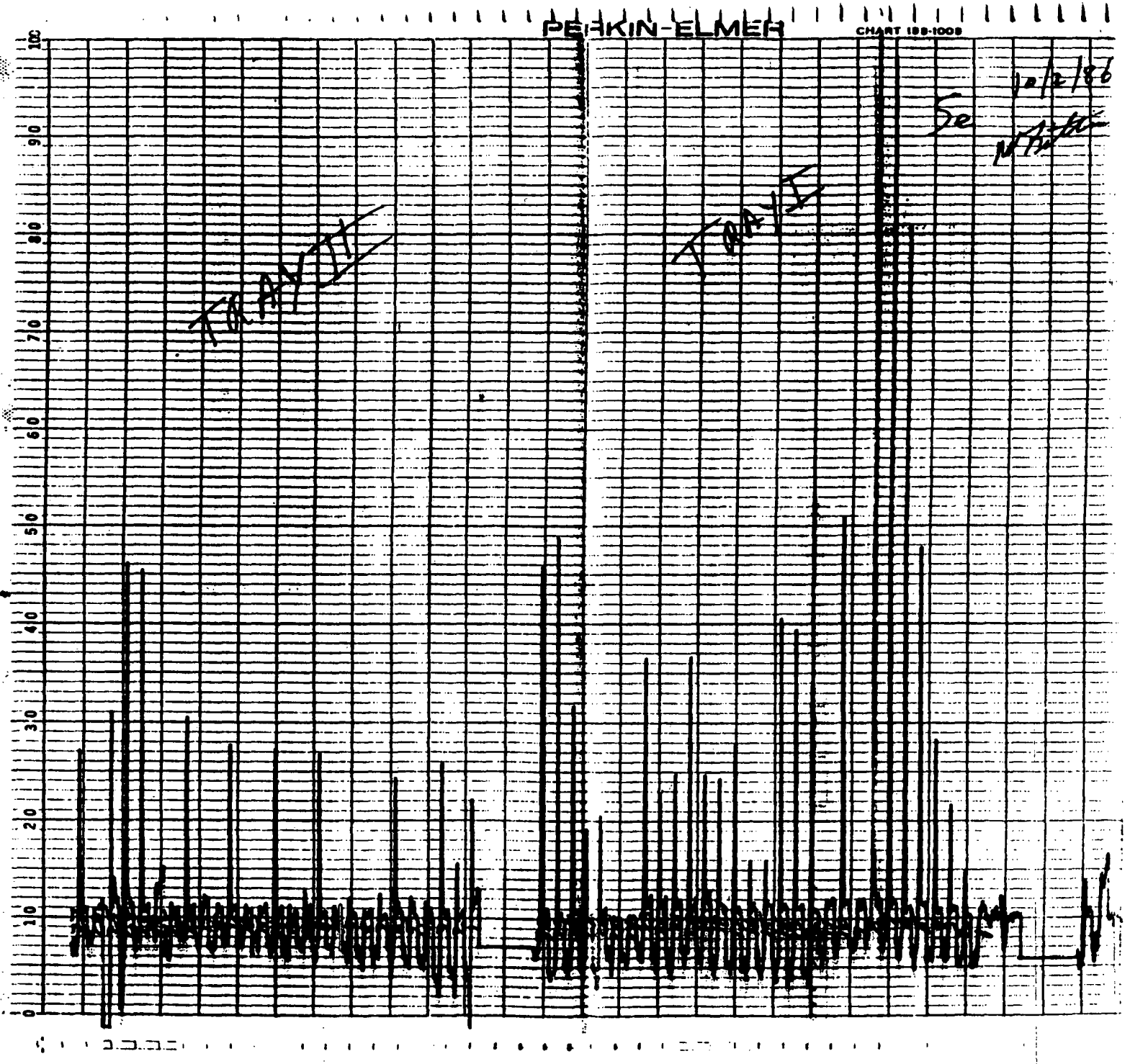
MSA-II

22	0.028
23	0.038
24	0.045
25	0.066

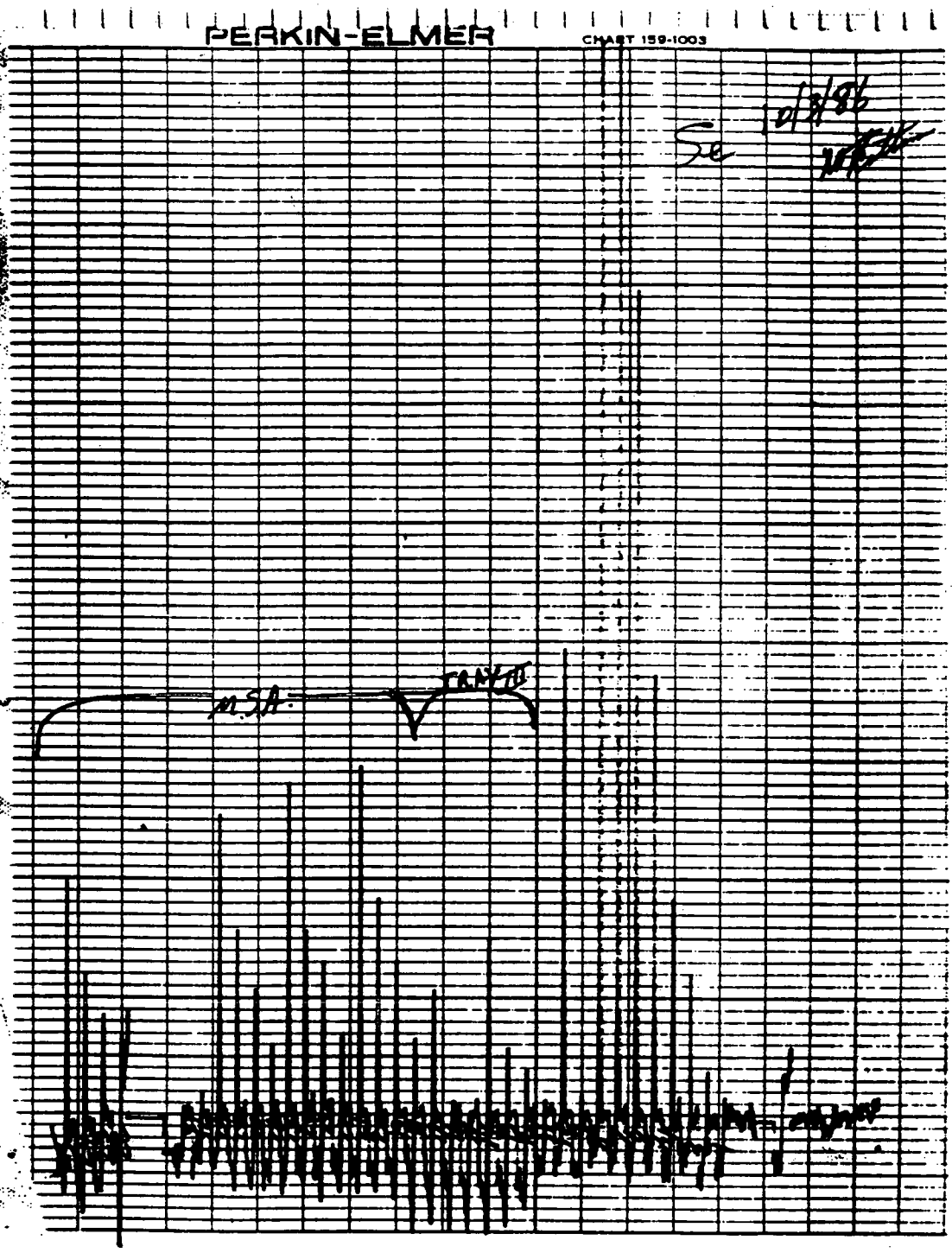
Se TRAY III

1	0.011
1	0.012
2	0.020
3	0.042
4	0.063
5	0.121
6	0.222
7	0.289
8	0.379
9	0.016
10	0.143
11	0.018
12	0.026
13	0.032
14	0.056
15	0.015
16	0.003
17	0.040
18	0.032
19	0.051
20	0.065
21	0.101
22	0.032
23	0.049
24	0.055
25	0.094
26	0.025
27	0.038
28	0.055
29	0.085
30	0.011
31	0.008

119


PERKIN-ELMER
CHART 195-1008
100
90
80
70
60
50
40
30
20
10
0
TRAYT
TRAYT
Se 10/2/86

020


PERKIN-ELMER
CHART 159-1003
Se
10/8/86
MSA
TANYO

2M

Pb

86

DATE 9-24-86

Absorbance of 20.0 Std.= .180

ANALYST JMH

S1-_____; S2-_____; S3-_____

Standards:

	Known Value	Reading
1)	.5	.5
2)	1.0	1.0
3)	2.0	2.0
4)	20.0	20.0
5)		

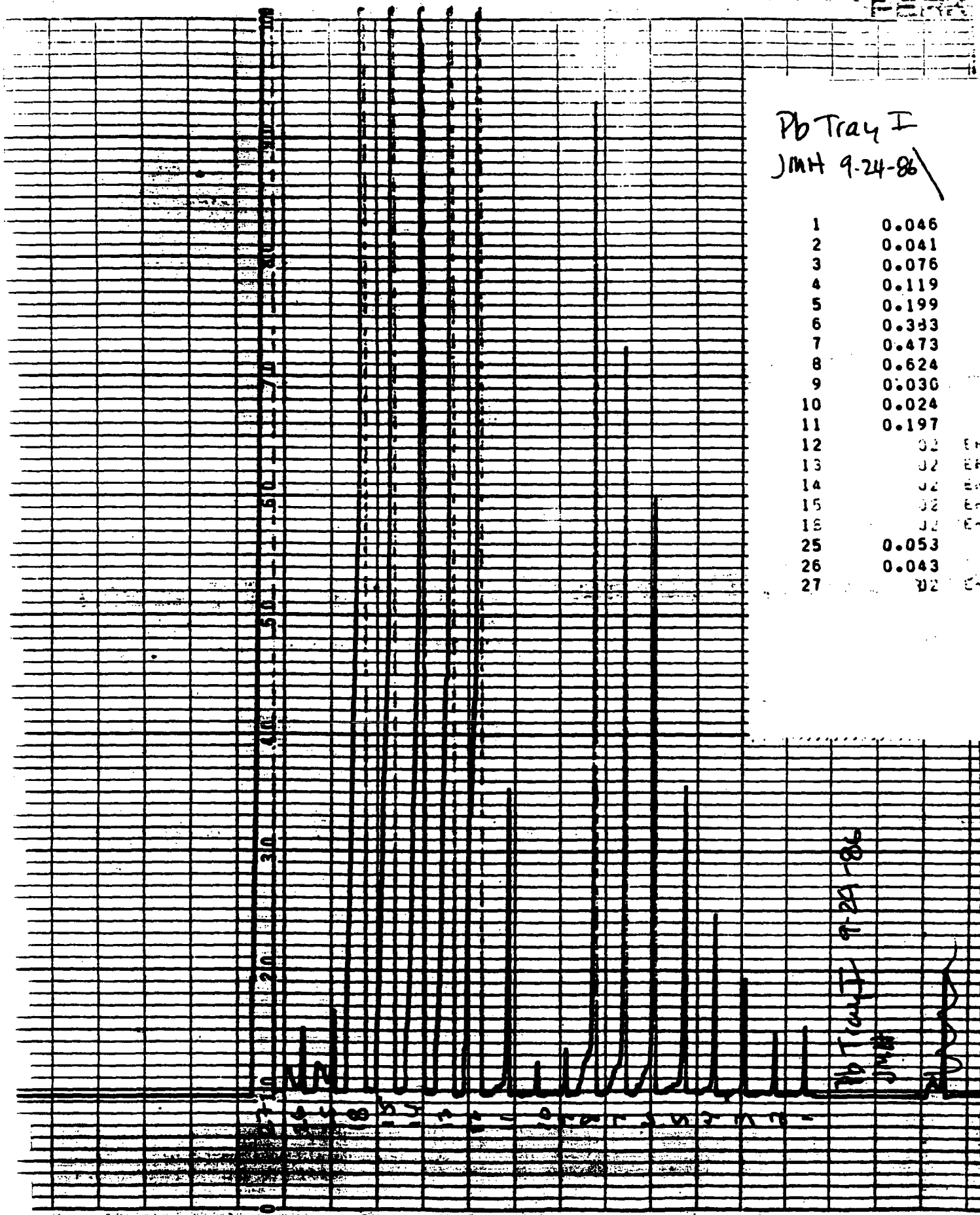
Lab No.	Duplicate	Spike	Spike Reading	% Recovery
660541	1.3 0% RPD	0.5 digs SPIKE	1.7	~~100~~% 80%

Lab No.	DEC ID Nº	D.I. FACTOR	INST. READING mg/L	RESULT ug/L *
CALIBRATION BLANK			<0.2	<200 *
METHOD BLANK			<0.2	<200 *
CALIBRATION VER. EMSL/KNOWN	ICAP-19 True value 1.01	2	1.00	1000 *
660533	CD910-SED1	200ml/1g x .9mg/l ÷ .56	0.9	321 mg/Kg
537	CD910-SED2	200ml/1g x .9mg ÷ .70	0.9	257 mg/Kg
541	CD910-S1	200ml/1g x 1.3mg ÷ .59	1.3	441
545	CD910-S2	200ml/1g x 2.7mg ÷ .93	2.7	581
549	CD910-S3	200ml/1g x 8.7mg ÷ .90	8.7	1930
				(DRY WEIGHT)
CALIBRATION BLANK			<0.2	<200 *
METHOD BLANK			<0.2	<200 *
CONTINUING CALIBRATION VERIFICATION	ICAP-19 TV 1.01 mg/l	2	1.00	1000 *

42d

Tray No. I Test Pb lyr — Date 9-24-86
Analyst JMH

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	blank				
2	2*				
3	6				
4	10				
5	20				
6	40				
7	50				
8	70				
9	BLANK	—			
10	DIG BLK	—			
11	EMSL	97.5*	(5) 19.5*	98% rec	WP386 TV100*
12	660 533	DILUTE			NJ DEP #
13	dup 533.	↓			CD 910 - SED 1
14	+10 533	↓			
15	660 537	DILUTE			
16	dup 537	↓			CD 910 - SED 2
17	+10 537	↓			
18	660 541	DILUTE			
19	dup 541	↓			
20	+10 541	↓			
21	660 541	↓			CD 910 - S1
22	dup 541	↓			
23	+10 541	↓			
24	+20 541	↓		digested	
25	CAL BLK	—			
26	DIG BLK	—			
27	660 545	DILUTE			
28	dup 545	↓			CD 910 - S2
29	+10 545	↓			
30					


Pb Tray I
JMH 9-24-86
1 0.046
2 0.041
3 0.076
4 0.119
5 0.199
6 0.383
7 0.473
8 0.624
9 0.030
10 0.024
11 0.197
25 0.053
26 0.043
0
10
20
30
40
50
60
70
80
90
100
N2
Pb Tray I 9-24-86

Tray No. II Test Pb Date 9-24-86
Analyst JMH

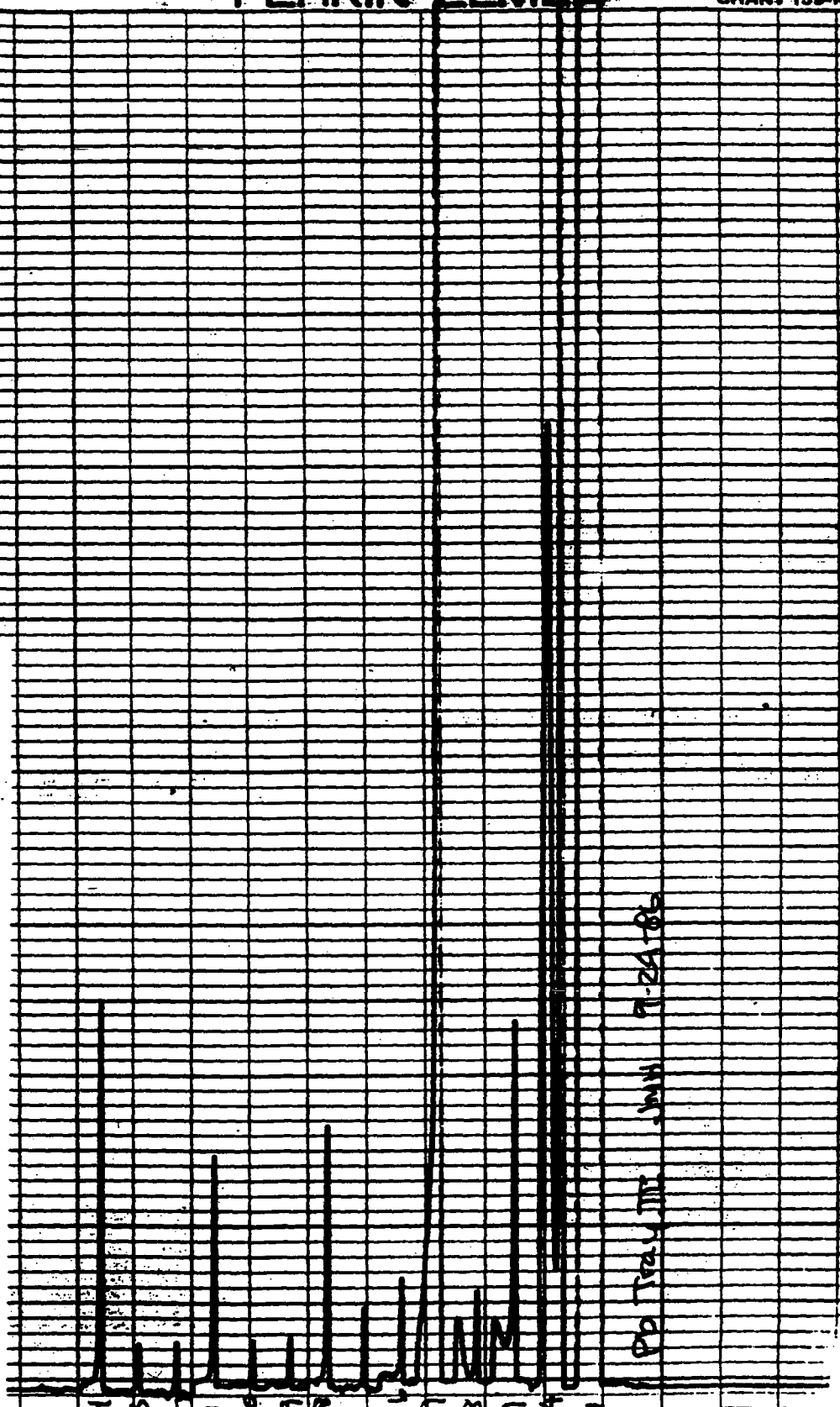
Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	660549	DILUTE			
2	dup 549	↓			CD 910-S3
3	+10 549	↓			
4	660553	DILUTE			
5	dup 553	(5x)			CD 910-SW1
6	+10 553	↓			
7	CAL BLK	—			
8	DIG BLK	—			
9	660557	DILUTE			
10	dup 557	(10x)			
11	+10 557				
12	+20 557			digested	CD 910 SW2 / SW2Q
13	660557				
14	dup 557				
15	+10 557	↓			
16	660561	<2.0*	RPD NC		
17	dup 561	<2.0*		OK	CD 910 - TB
18	+10 561	12.0*	120% rec		
19	660565	<2.0*	RPD NC		
20	dup 565	<2.0*		OK	CD 910 - FB
21	+10 565	10.5*	105% rec		
22	CAL BLK	—			
23	DIG BLK	—			
24	EMSL	100*	(5) 20.0*	100% rec	WP386 TV 100*
25					
26					
27					
28					
29					
30					

PERKIN-ELMER

CHART 159-1012

Pb Tray II
JMH 9-24-86

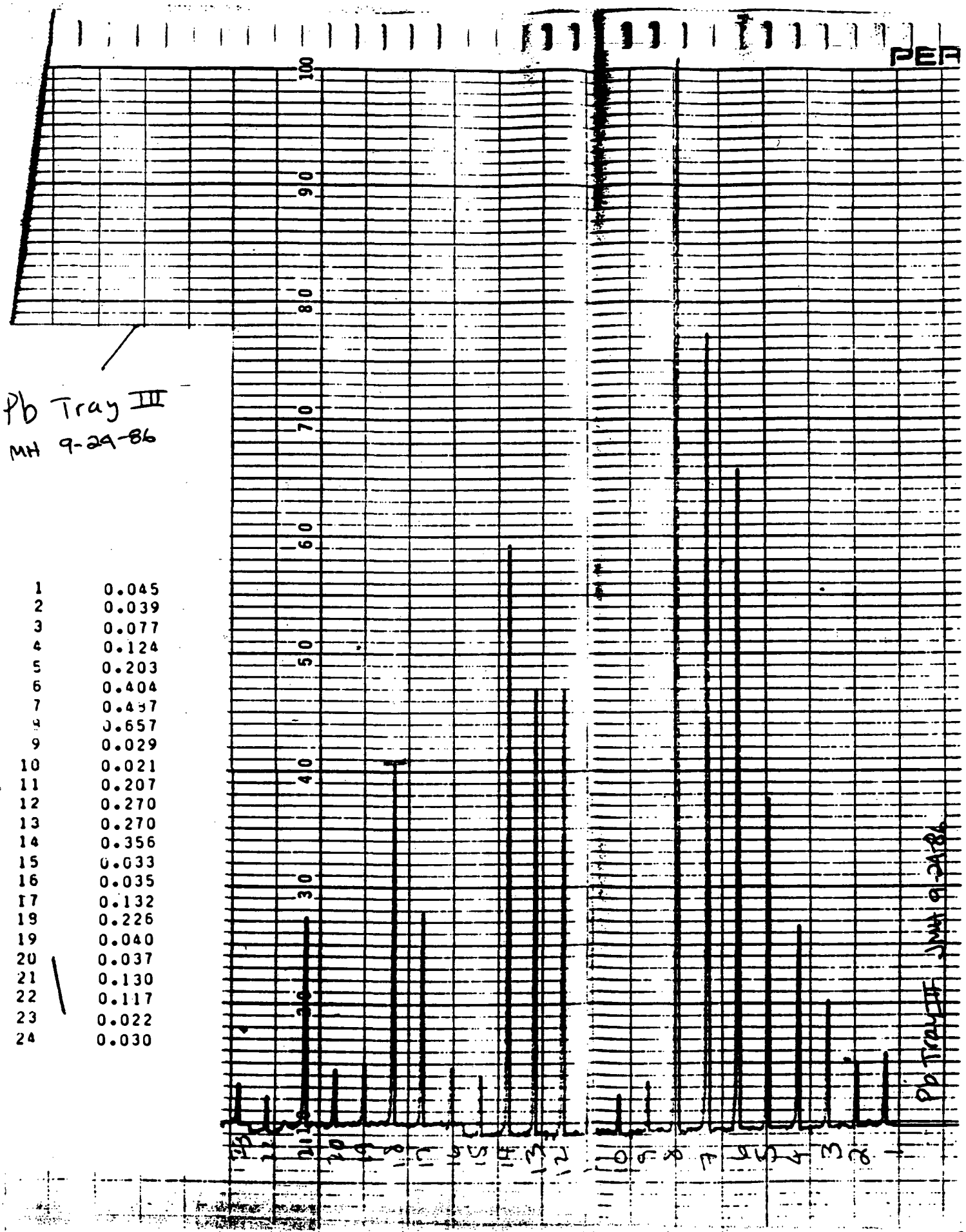
1	02	ER
4	0.898	
7	0.183	
8	0.048	
9	1.630	
16	0.056	
17	0.043	
18	0.133	
19	0.025	
20	0.026	
21	0.119	
22	0.025	
23	0.023	
24	0.198	
~~25~~	~~0.000~~	



Tray No. III Test Pb Date 9-24-86

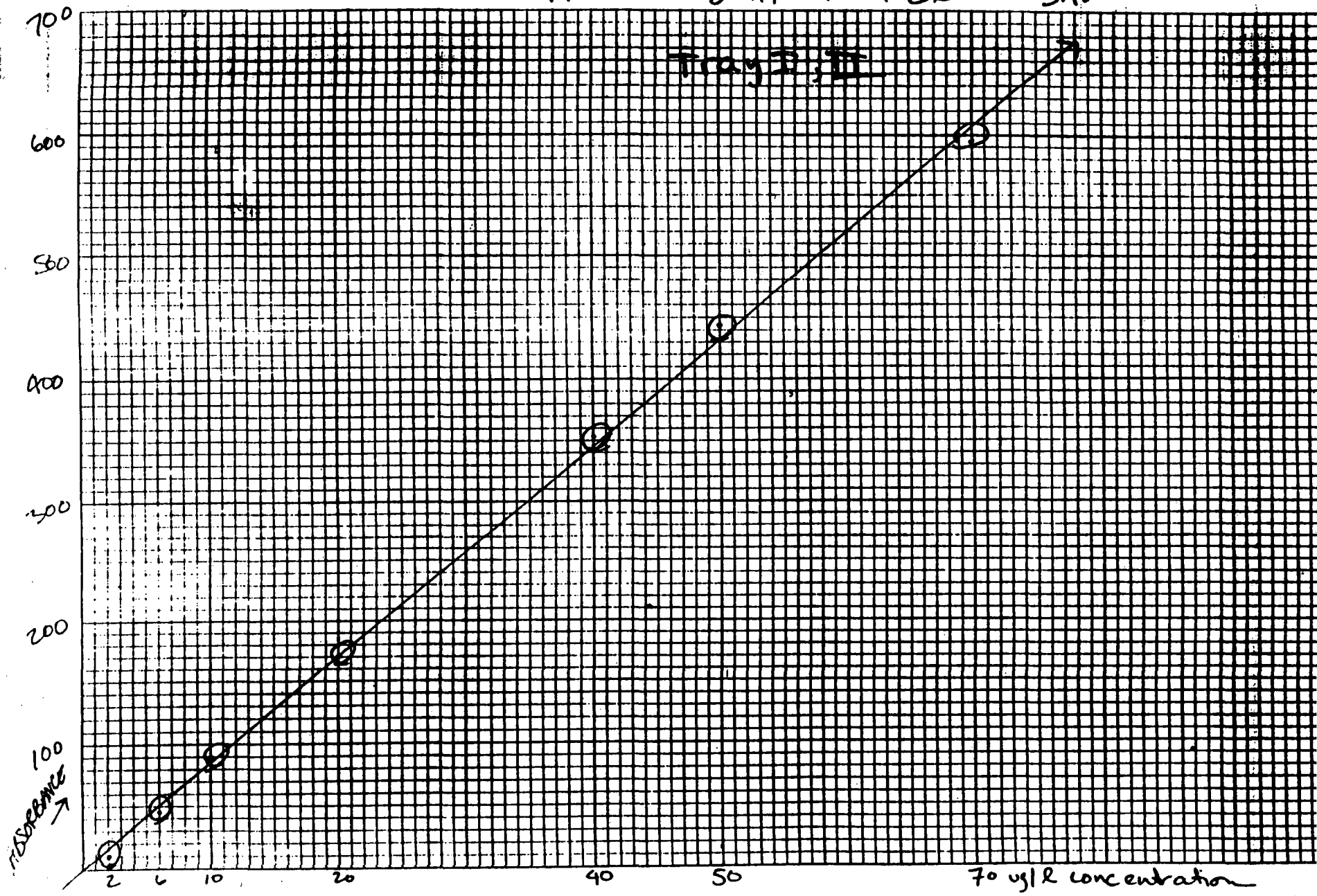
Analyst JMH

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	blank				
2	2*				
3	6				
4	10				
5	20				
6	40				
7	50				
8	70				
9	CALBLK	—			
10	DIGBLK	—			
11	WP386	100.0*	(5) 20.0*	100% rec	TV 100*
12	660553	135.0*	(5) 27.0*	0% RPD	
13	dup 553	135.0*	(5) 27.0*		CD 910-SW1
14	+10 553	36.5*	(5) 36.5*	95% rec	
15	660 557	<20.0*	(10) <2.0*	RPD NC	
16	dup 557	<20.0*	<2.0*		
17	+10 557	11.5*	11.5*	115% rec	
18	+20 557	22.0*	22.0*	~~[illegible]~~ 110% rec	see case notes CD 910 SW2/SW2Q
19	660 557	<20.0*	<2.0*		
20	dup 557	<20.0*	<2.0*		
21	+10 557	11.0*		110% rec	
22	CAL BLK	—			
23	DIG BLK	—			
24					
25					
26					
27					
28					
29					
30					



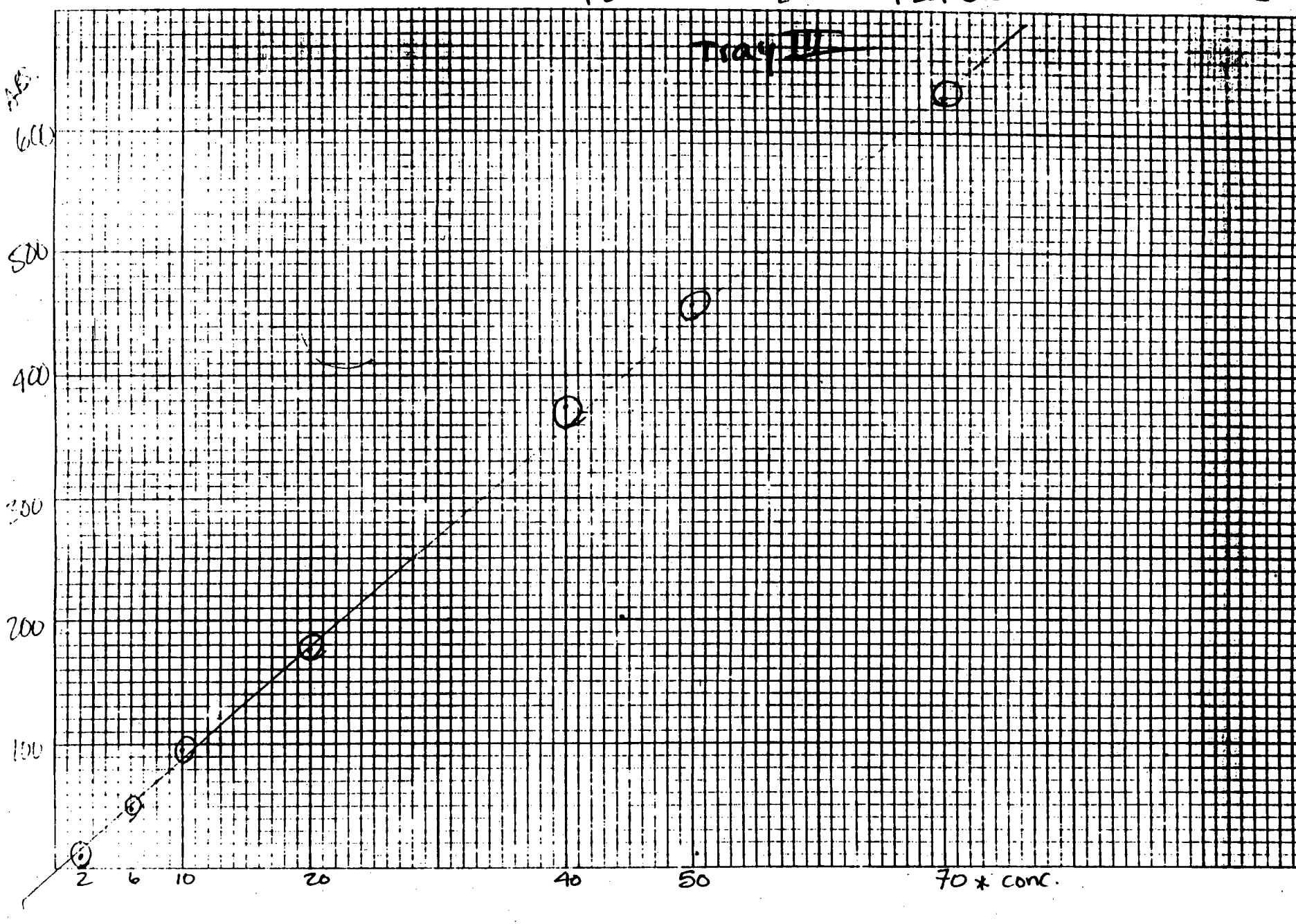
1	0.045
2	0.039
3	0.077
4	0.124
5	0.203
6	0.404
7	0.457
8	0.657
9	0.029
10	0.021
11	0.207
12	0.270
13	0.270
14	0.356
15	0.033
16	0.035
17	0.132
18	0.226
19	0.040
20	0.037
21	0.130
22	0.117
23	0.022
24	0.030

Pb JMH 9-24-86 SMV



K+E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.
46 0700

✓ Pb JMH 9-24-86



K+E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.
46 0700

DATE 9-30-86

TEST CODE TI

ANALYST JMH

LAB NO.	RESULT
6610533	<3.6 mg/kg
537	<2.9
541	<3.4
545	<2.2
549	<2.2
553	<10 *
557	
561	
565	

Sir can I have these back after you have got into copy today?

Tray No. I Test Tl Pg No. — Date 9/25/8.
Analyst [illegible]

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	Blank				
2	2 *				
3	6				
4	10				
5	20				
6	90				
7	50				
8	70				
9	Calblank	<10			
10	Ensl Tgt 2CAP	1020	100	T.V. 1040	.0102 x100 = 1.02 99% rec
11	Dig blank	<10			
12	660533	<10	RPDNC		CD 910 5ED1
13	dup 533	<10			
14	+20 533	19.5	97.5% rec		.0195
15	537	<10	RPDNC		CD 910-5ED2
16	dup 537	<10			
17	+20 537	16.5	82.5% rec		.0165
18	541	<10	RPDNC		CD 910-51
19	dup 541	<10			
20	+20 541	19.0	95% rec		.019
21	541	<10	RPDNC		CD 910-51
22	dup 541	<10			
23	+20 541	18.0	90% rec		.018
24	+50 541	36.0	digested	72% rec	.036
25	Calblank	<10			
26	dig blank	<10			
27	545	<10	RPDNC		CD 910-52
28	dup 545	<10			
29	+20 545	16.0	80% rec		.016
30					

Tray No. II Test T1 Date 9/25/86
Analyst [illegible]

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	660549	<10	RPD NC		CD 910-53
2	dup 549	<10			
3	+20549	15.0	75% rec		.015
4	553	<10	RPD NC		CD 910-SW1
5	dup 553	<10			
6	+20553	15.0	75% rec		.015
7	Cal blank	<10			
8	dig blank	<10			
9	557	<10	RPD NC		CD 910 SW2/SW2A
10	dup 557	<10			
11	+20557	14.0	70% rec		.014
12	+50 557	33.0	digested	66% rec	.033
13	557	<10	RPD NC		
14	dup 557	<10			
15	+20557	14.0	70% rec		.014
16	561	<10	RPD NC		CD 910-TB
17	dup 561	<10			
18	+20561	20.0	100% rec		.020
19	565	<10	RPD NC		CD 910-FB
20	dup 565	<10			
21	+20565	20.0	100% rec		.02
22	Cal blank	<10			
23	dig blank	<10			
24	Ecol ICAP 19	1030	100	Tn 1010	.0103 x 100 = 1.03 101% rec
25					
26					
27					
28					
29					
30					

Tl TRAY II

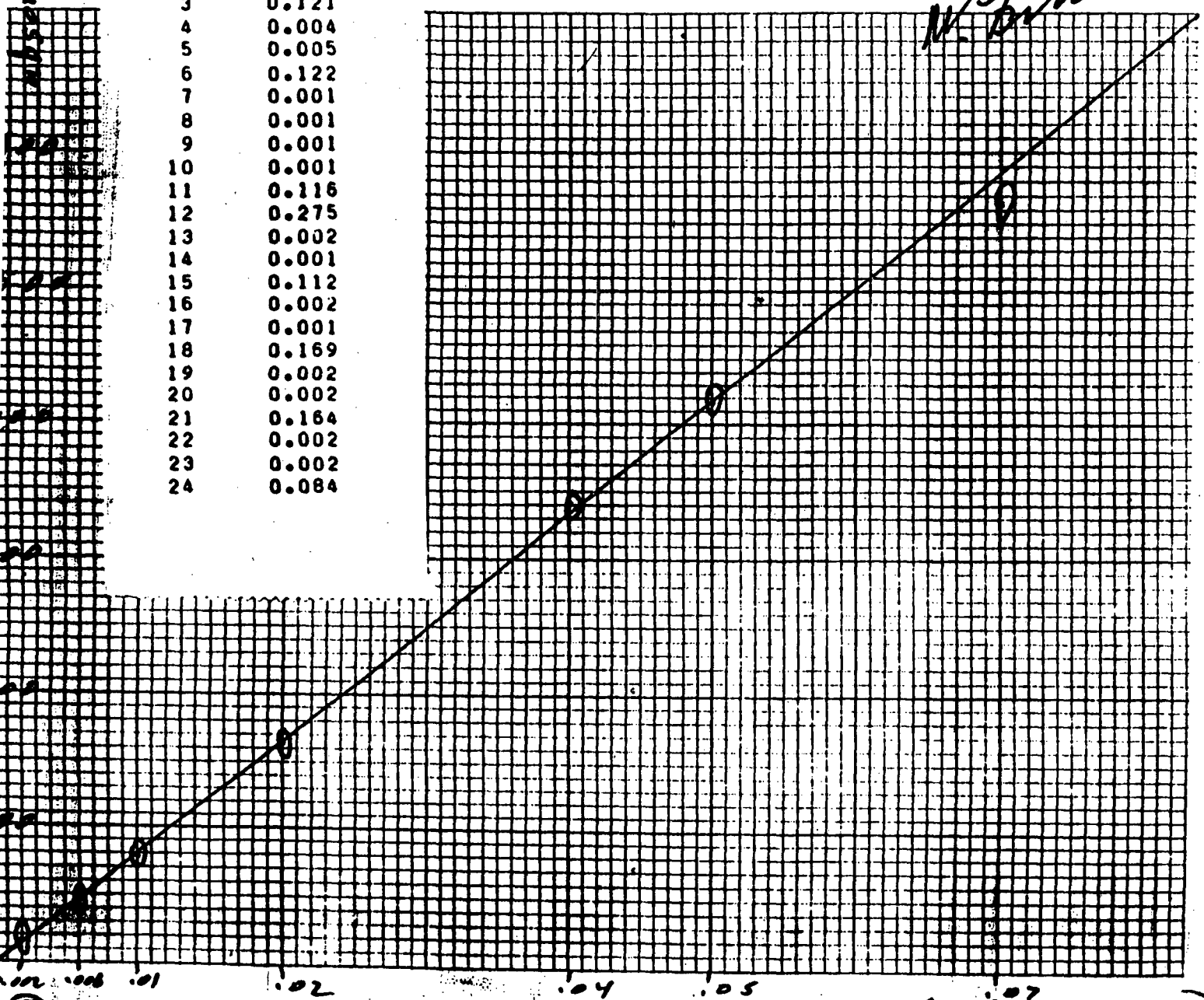
TO THE INCH • 7 X 10 INCHES
A. EBBER CO. MADE IN U.S.A.

Tl

46 0700

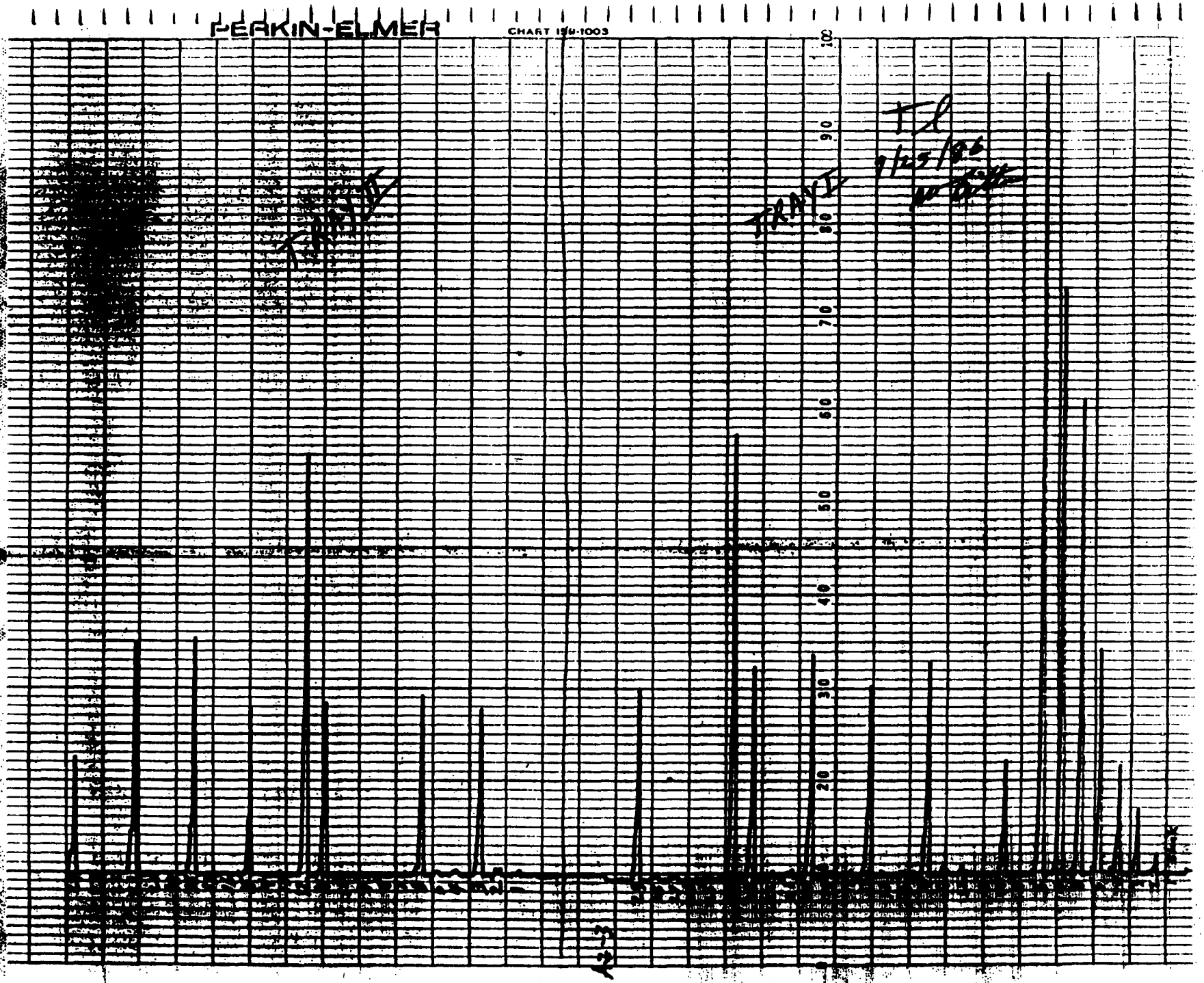
9/25/86
W. Ritter

1	0.005
2	0.007
3	0.121
4	0.004
5	0.005
6	0.122
7	0.001
8	0.001
9	0.001
10	0.001
11	0.116
12	0.275
13	0.002
14	0.001
15	0.112
16	0.002
17	0.001
18	0.169
19	0.002
20	0.002
21	0.164
22	0.002
23	0.002
24	0.084



Tl TRAY I

1	0.001
2	0.017
3	0.048
4	0.090
5	0.165
6	0.342
7	0.418
8	0.565
9	0.001
10	0.083
11	0.001
12	0.009
13	0.008
14	0.161
15	0.003
16	0.003
17	0.135
18	0.005
19	0.004
20	0.158
21	0.006
22	0.005
23	0.150
24	0.303
25	-0.001
26	-0.002
27	0.004
28	0.005
29	0.131


PERKIN-ELMER
CHART 1SU-1003
10
20
30
40
50
60
70
80
90
100

DATE 9-30-86

TEST CODE AS ANALYST JMH

LAB NO.	RESULT
6600533	64.3 ug/kg
537	13.2
541	30.8
545	15.9
549	26.2
553	11.8 *
557	<10.0 *
561	<10.0 *
565	<10.0 *

Tray No. I Test As Pg No. — Date 9/30/86
Analyst [illegible]

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	Blank				
2	2 *				
3	6				
4	10				
5	20				
6	40				
7	50				
8	70				
9	Calblank				
10	EMSL WP 386	101	5	T.V.=100	.0202 RSD 101
11	Digblank				
12	660533				CD910SED1
13	dup 533				
14	+20 533		All samples over Calibration Must be diluted		
15	537				CD910-5ED2
16	dup 537				
17	+20 537				
18	541				CD910-51
19	dup 541				
20	+20 541				
21	541				CD910-51
22	dup 541				
23	+20 541				
24	+20 541		digested		
25	Calblank				
26	digblank				
27	545				CD910-52
28	dup 545				
29	+20 545				
30					

TRAY 2 row A5 date 9/30/86

Analyst [illegible]

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	660549		over conc dilute		CD 910-53
2	dup549				
3	+20 549				
4	553	10.5	RPD=21.3	1/20 *	CD 910-SW1 .0105
5	dup 553	13.0			.013
6	+20553	28.5	90% rec		.0285-.005=.018
7	Calblank	<10			
8	digblank	<10			
9	557	<10	RPDNC		CD 910SW2/SW2Q
10	dup 557	<10			.002
11	+20557	19.5	97.5% rec		.0215-.002=.0195
12	+20557	22	digested	112%	
13	557	<10	RPDNC		
14	dup 557	<10			≈.002
15	+20 557	19.0	95% rec		.021-.002=.019
16	561	<10	RPDNC		CD 910-TB
17	dup561	<10			
18	+20561	20	100% rec		.02
19	565	<10			CD 910-FB
20	dup565	<10			
21	+20565	21.5	107% rec		.0215
22	Calblank	<10			
23	digblank	<10			
24	Ensl std	97.5	5	Tr.=100	.0195X5=.0975 97.5% rec
25	659412		dilute		
26	660653		20		.022 x20 = .44
27	655		20		.013 x20 = .26
28	~~471~~				
29	~~472~~				
30	~~17~~				

** [illegible]

Tray No. III Test As Hg No. — Date 9/30/80
Analyst [illegible]

Cap	Lab No.	Result**	dil. fact.	abs.	notes
1	660533	14.0	5	44.4% RPD*	.028 x 5 = .14 CD910SED1
2	dup 533	22.0	5		.044 x 5 = .22
3	+20 533	17.0	5	85% recov.	.061 - .044 = .017 .061 x 5 = .305
4	537	47.5	5	5.9% RPD	.0095 x 5 = .0475 CD910SED2
5	dup 537	45.0	5		.009 x 5 = .095
6	+20 537	17.0	5	85% recov	.026 - .009 = .017 .0485 = .17
7	541	90.0 (91.3)	5	RPD = 2.7%	.018 x 5 = .09 CD910S1
8	dup 541	92.5	5		.0185 x 5 = .0925
9	+20 541	18.0	5	90% recov	.036 - .018 = .018
10	541	100.0 (99.3)	5	16.2% RPD	.02 x 5 = .100 CD910S1
11	dup 541	85.0	5		.017 x 5 = .085
12	+20 541	17.0	5	85% recov.	.034 - .017 = .017
13	+20 541	15.0	digested ÷ 5	75% recov.	.021 x 5 = .105 - .09 = .015
14	Cal blank	<10			
15	dig blank	<10			
16	545	70.0	.5	10.1% RPD	.014 x 5 = .07 CD910S2
17	dup 545	77.5	5		.0155 x 5 = .0775
18	+20 545		5	95% recov.	.033 - .014 = .017
19	549	120.0	5	0.9% RPD	.024 x 5 = .12 CD91053
20	dup 549	115.0	5		.023 x 5 = .115
21	+20 549		5	85% recov	.040 - .023 = .017
22	EPA std 386	97.5	5	97.5% recov	.0195 x 5 = .0975 T.K. 100
23	659470	40.0	10		.004 x 10 = .04
24					
25					
26					
27					
28					
29					
30					

8 TO THE INCH • 7 X 10 INCHES
E. & ERBEN CO. MADE IN U.S.A.
46 0700

As

Abs.

As TRAY I

1	0.030
2	0.039
3	0.071
4	0.120
5	0.213
6	0.372
7	0.450
8	0.612
9	0.036
10	0.201
11	0.038
12	0.965
15	0.565
18	1.176
25	0.037
26	0.035
27	0.671

As TRAY 2

1	0.762
4	0.118
5	0.141
6	0.272
7	0.031
8	0.029
9	0.044
10	0.046
11	0.212
12	0.214
13	0.048
14	0.054
15	0.209
16	0.025
17	0.027
18	0.199
19	0.025
20	0.029
21	0.206
22	0.027
23	0.030
24	0.194
25	0.717
26	0.215
27	0.137

As TRAY III

1	0.263
2	0.400
3	0.538
4	0.100
5	0.098
6	0.242
7	0.173
8	0.180
9	0.325
10	0.191
11	0.166
12	0.311
13	0.202
14	0.025
15	0.029
16	0.142
17	0.153
18	0.302
19	0.229
20	0.218
21	0.354
22	0.190

.90
.80
.70
.60
.50
.40
.30
.20
.10

.001 .006 .01 .02 .04 .05 .07

mg/l As →

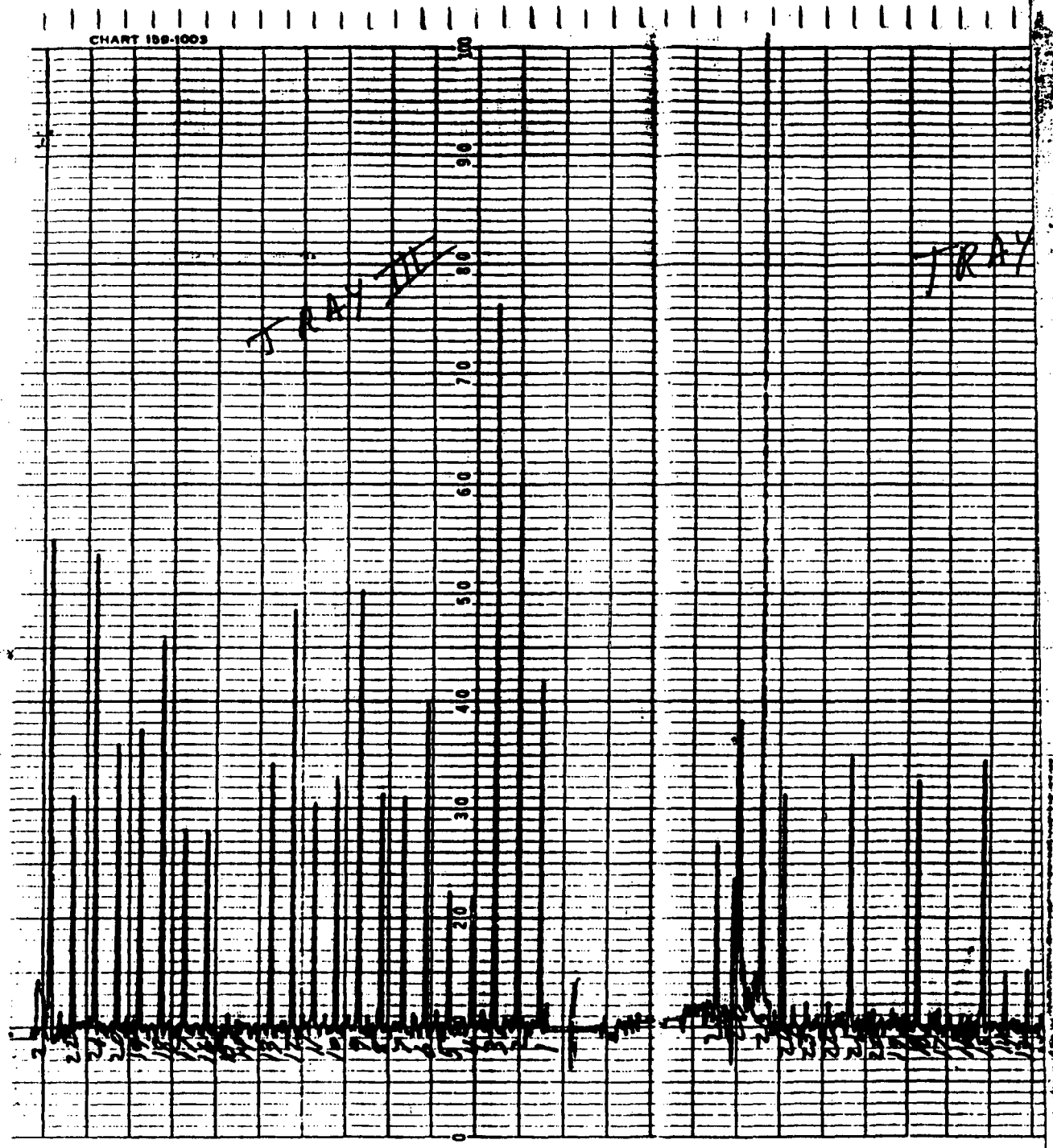


CHART 189-1003
100
90
80
70
60
50
40
30
20
0
TRAY III
TRAY

Tray No. _____ Test Hg Pg ___ Date 10/6/86

Analyst JMH

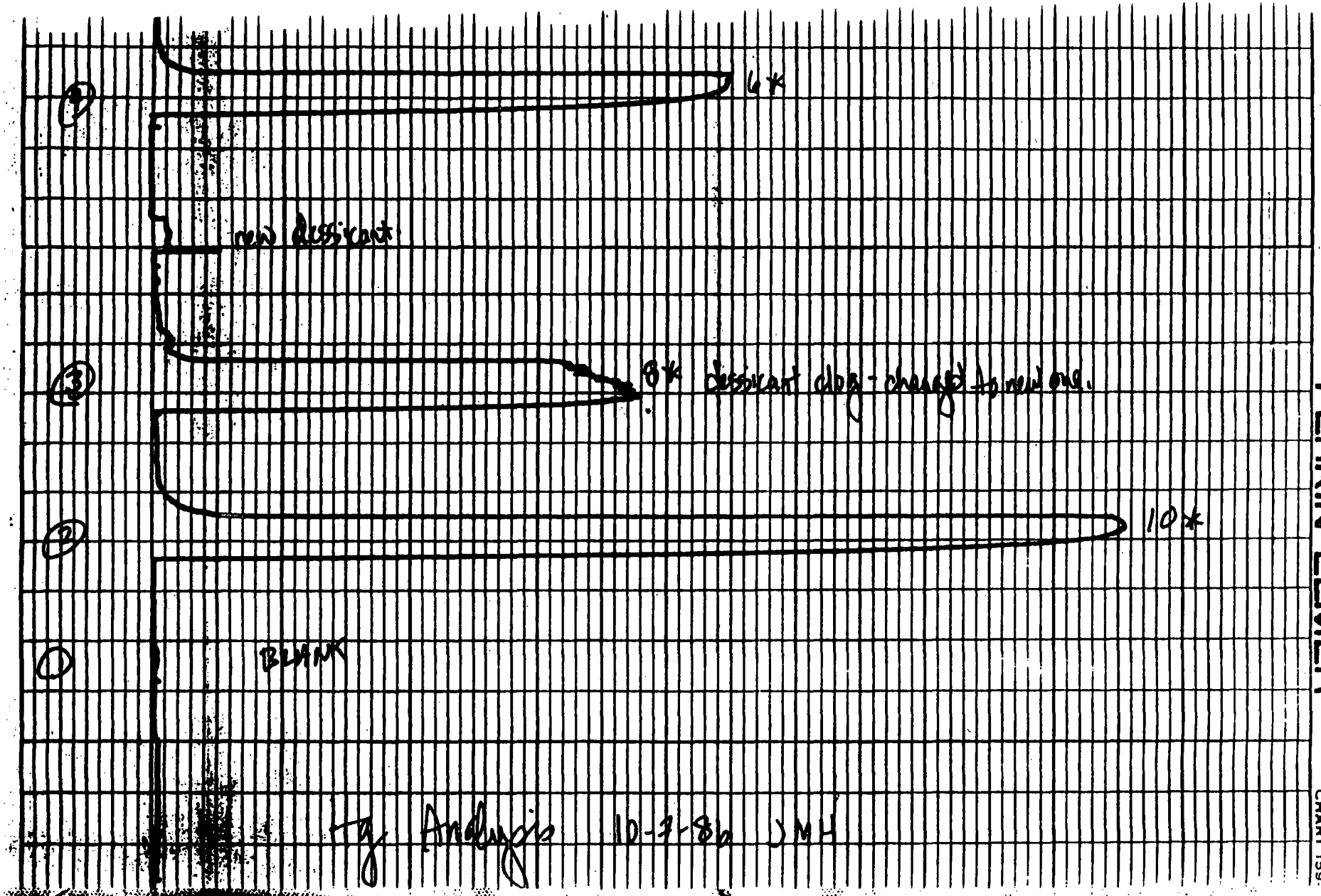
Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	Blank				
2	10 *				
3	8				
4	6			calculations	ug/g ÷ %TS = mg/kg drg
5	4				
6	2				
7	1				
8	.2 *				
9	Blank	<0.2 *			
10	WP386	4.8 *	96% rec		TV 5.0 *
11	660 541	.88 mg/kg	.26g .135 *	82% RPD	.135/.26 ÷ .15/.4 = .88 mg/kg
12	dup 541	2.1 mg/kg	.25g .310 *		CD910-31 .31/.15 ÷ .59 = 2.1
13	tl 541	[illegible]	.36g .310 *		.31/.36 ÷ .59 = 1.46
14	660 545	1.0 mg/kg	.31g .30 *	.3/.31 ÷ .85 1.04	CD910-52
15	660 549	1.4 mg/kg	.43g .53 *	.53/.43 ÷ .90 1.37	CD910-53
16	660 743	.29 mg/kg	.55g .03 *	[illegible]	EEI } 29% RPD
17	dup 743	.39 mg/kg	.40g .03 *	.03/	
18	tl 743	50% [illegible]	.20g .06 *	Flag with N	
19	661 343	<0.2 *			
20	661 344	<0.2 *			
21	BLANK	<0.2 *			TV 5.0 *
22	WP386	4.8	96% rec		
23	661 345	<0.2 *			EEI
24	346	0.4 *			
25	356	2.0 *	(2) 1.0 *		
26	357	2.6 *	1.3 *		
27	358	0.4 *	0.2 *		
28	359	0.4 *	0.2 *		
29	365	3.2 *			
30	661 366	<0.2 *	RPD NC		
30A	dup 366	<0.2 *			
30B	660 744	2.0 *			

Test Hg Hg Date 10-6-86

Analyst JMH

	Result**	dil. fact.	abs.	notes
[illegible]t	0.8*	80% rec		EEI
[illegible]K	<0.2*			
[illegible]	4.9*	98% rec		TV 5.0* EMSL

1	0.001
2	0.380
3	0.188
4	0.228
5	0.131
6	0.089
7	0.037
8	0.011
9	0.004
10	0.188
11	0.057
12	0.123
13	0.124
14	0.120
15	0.206
16	0.019
17	0.017
18	0.029
19	0.015
20	0.008
21	3.006
22	0.191
23	0.013
24	0.023
25	0.045
26	0.056
27	0.016
28	0.015
29	0.131
30	0.008
30A	0.008
30B	0.084
31	0.040
32	0.007
33	0.193


4
6*
new dessicant
3
8* dessicant clog - changed to new one.
2
10*
1
BLANK
Hg Analysis 10-7-86 JMH
PERKIN-ELMER
CHART 159

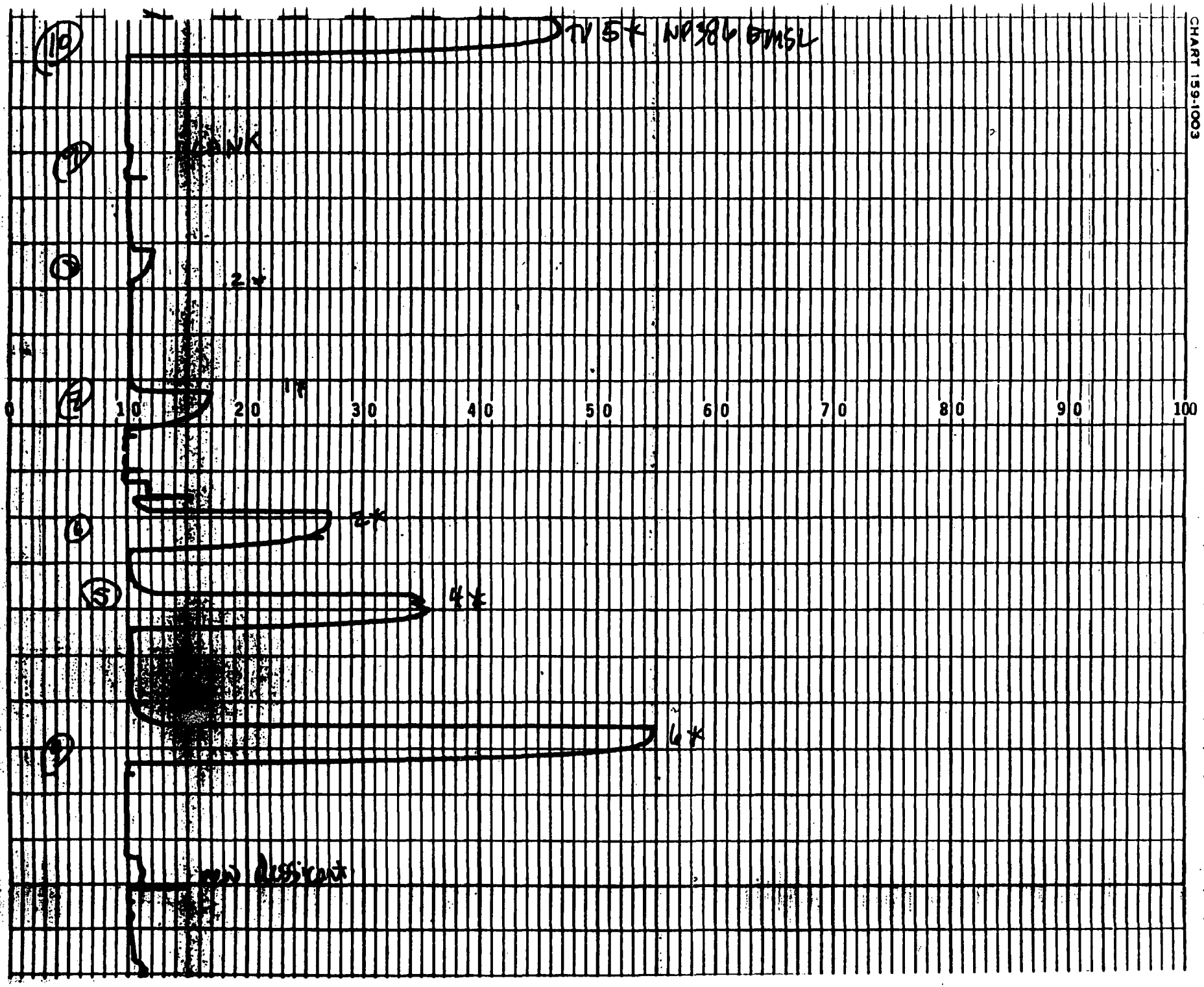
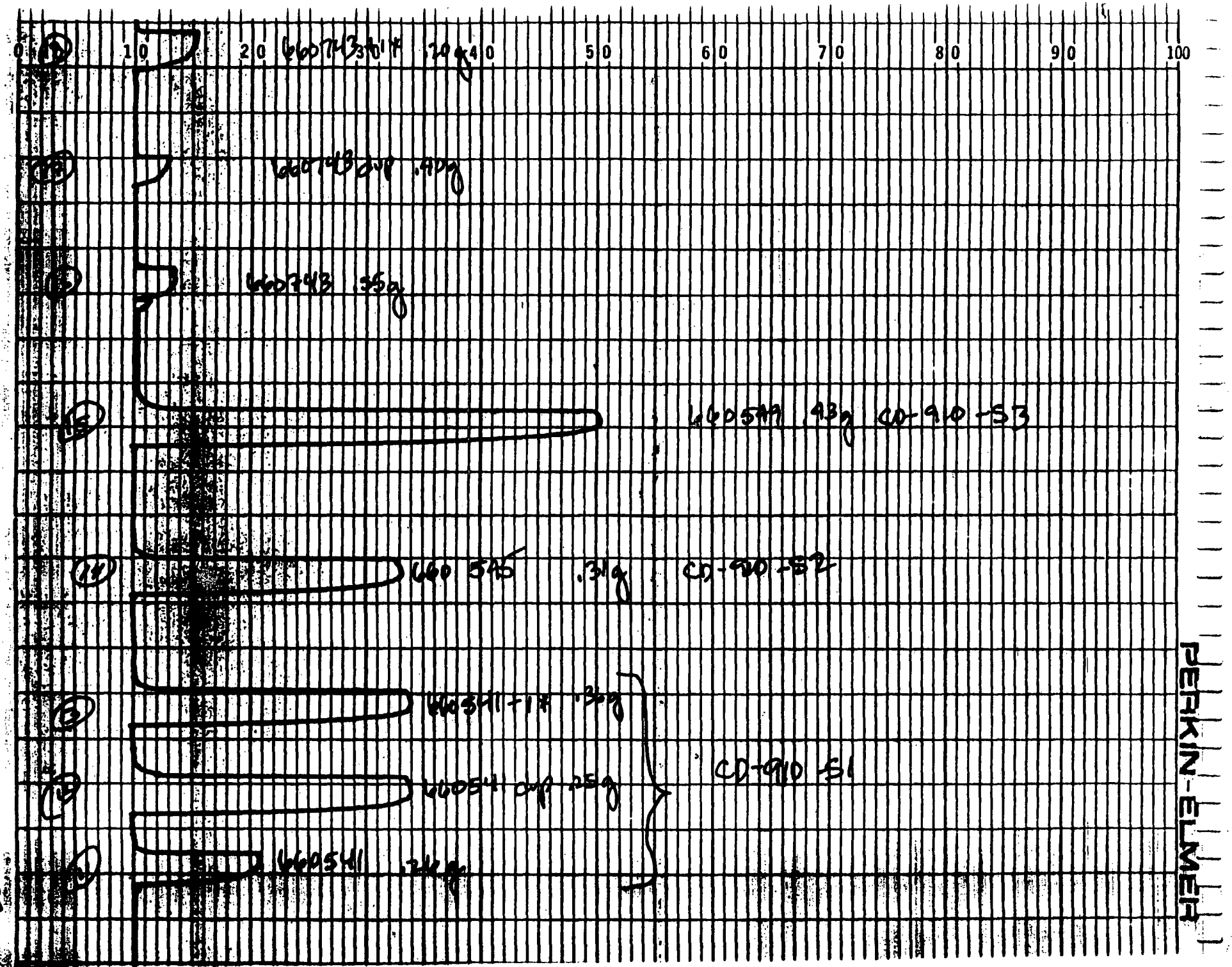
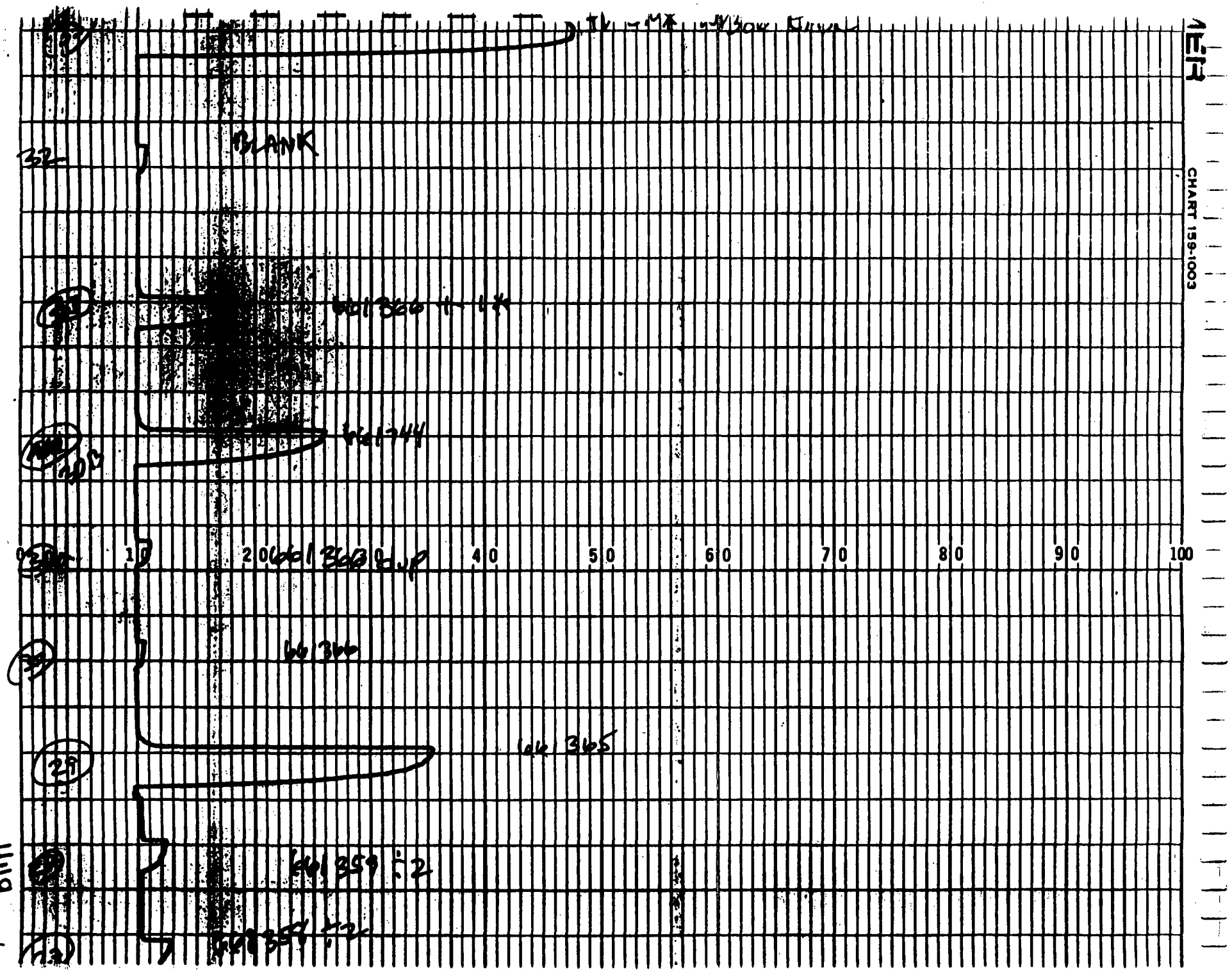


CHART 159-1003
0
10
20
30
40
50
60
70
80
90
100
2*
4*
6*


0
10
20
30
40
50
60
70
80
90
100
660743 .35g
660549 .43g CD-910-53
660546 .31g CD-910-52
660541 .25g
CD-910-51
PERKIN-ELMER

N-ELMER
CHART 159-1003
661345
BLANK
661344
661343


BLANK
661366 11-14
661344
661368 dup
66 366
66 365
661359 ÷2
661359 ÷2
0
10
20
40
50
60
70
80
90
100
CHART 159-1003

Tray No. _____ Test Hg Date [illegible]

Analyst JMH

Cup	Lab No.	Result**	dil. fact.	abs.	notes
1	Blank	—	—		—
2	.01				
3	.008				
4	.006				
5	.004				
6	.002				
7	.001				
8	.0002				
9	Blank				DEP # ↓
10	WP386	4.8 *		96% rec.	True value 5.0 *
11	660533	.24 mg/kg		4.45g 0.4/4.6 = .10	CD 910 -SED 1
12	537	.01 U		2.0g .4/20 = .10	CD 910 -SED 2 < .1 mg/kg
13	↓ 541				
14	dup 541	dilute			CD 910-S1
15	+1 541				
16	660 545	DILUTE			CD 910 - S2
17	549	DILUTE			CD 910 - S3
18	553	<0.2 *			CD 910 -SW1
19	↓ 557	↓	RPD NC		
20	dup 557				CD 910 SW2 / SW2A
21	+1 557	1.05	105% rec		
22	Blank	—			
23	660561	<0.2 *			CD 910 - TB
24	660 565	<0.2 *			CD 910 - FB
25	WP386/+1	1.0 *	100% rec		spiked carbon cell by W. Stalker and analyzed true value 5.0 * soran a 1:5
26	660882	<0.2 *			MW -1
27	886				MW-2A
28	890				MW -5
29	894				MW-6
30	↓ 898	↓			DUP-1

450

JMH

Hg 9/23/86

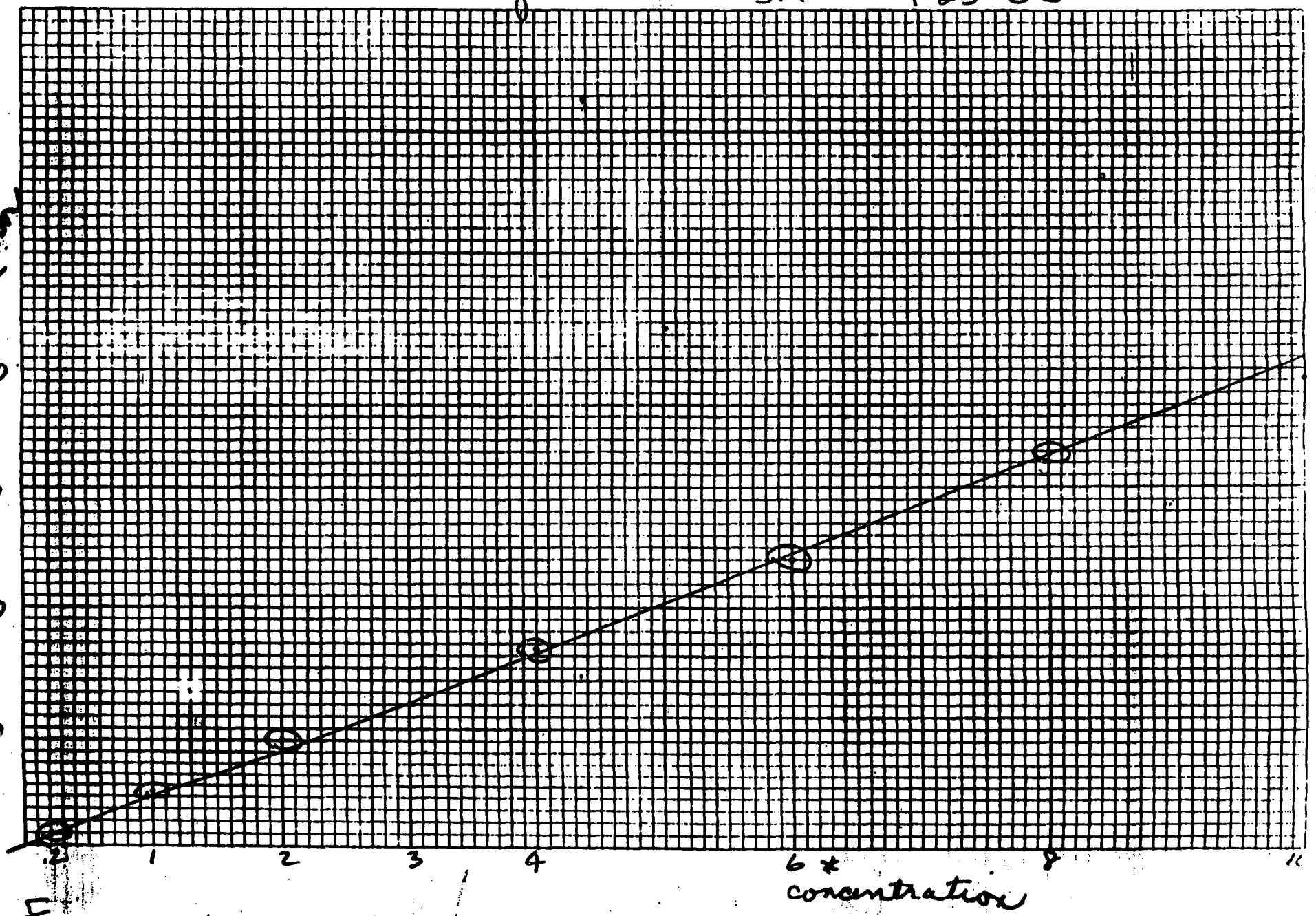
PERKIN-ELMER

1	0.002
2	0.394
3	0.331
4	0.241
5	0.178
6	0.102
7	0.056
8	0.022
9	0.011
10	0.206
11	0.035
12	0.057
16	0.012 -9
19	0.004
20	0.003
21	0.048
22	0.035
23	0.004
24	0.002
25	0.071 =MSL
25	0.046 1.0%
25	0.005
27	0.004
26	0.003
29	0.003
30	0.005
31	0.004
32	0.006
33	0.004
34	0.006
35	0.006
36	0.005
37	0.035
38	0.048
39	0.197
40	0.007
41	0.006
42	0.007
43	0.011
44	0.007
45	0.004
46	0.007
47	0.006
48	0.006
49	0.007
50	0.007
51	0.050
52	0.200
53	0.010
54	0.011
55	0.007
56	0.005
57	0.004

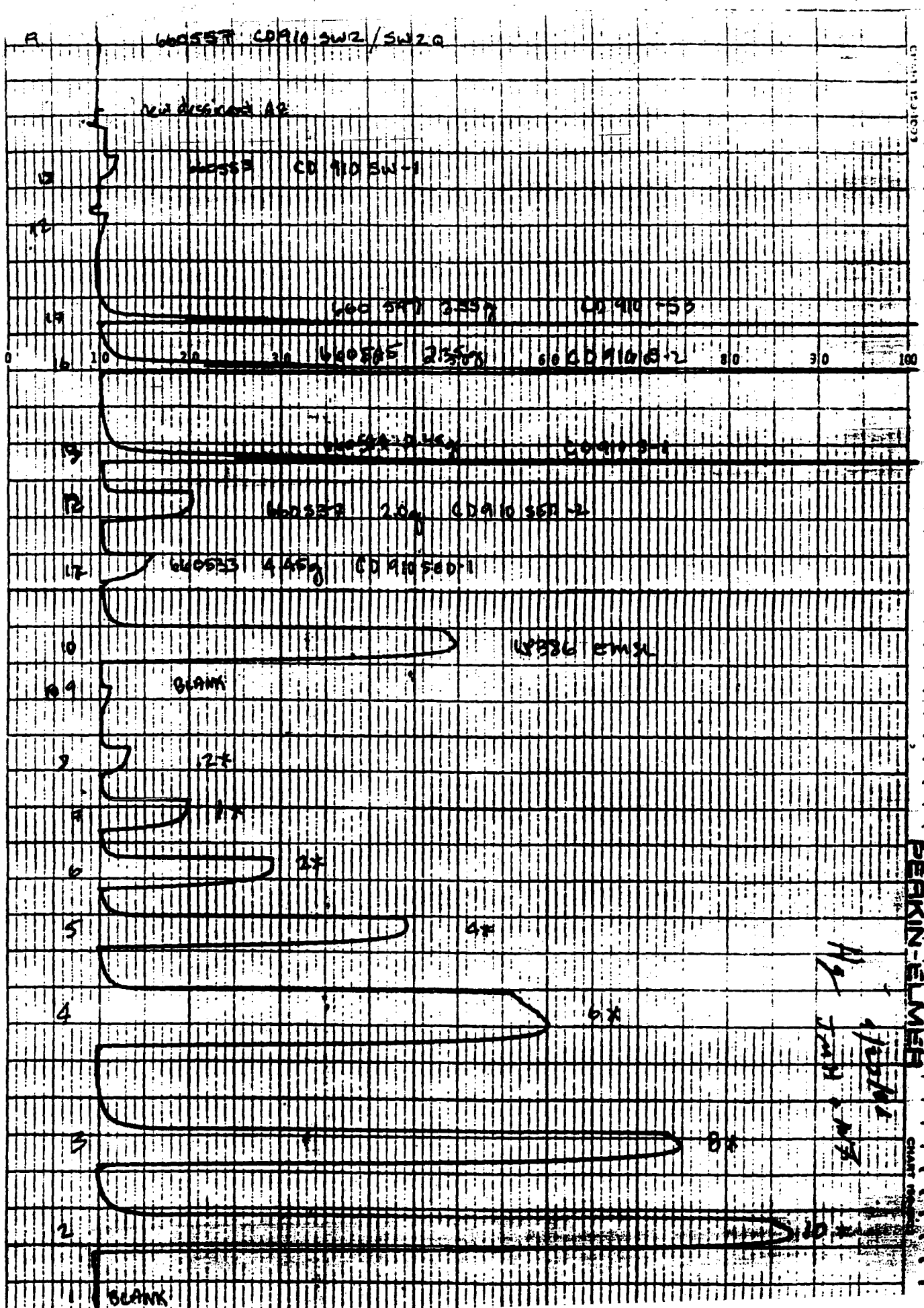
452

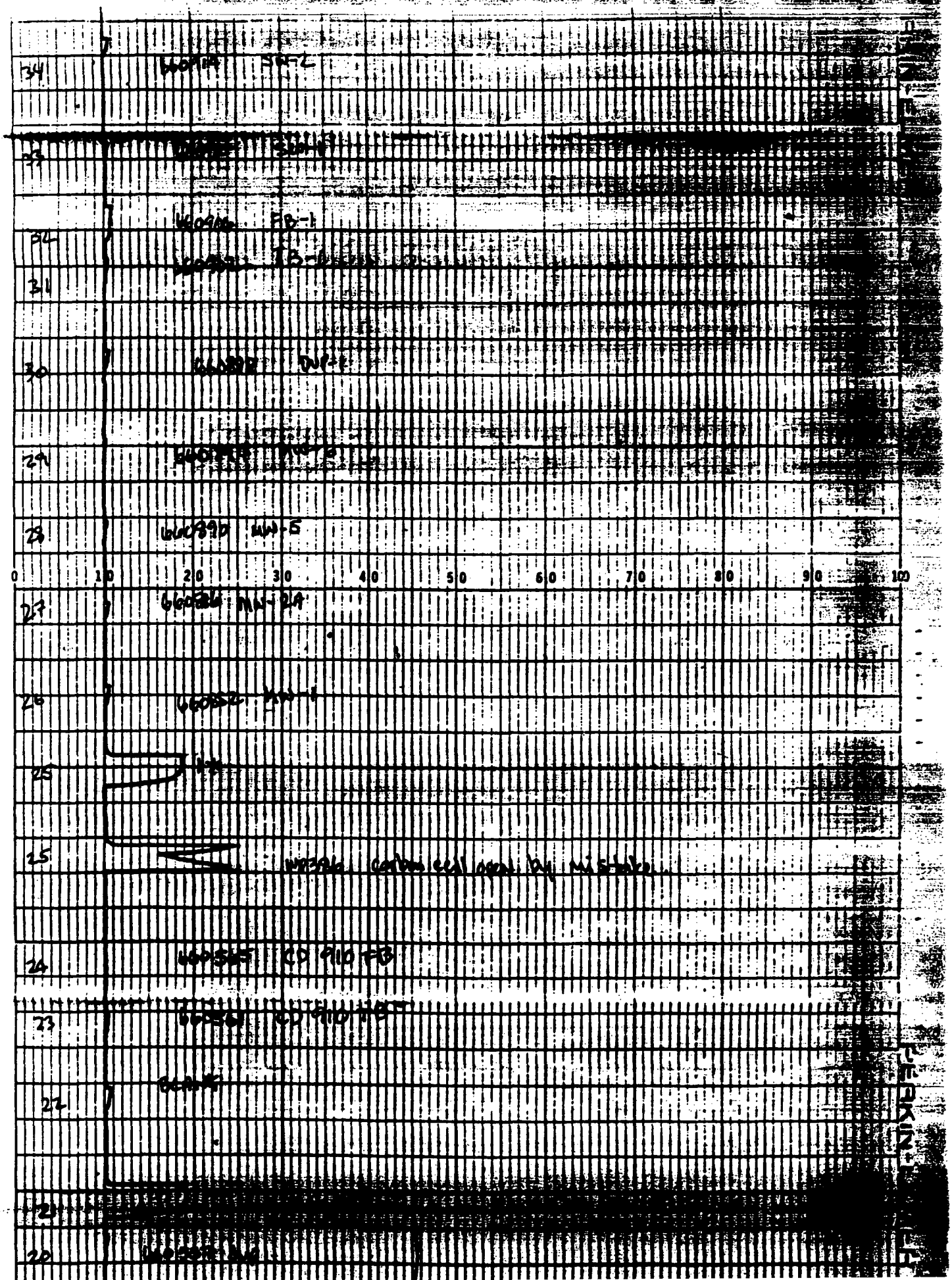
456

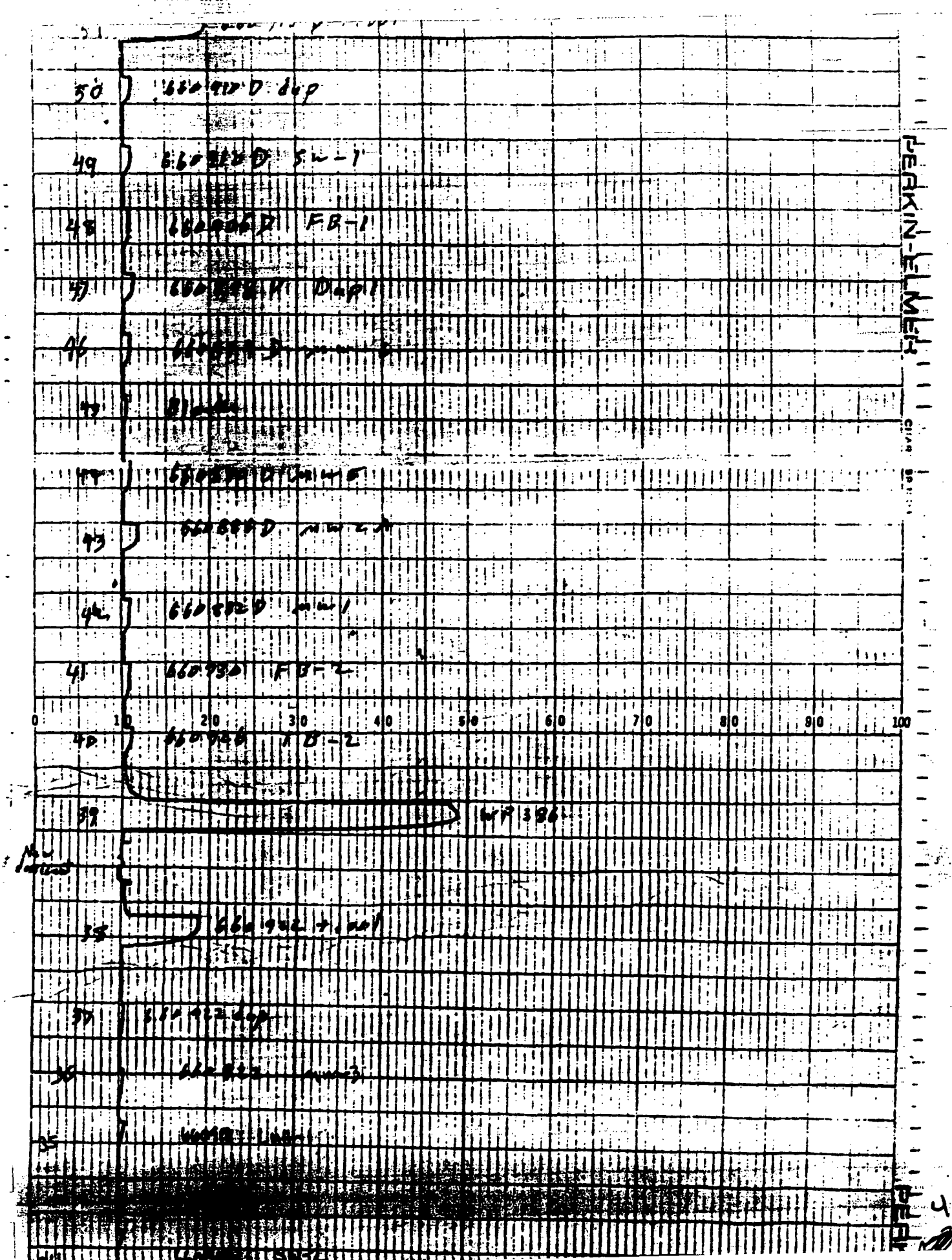
Hg JMH 9-23-86

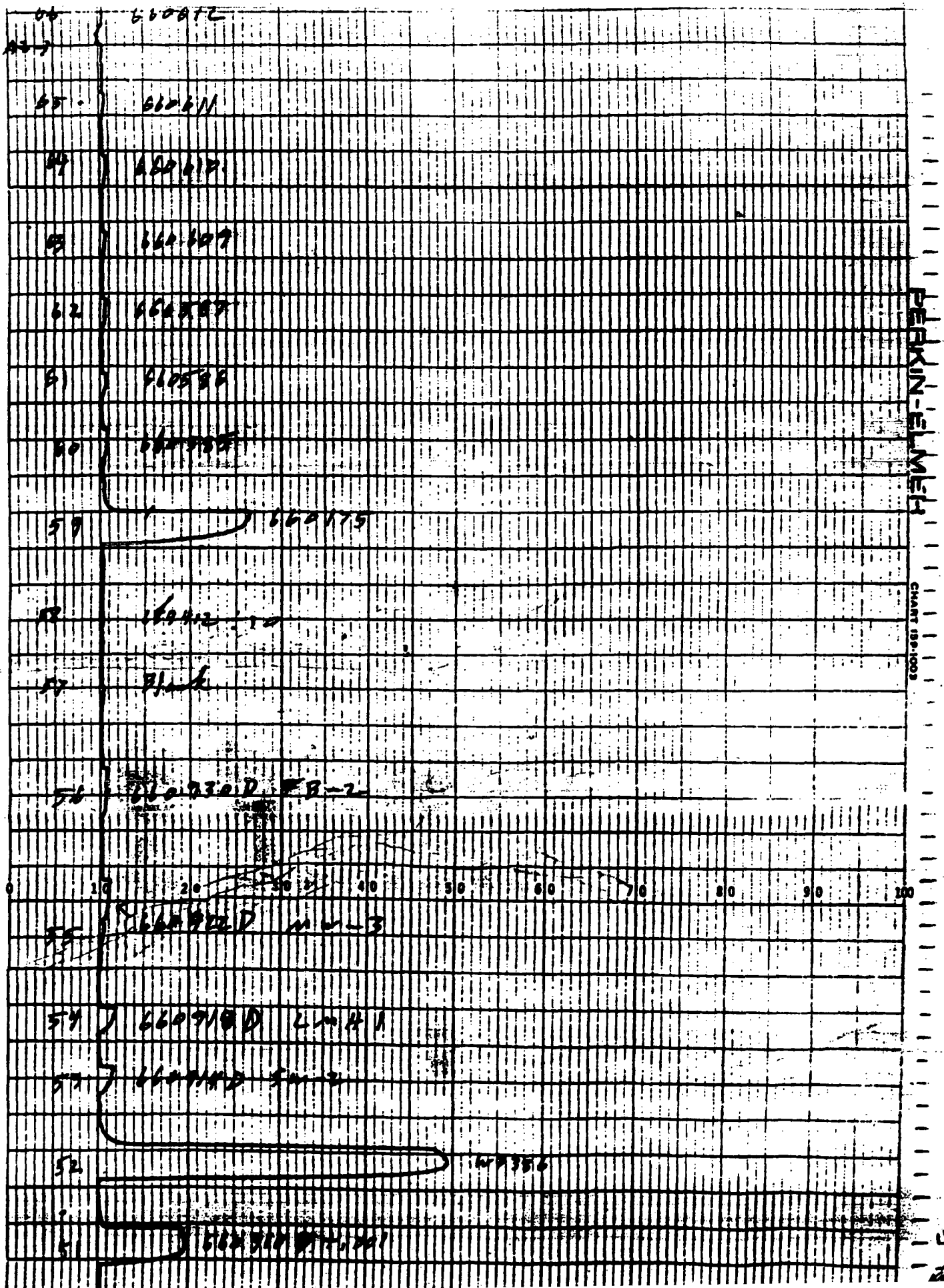


K+E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.
46 0700


660557 CD910 SW2/SW2Q
new dessicant A2
660557 CD 910 SW-1
660 557 2.55g CD 910 FSD
660565 2.50g CD910 DD-2
660564 2.46g CD910 D-1
660553 2.0g CD910 SED-2
660553 4.46g CD910 SED-1
4936 EMSL
BLANK
2*
1*
2*
4*
6*
8*
10*
BLANK
PERKIN-ELMER


34
660814 SW-2
33
32
660816 FB-1
31
30
660802 DW-1
29
660818 MW-10
28
660890 MW-5
0
10
20
30
40
50
60
70
80
90
100
27
660826 MW-24
26
660824 MW-1
25
24
660845 CD 910-FB
23
22
21
20


50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
FB-1
FB-2
0
10
20
30
40
50
60
70
80
90
100
PERKIN-ELMER


PERKIN-ELMER
CHART 159-1003
0
10
20
30
40
50
60
70
80
90
100

DATE 9-30-86

TEST CODE Zn ANALYST JMH

LAB NO.	RESULT
1660533	745 mg/kg
537	195
541	450
545	64.3
549	1800
553	197 *
557	~~[illegible]~~ 21
561	<20
565	<20

DATE 9-30-86

TEST CODE Ag ANALYST JMB

LAB NO.	RESULT
10D533	3.6 ug/kg
537	2.0
541	12.4
545	2.4
549	11.1
553	<10
557	
561	
565	

DATE 9-30-86

TEST CODE Ni ANALYST JMH

LAB NO.	RESULT	
6660533	142	mg/kg
537	37.8	
541	59.7	
545	16.3	
549	589	
553	<40	*
557		
561		
565		

DATE 9-30-86

TEST CODE Cu ANALYST JMH

LAB NO.	RESULT	
10/20 533	427	mg/kg
537	75.5	
541	235	
545	62.4	
549	1600	
553	80	*
557	25	
561	<25	
565	<25	

46d

DATE 9-30-86

TEST CODE Cr ANALYST JMH

LAB NO.	RESULT	
6660533	82.5	mg/kg
537	25.2	↓
541	81.0	↓
545	15.1	↓
549	242	↓
553	12	*
557	< 10	↓
561	↓	↓
565	↓	↓

DATE 9-30-86

TEST CODE Cd ANALYST JMH

LAB NO.	RESULT	
6600533	33.9	mg/kg
537	8.6	↓
541	20.3	↓
545	3.2	↓
549	55.3	↓
553	9	*
557	< 5	↓
561	↓	↓
565	↓	↓

DATE 9-30-86

TEST CODE Be ANALYST JMH

LAB NO.	RESULT
6060533	~~19.~~ 20.0 mg/kg
537	2.3
541	4.1
545	1.1
549	2.9
553	<5 *
557	
561	
565	

DATE 9-30-86

TEST CODE Sb ANALYST JMH

LAB NO.	RESULT	
660533	~~62.88~~ 62.8	mg/kg dry
537	~~<17.16~~ <17.2	
541	~~30.51~~ 30.5	
545	~~<12.90~~ <12.9	
549	~~30.41~~ 30.4	
553	<60	ug/l or *
557		
561		
565		

Zero Calibration

Number of Steps to Zero Order [illegible]

Help/Edit Data Files [illegible]

F 2	Reference Wavelength	355.42[illegible]
F 3	PMT Setting	10
F 4	Range for Wavelength Scan	.03
F 5	Integration Time	.1
F 6	Save Current Answers as Default	
F 7	Perform Zero Order Calibration	ZERO SETTING COMPLETED.
F 9	Concise 'Help'	
F 10	Return to Previous Menu	

SEEKING REFERENCE WAVELENGTH . . . 355.3946 355.3945 355.3943
REFERENCE POSITION = -0.0385
Press 'ESCape' to Continue ...
ICPCPS:ZEROCAL: TASK: NJDEP 9/25/85 @ 11:10

Results For BE 206.833

	Low Intensity	High Intsnsity	Intercept	Slope	Curvature
Curve 1	596	11334	-0.55032	0.00098	0.00000

Standard	Intensity	Concen.	Calc. Con.	Con. Error	% Error	Order
1	596	0.000	-0.004	-0.004		1
2	11334	10.000	9.846	-0.154	-1.54	1
3	1727	1.000	1.034	0.034	3.39	1
4	Not in Standard					
5	Not in Standard					

The RMS Error is 2.629%

Results For BE 234.561

	Low Intensity	High Intensity	Intercept	Slope	Curvature
Curve 1	203	26159	-0.00771	0.00004	0.00000

Standard	Intensity	Concen.	Calc. Con.	Con. Error	% Error	Order
1	203	0.000	0.000	0.000		1
2	Not in Standard					
3	Not in Standard					
4	26159	1.000	0.985	-0.015	-1.47	1
5	2883	0.100	0.102	0.002	1.73	1

The RMS Error is 1.604%

Results For CD 214.438

	Low Intensity	High Intensity	Intercept	Slope	Curvature
Curve 1	289	13604	-0.05948	0.00022	0.00000

Standard	Intensity	Concen.	Calc. Con.	Con. Error	% Error	Order
1	289	0.000	0.000	0.000		1
2	Not in Standard					
3	Not in Standard					

Fitted Curve 05-08-1988 @ 11:30:25 -- 2 -- 4

3604	3.000	2.938	-0.062	-2.07	1	Order
1672	0.300	0.309	0.009	2.97	1	---
						1

is 2.561%

1
1

Results For CR 205.552

tensity	High Intensity	Intercept	Slope	Curvature
385	10294	-0.11546	0.00030	0.00000

ensity	Concen.	Calc. Con.	Con. Error	% Error	Order
335	0.000	-0.001	-0.001		1
andard					
andard					
0294	3.000	2.958	-0.042	-1.40	1
1417	0.300	0.308	0.008	2.54	1

is 2.051%

re

.00000

Order

1

1
1

Results For CU 324.754

tensity	High Intensity	Intercept	Slope	Curvature
443	13085	-0.10309	0.00023	0.00000

ensity	Concen.	Calc. Con.	Con. Error	% Error	Order
443	0.000	-0.001	-0.001		1
tandard					
tandard					
13085	3.000	2.919	-0.081	-2.69	1
1807	0.300	0.314	0.014	4.76	1

is 3.868%

re

.00000

Order

1

1
1

Results For NI 231.604

ntensity	High Intensity	Intercept	Slope	Curvature
387	11798	-0.24242	0.00027	0.00000

245

468

Statistics For Fitted Curve 09-06-1988 @ 11:30:31 -- E

	Low Intensity	High Intensity	Intercept	Slope	Curvature
Curve 1	327	5080	-0.55470	0.00208	0.00000

Standard	Intensity	Concen.	Calc. Con.	Con. Error	% Error	Order
1	327	0.000	-0.004	-0.004		1
2	Not in Standard					
3	Not in Standard					
4	5080	10.000	9.893	-0.107	-1.07	1
5	822	1.000	1.027	0.027	2.69	1

The RMS Error is 2.046%

Results For AS 193.759

	Low Intensity	High Intensity	Intercept	Slope	Curvature
Curve 1	573	5912	-1.07109	0.00185	0.00000

Standard	Intensity	Concen.	Calc. Con.	Con. Error	% Error	Order
1	573	0.000	-0.009	-0.009		1
2	Not in Standard					
3	Not in Standard					
4	5912	10.000	9.889	-0.111	-1.11	1
5	1138	1.000	1.039	0.039	3.87	1

The RMS Error is 2.846%

Results For 3E 196.090

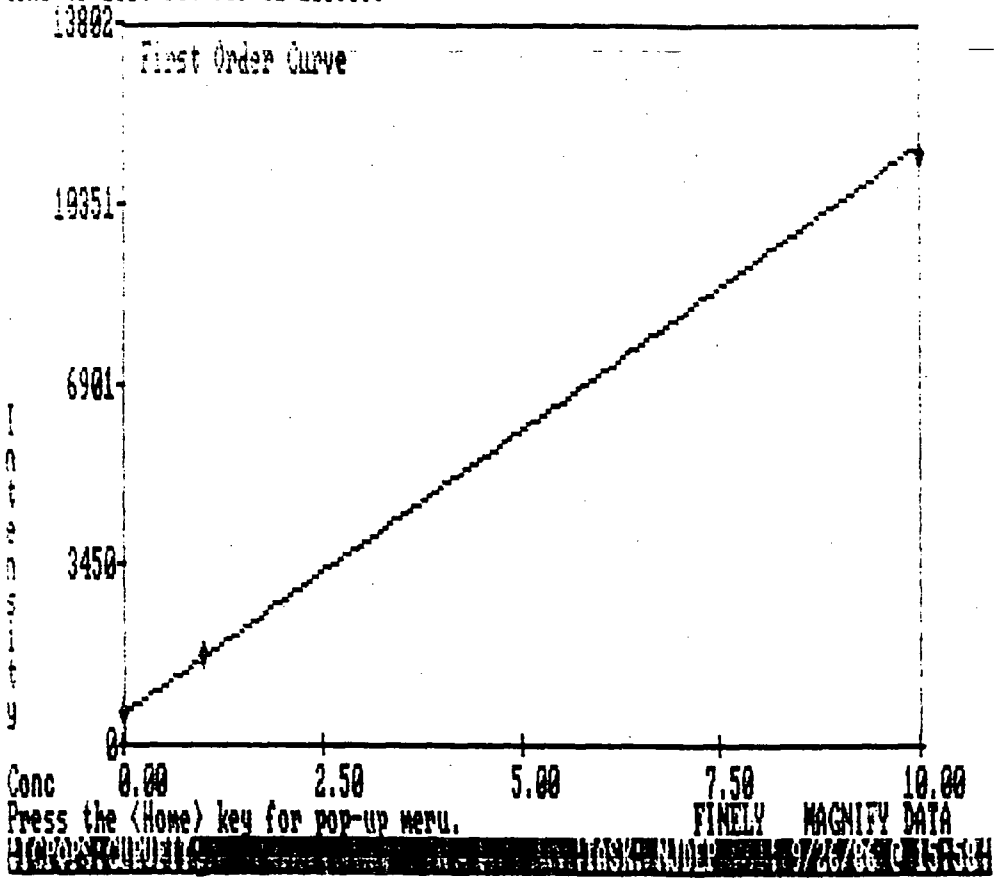
	Low Intensity	High Intensity	Intercept	Slope	Curvature
Curve 1	536	3218	-1.00391	0.00184	0.00000

Standard	Intensity	Concen.	Calc. Con.	Con. Error	% Error	Order
1	536	0.000	-0.018	-0.018		1
2	Not in Standard					
3	Not in Standard					
4	3218	5.000	4.918	-0.082	-1.64	1
5	844	0.500	0.549	0.049	9.84	1

Predictions For Fitted Curve

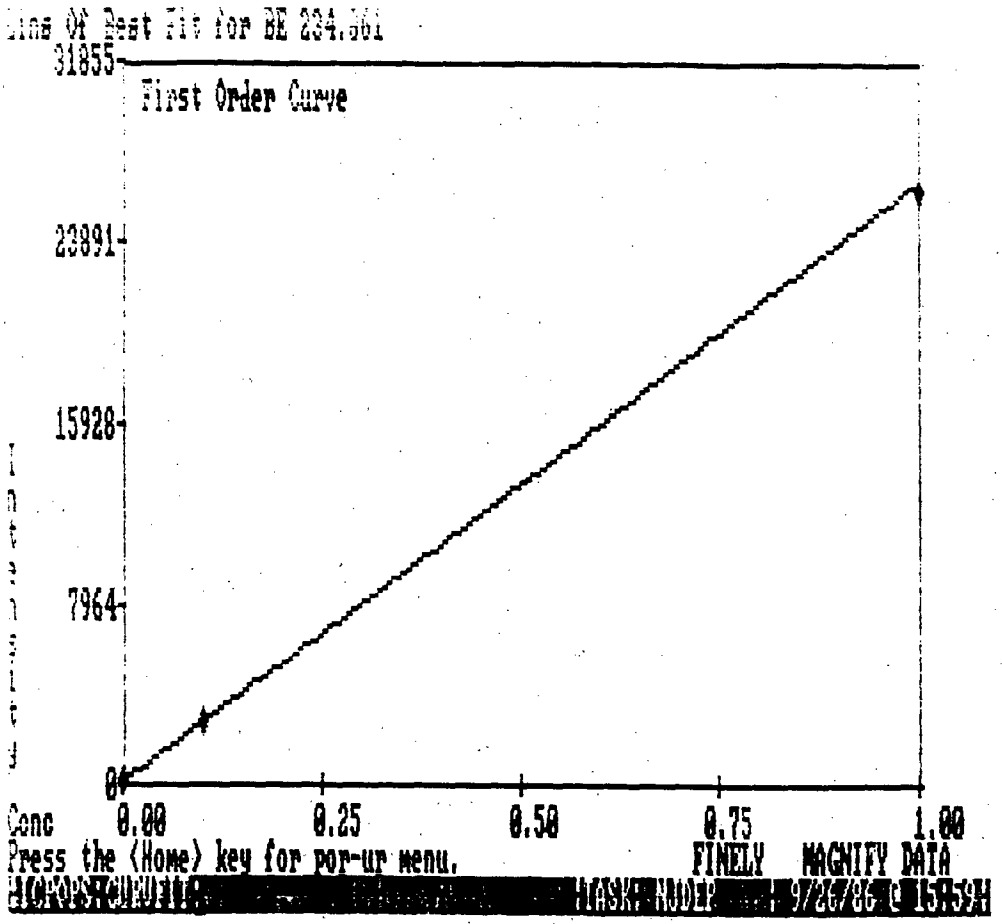
The RMS Error is 7.058%

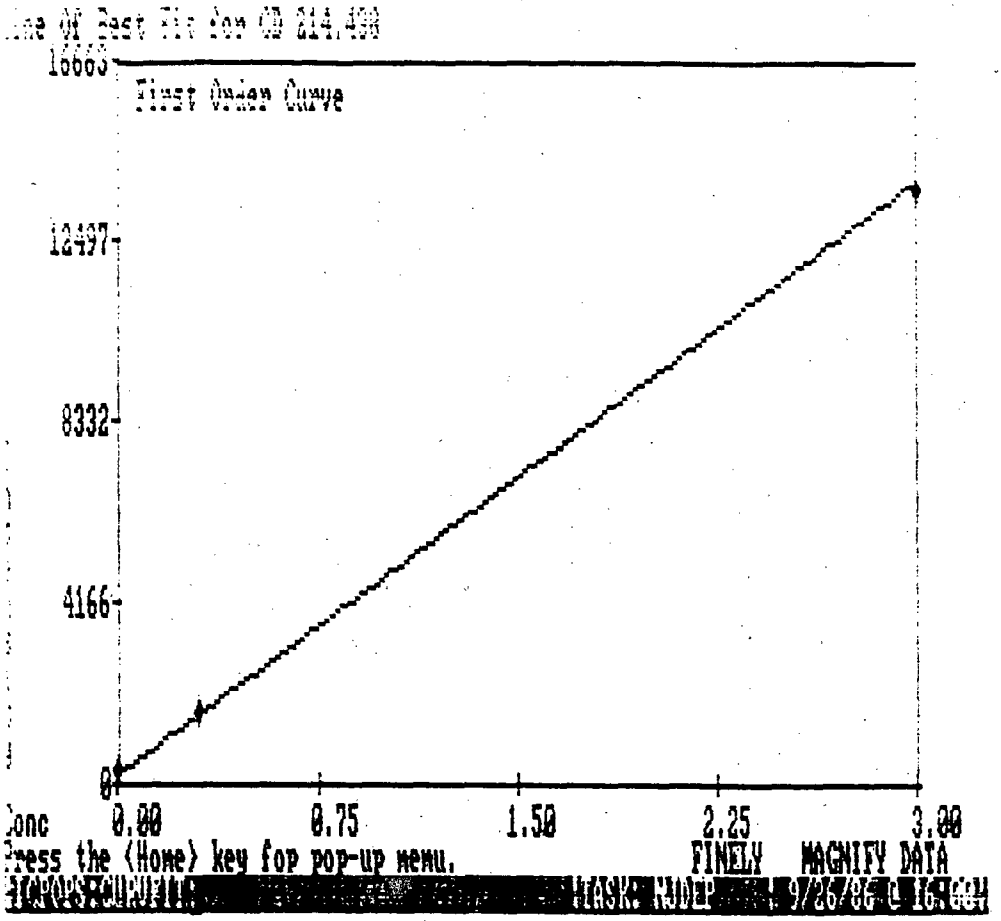
Line Of Best Fit for S3 226.000

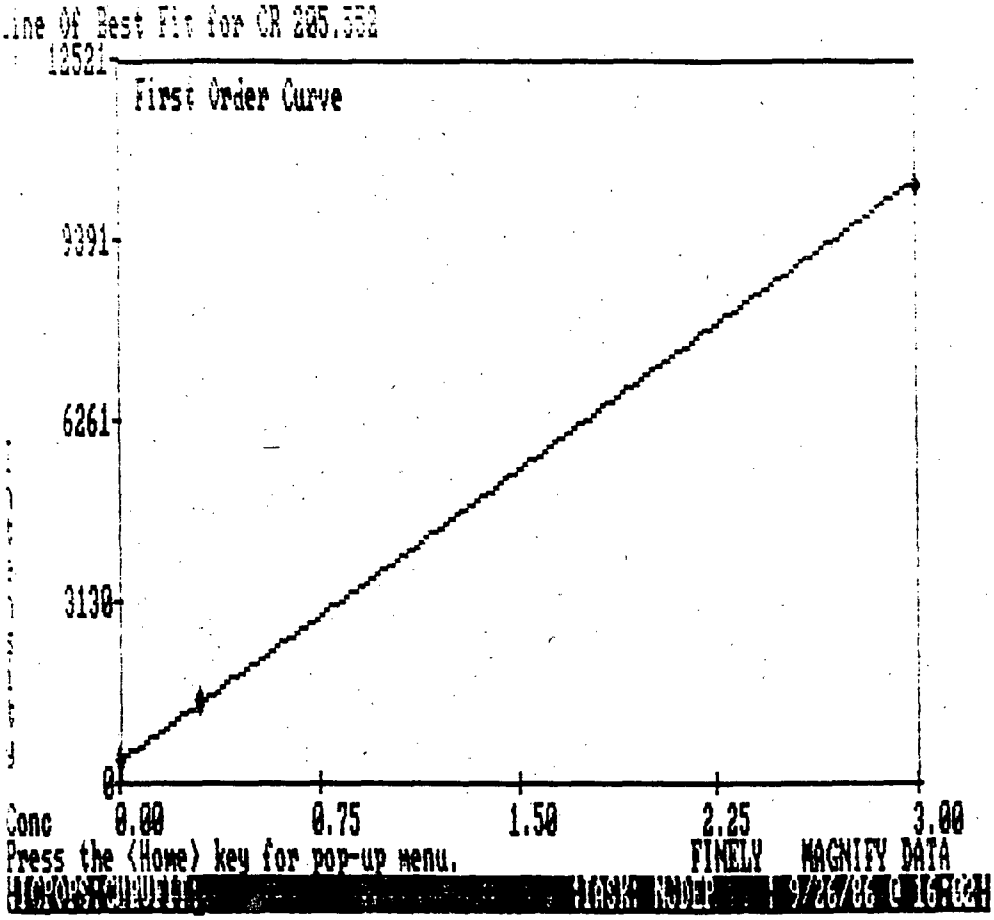


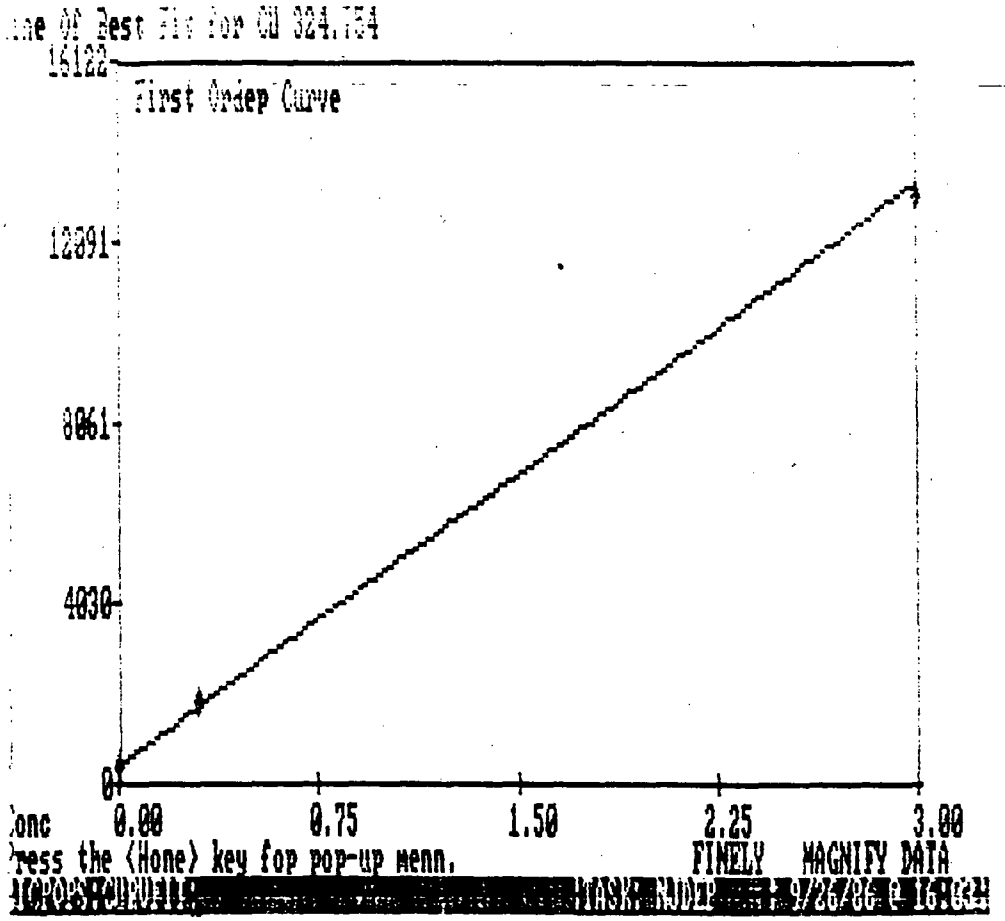
[redacted]

471

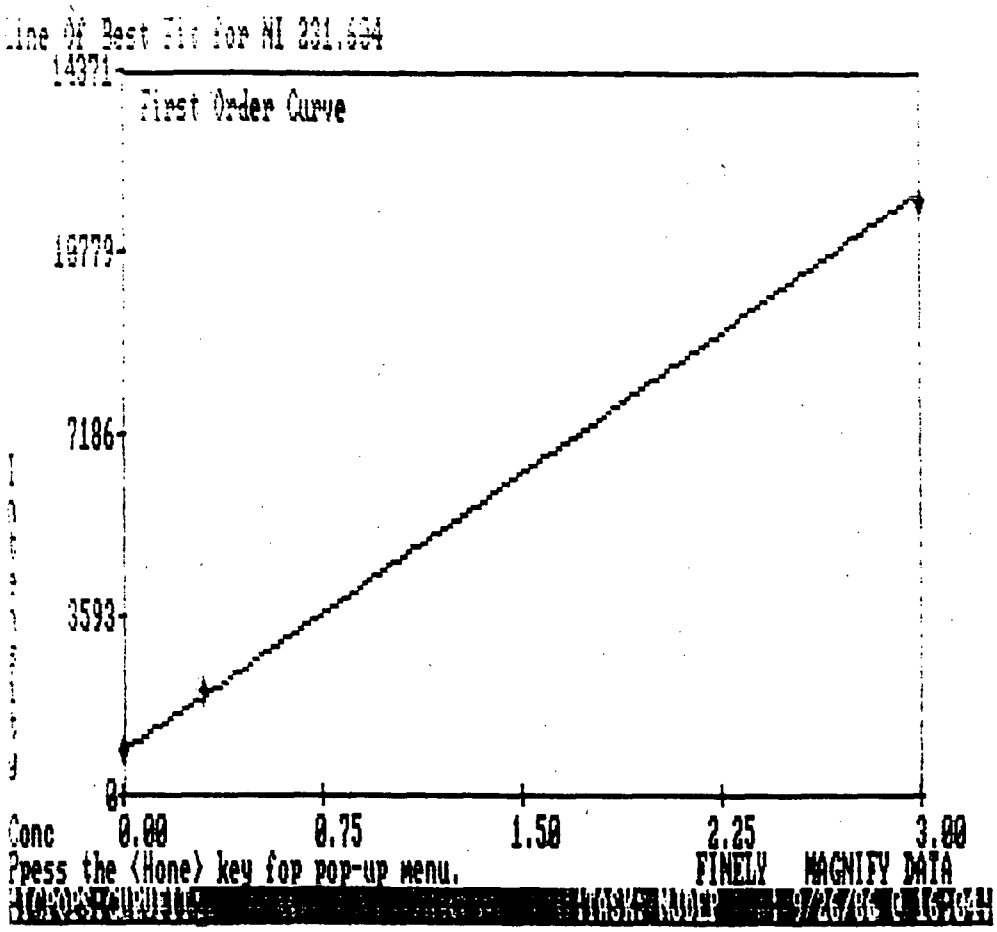

Line Of Best Fit for BE 234.561
31855
First Order Curve
23891
15928
7964
0
Conc
0.00
0.25
0.50
0.75
1.00
Press the (Home) key for pop-up menu.
FINELY
MAGNIFY DATA


Line Of Best Fit for CD 214.498
First Order Curve
16663
12497
8332
4166
0
Conc
0.00
0.75
1.50
2.25
3.00
Press the (Home) key for pop-up menu.
FINELY
MAGNIFY DATA

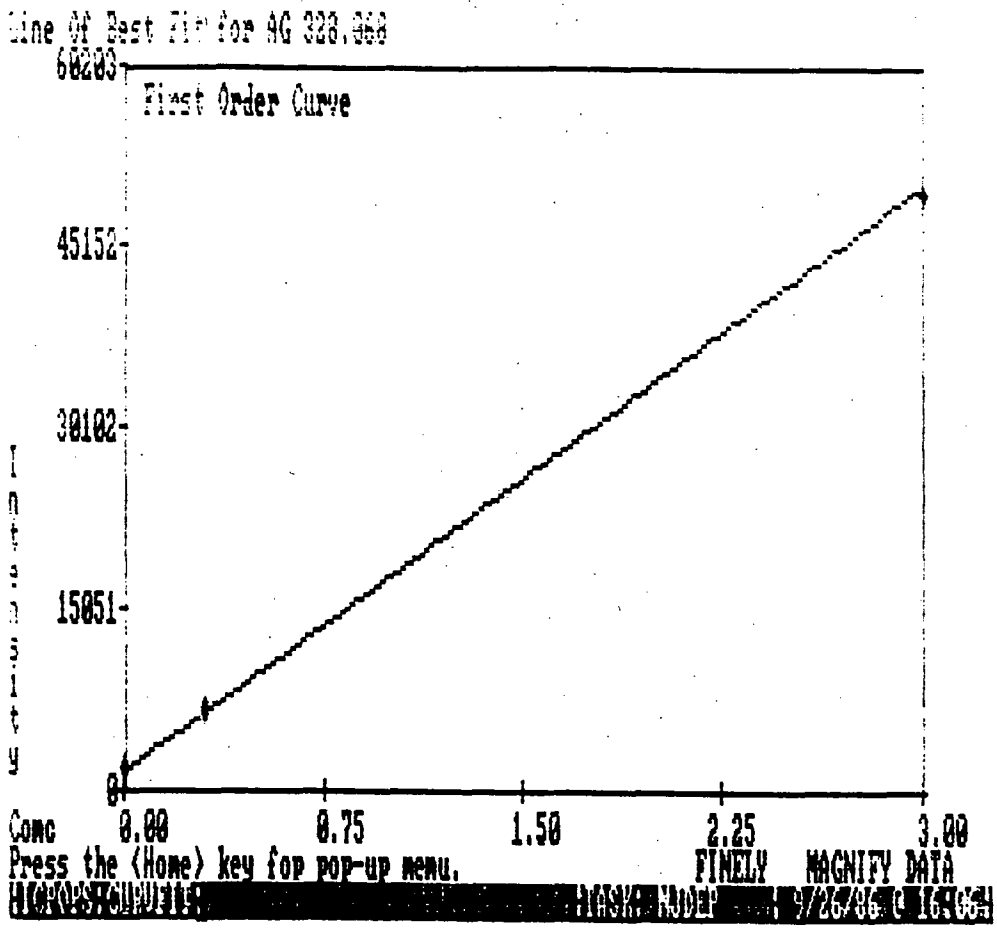

ine Of Best Fit for CR 205.352
12521
First Order Curve
9391
6261
3130
0
Conc
0.00
0.75
1.50
2.25
3.00
Press the (Home) key for pop-up menu.
FINELY MAGNIFY DATA

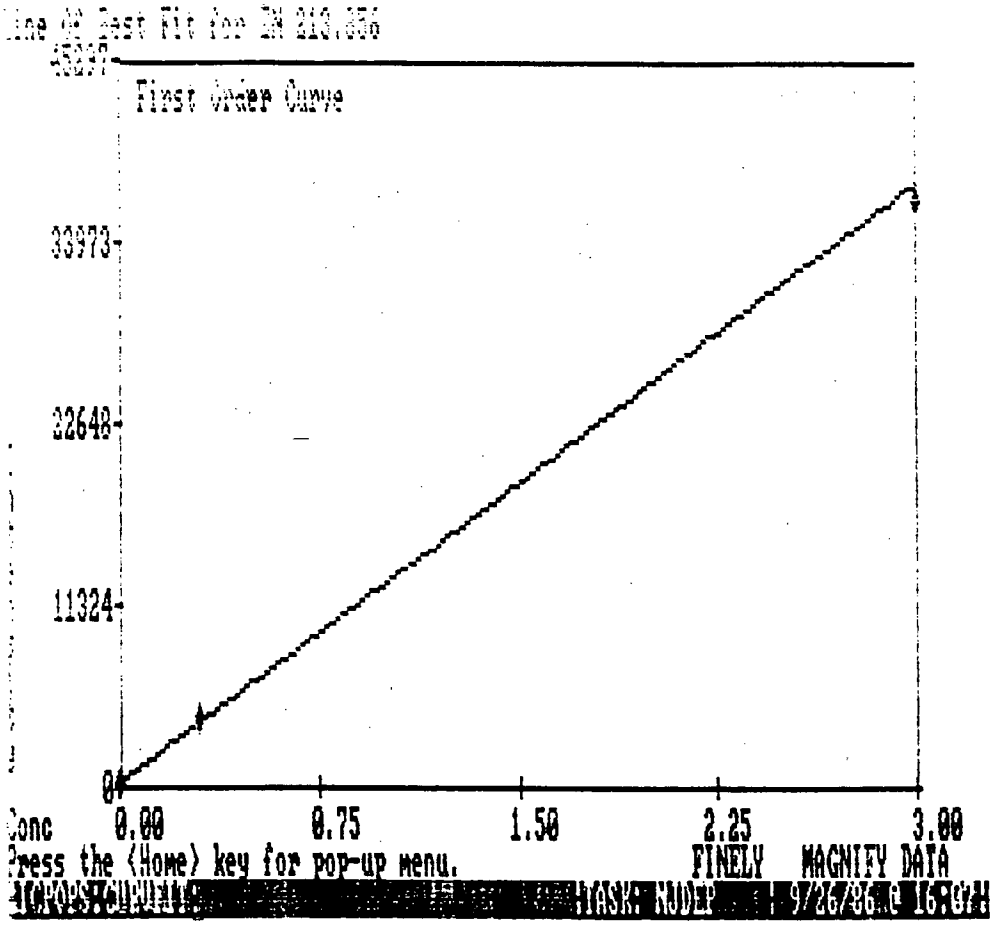

ne Of Best Fit for CU 324.754
16122
First Order Curve
12091
8061
4030
0
Conc
0.00
0.75
1.50
2.25
3.00
Press the <Home> key for pop-up menu.
FINELY MAGNIFY DATA
MICROSTUDIO
TASK MODE
9/26/86 @ 16:06

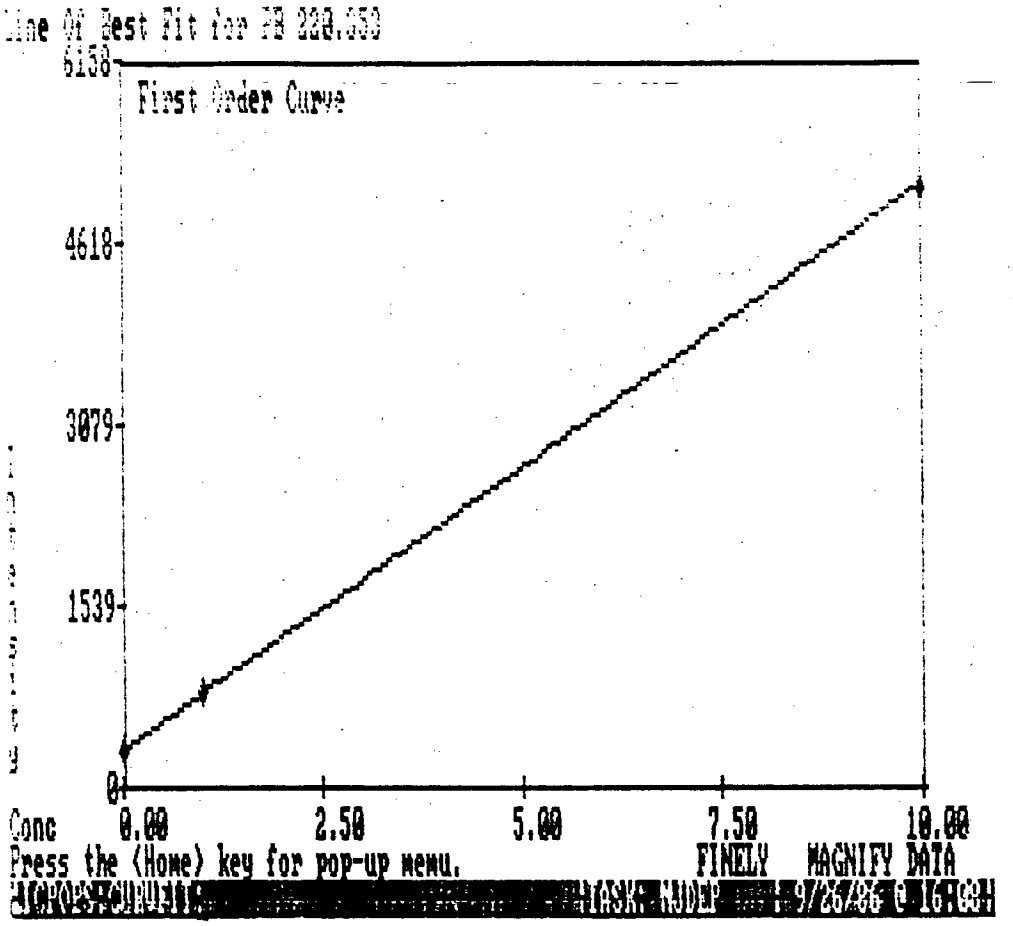
475


Line Of Best Fit for NI 231.604
14371
First Order Curve
10779
7186
3593
0
Conc
0.00
0.75
1.50
2.25
3.00
Ppess the <Hone> key fop pop-up menu.
FINELY
MAGNIFY DATA

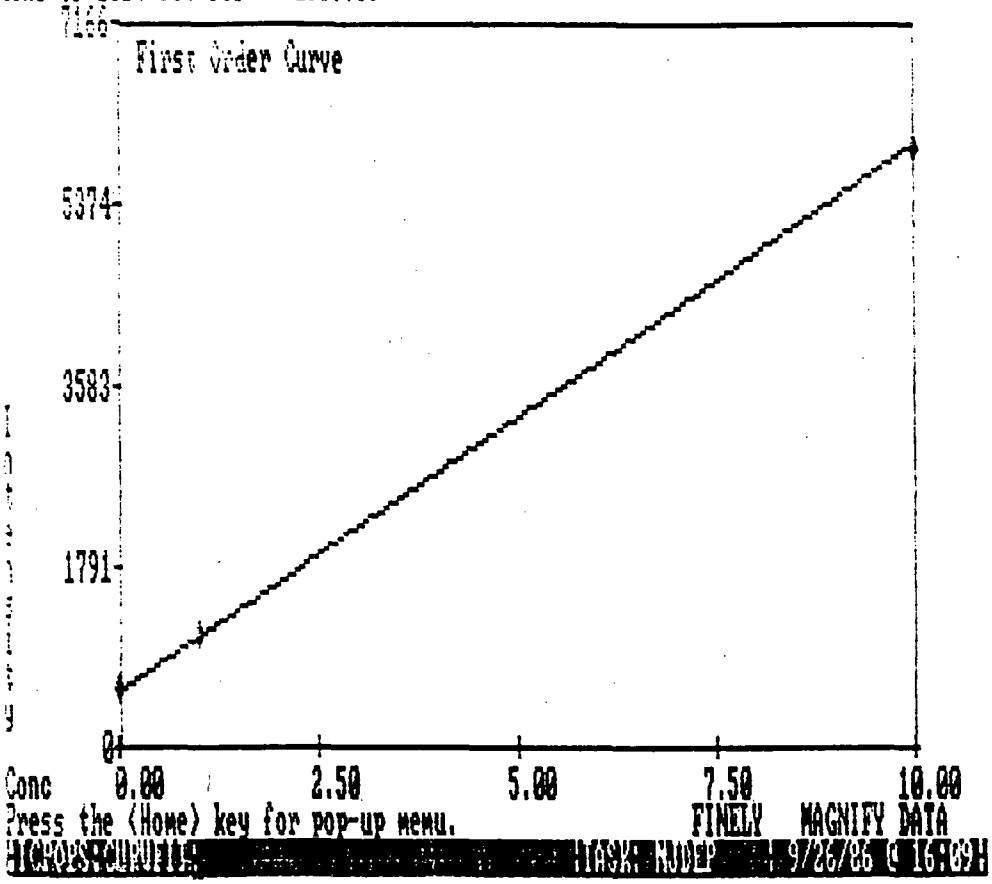
476


Line Of Best Fit for AG 328.068
First Order Curve
60203
45152
30102
15051
0
Intensity
Conc
0.00
0.75
1.50
2.25
3.00
Press the (Home) key for pop-up menu.
FINELY
MAGNIFY DATA

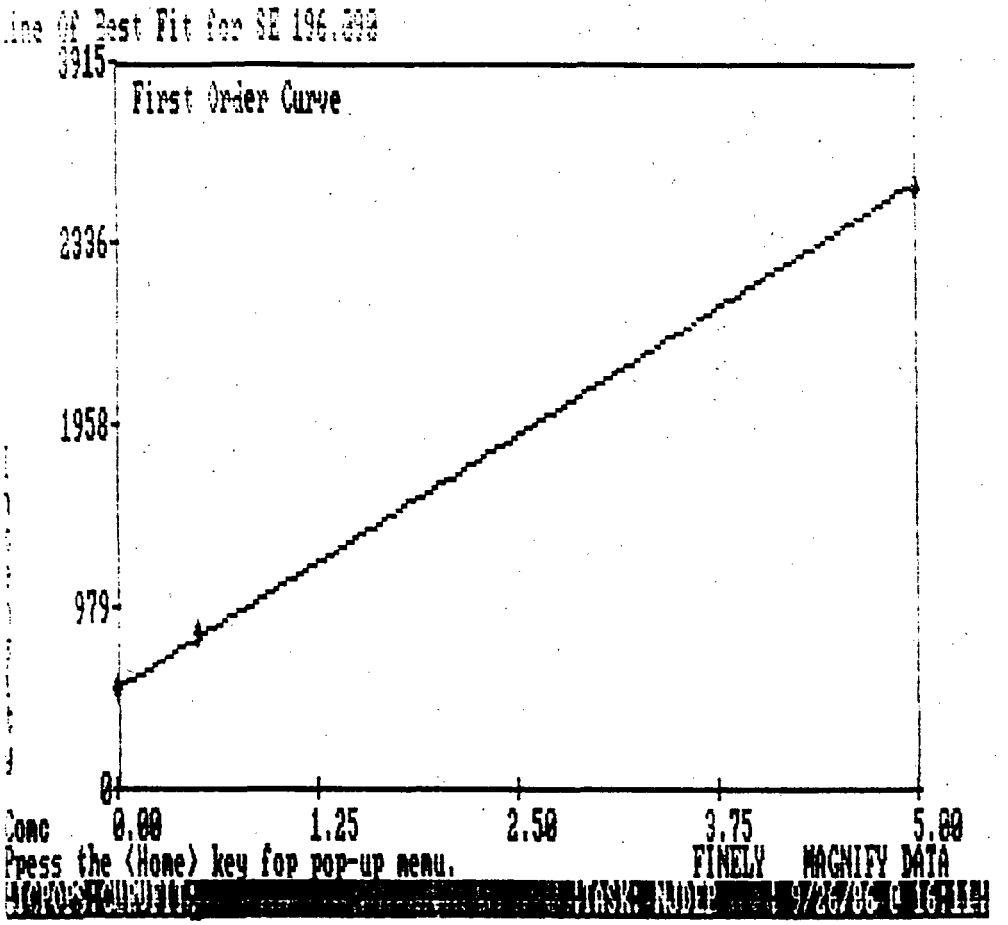

Line Of Best Fit for IN 210.056
First Order Curve
33973
22648
11324
0
Conc
0.00
0.75
1.50
2.25
3.00
Press the <Home> key for pop-up menu.
FINELY
MAGNIFY DATA


Line Of Best Fit for FB 220.050
First Order Curve
6138
4618
3079
1539
0
Conc
0.00
2.50
5.00
7.50
10.00
Press the (Home) key for pop-up menu.
FINELY MAGNIFY DATA

Line Of Best Fit for AS 193.757



480


ine Of Best Fit for SE 196.000
3915
First Order Curve
2336
1958
979
0
Conc
0.00
1.25
2.50
3.75
5.00
Press the (Home) key for pop-up menu.
FINELY
MAGNIFY DATA

Test Of Precision And Repeatabilities 09-26-1986 @ 11:38:37 -- 1

interference standard

interference standard

Begin Analysis - Sample Number 1 - Replication 1

Ele. Sym.	Wave-length	Peak Position	Peak Intensity	Net Peak Intensity
AS	193.759	-0.0001	1259	1259
BE	196.09	0.0010	929	929
CR	205.552	0.0002	1362	1362
SB	206.833	0.0006	1737	1737
ZN	213.856	0.0006	4136	4136
CD	214.438	0.0004	1650	1650
PB	220.353	0.0000	827	827
NI	231.604	0.0003	1966	1966
BE	234.861	-0.0001	2931	2931
CU	324.754	0.0003	1677	1677
AG	328.068	0.0002	5826	5826

Elem. Sym.	Wave-length	Net Peak Intensity
09-26-1986	11:40:06	
SB	206.833	1737
BE	234.861	2931
CD	214.438	1650
CR	205.552	1362
CU	324.754	1677
NI	231.604	1966
AG	328.068	5826
ZN	213.856	4136
PB	220.353	827
AS	193.759	1259
BE	196.09	929

Begin Analysis - Sample Number 1 - Replication 2

Ele. Sym.	Wave-length	Peak Position	Peak Intensity	Net Peak Intensity
AS	193.759	0.0005	1258	1253

482

CR	205.552	0.0000	1377	1377
SB	206.833	0.0004	1725	1725
ZN	213.856	0.0002	4116	4116
CD	214.438	0.0005	1655	1655
PB	220.353	-0.0005	830	830
NI	231.604	0.0002	2038	2038
BE	234.861	-0.0004	2936	2936
CU	324.754	0.0003	1671	1671
AG	328.068	0.0003	5803	5803

Elem. Sym.	Wave-length	Net Peak Intensity
09-26-1966	11:43:07	
SB	206.833	1725
BE	234.861	2936
CD	214.438	1655
CR	205.552	1377
CU	324.754	1671
NI	231.604	2038
AG	328.068	5803
ZN	213.856	4116
PB	220.353	830
AS	193.759	1258
SE	196.09	925

Begin Analysis - Sample Number 1 - Replication 3

Ele. Sym.	Wave-length	Peak Position	Peak Intensity	Net Peak Intensity
AS	193.759	-0.0002	1351	1351
SE	196.09	0.0011	911	911
CR	205.552	0.0002	1370	1370
SB	206.833	0.0008	1730	1730
ZN	213.856	0.0003	4202	4202
CD	214.438	0.0006	1669	1669
PB	220.353	0.0000	839	839
NI	231.604	0.0001	2050	2050
BE	234.861	-0.0004	2923	2923
CU	324.754	0.0002	1668	1668
AG	328.068	0.0001	5750	5750

Elem. Sym.	Wave-length	Net Peak Intensity
09-26-1986	11:46:07	

BE	234.861	2923
CD	214.438	1669
CR	205.552	1370
CU	324.754	1668
NI	231.604	2050
AG	328.068	5750
ZN	213.856	4202
PB	220.353	839
AS	193.759	1351
SE	196.09	911

Begin Analysis - Sample Number 1 - Replication 4

Ele. Sym.	Wave-length	Peak Position	Peak Intensity	Net Peak Intensity
AS	193.759	-0.0002	1351	1351
SE	196.09	0.0001	921	921
CR	205.552	0.0000	1375	1375
SB	206.833	0.0007	1761	1761
ZN	213.856	0.0004	4173	4173
CD	214.438	0.0006	1668	1668
PB	220.353	-0.0003	829	829
NI	231.604	0.0003	2073	2073
BE	234.861	-0.0001	2881	2881
CU	324.754	0.0004	1667	1667
AG	328.068	0.0004	5733	5733

Elem. Sym.	Wave-length	Net Peak Intensity
09-26-1986	11:49:08	
SB	206.833	1761
BE	234.861	2881
CD	214.438	1668
CR	205.552	1375
CU	324.754	1667
NI	231.604	2073
AG	328.068	5733
ZN	213.856	4173
PB	220.353	829
AS	193.759	1351
SE	196.09	921

Begin Analysis - Sample Number 1 - Replication 5

INTERFERENCE CHECK

9-29-86
JMH

AS	193.759	-0.0011	1161	1153
SE	196.09	No Peak!	834	834
CR	205.552	-0.0007	1260	1260
SB	206.833	-0.0012	533	533
ZN	213.856	-0.0006	3615	3615
CD	214.438	-0.0004	1464	1464
PB	220.353	-0.0010	794	794
NI	231.604	-0.0008	895	895
SE	234.861	-0.0009	2632	2632
CU	324.754	-0.0006	1516	1516
AG	328.068	-0.0001	1580	1580

Calculating Concentrations for Sample Number I

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction TV	% rec	Net Concentration
SB	206.833	533	1.061	1.0	1.06	1.061
SE	234.861	2632	0.102	.10	102	0.102
CD	214.438	1464	0.313	0.30	104	0.313
CR	205.552	1260	0.302	.30	100	0.302
CU	324.754	1516	0.288	.30	96	0.288
NI	231.604	895	0.300	.30	100	0.300
AG	328.068	1580	0.261	.30	87	0.261
ZN	213.856	3615	0.297	.30	99	0.297
PB	220.353	794	~~1.161~~			1.161
AS	193.759	1153	~~1.305~~			1.305
SE	196.09	834	~~0.672~~		±20% range	0.672

Test Of Precision And Repeatabilities 09-26-1986 @ 11:49:11 -- 4

Sym.	length	Position	Intensity	Intensity
AS	193.759	0.0002	1303	1303
SE	196.09	-0.0001	907	907
CR	205.552	0.0003	1396	1396
SB	206.833	0.0003	1718	1718
ZN	213.856	0.0003	4285	4285
CD	214.438	0.0004	1670	1670
PB	220.353	-0.0002	832	832
NI	231.604	0.0001	2083	2083
BE	234.861	-0.0004	2899	2899
CU	324.754	0.0002	1659	1659
AG	328.068	0.0004	5731	5731

Elem. Sym.	Wave-length	Net Peak Intensity
09-26-1986	11:52:08	
SB	206.833	1718
BE	234.861	2899
CD	214.438	1670
CR	205.552	1396
CU	324.754	1659
NI	231.604	2083
AG	328.068	5731
ZN	213.856	4285
PB	220.353	832
AS	193.759	1303
SE	196.09	907

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	S.D.	R.S.D.
SB	206.833	0.0006	1734	16.5136	0.9523
BE	234.861	-0.0003	2914	23.2809	0.7989
CD	214.438	0.0005	1662	9.2358	0.5557
CR	205.552	0.0001	1376	12.5897	0.9149
CU	324.754	0.0003	1668	6.5422	0.3922
NI	231.604	0.0002	2042	46.0923	2.2572
AG	328.068	0.0003	5769	43.3163	0.7508
ZN	213.856	0.0004	4182	66.2593	1.5844
PB	220.353	-0.0002	831	4.6152	0.5554
AS	193.759	0.0000	1304	46.2580	3.5474
SE	196.09	0.0005	919	9.3167	1.0138

[illegible]

9-29-86 JMH

[illegible] - Sample Number [illegible]

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	-0.0002	1216	1216
SE	196.09	-0.0013	873	873
CR	205.552	-0.0009	1246	1246
BE	206.833	-0.0003	535	535
ZN	213.856	-0.0003	3715	3715
CD	214.438	-0.0001	1465	1465
PB	220.353	-0.0007	794	794
NI	231.604	-0.0005	896	896
BE	234.861	-0.0003	2832	2832
CU	324.754	-0.0006	1519	1519
AG	328.068	-0.0001	1581	1581

Calculating Concentrations for Sample Number 1

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction TV	% rec	Net Concentration
BE	206.833	535	1.068	1.0	107	1.068
BE	234.861	2832	0.103	0.10	103	0.103
CD	214.438	1465	0.314	0.3	105	0.314
CR	205.552	1246	0.297	0.3	99	0.297
CU	324.754	1519	0.288	0.3	96	0.288
NI	231.604	896	0.301	0.3	100	0.301
AG	328.068	1581	0.261	0.3	87	0.261
ZN	213.856	3715	0.306	0.3	102	0.306
PB	220.353	794	~~1.161~~			~~1.161~~
AS	193.759	1216	~~1.439~~			~~1.439~~
SE	196.09	873	~~0.[illegible]~~			~~0.[illegible]~~

INTERFERENCE CHECK

Date: [illegible] Result File: LINBARAM - Analysis Results

Sample Name BB 206.833 SE 224.021 [illegible] [illegible] [illegible] 324.754
09-29-1986
1 linear range TV.12 0.119 99%
2 linear range2
3 linear range TV.01 0.010 100% TV.01 0.010 100% TV.02 0.019 95% TV.05 0.050 10

Sample Name NI 231.604 AG 328.068 ZN 213.856 PB 220.353 AG 193.753
09-29-1986
1 linear range
2 linear range2 TV.08 101% TV.02 0.021 105% TV.04 0.041 103% T
3 linear range 0.081 ~~[illegible]~~ ~~[illegible]~~

Sample Name SE 196.09
09-29-1986
1 linear range
2 linear range2
3 linear range ~~[illegible]~~

9-29-86 JMH

Task: [illegible] Method File: [illegible] - Analysis Results 9-29-86 JMA

Sample Name	SB 206.833	SE 124.281	SD 214.438	SR 405.552	SU 424.734
09-29-1986	TV .12				
1 linear range	0.121				
2 linear range2	101%	TV .01	TV .01	TV .02	TV .05
3 linear range		0.010	0.009	0.021	0.050
		100%	100%	105%	100%

Sample Name	NI 231.604	AG 328.068	IN 213.858	PB 220.353	AS 193.759
09-29-1986					
1 linear range	TV .08	TV .02	TV .04	T	
2 linear range2		0.021			
3 linear range	0.080	105%	0.041	~~0.047~~	~~0.036~~
	100%		103%		

Sample Name	SE 196.09
09-29-1986	
1 linear range	
2 linear range2	
3 linear range	~~< 0.046~~

NJDEP ~~BATCH~~ ONE (1)

AUTO ~~NJDEP~~

DEP (result)

) CALIBEATION BLANK

) INST. CHECK STD (1) As Be Cd Cr Cu Pb Ni Se Ag Zn

) INST. CHECK STD (2) (Sb)

) EMSL ICAP-79: Sb Be Cd Cr Cu Pb Ni Zn ~~Ag~~ Se

) EMSL ICAP-7: Ag

) DIGESTED BLANK

7) 660 533 CD 910 -SED1

8) 660 537 -SED2

9) 660 541 -S1

10) 660 545 dup

11) 660 545 spike

12) 660 545 serial dilution

13) 660 545 CD910 -S2

14) 660 549 -S3

15) CAL BLANK

16) DIG BLANK

17) 2 above

18) 3

19) 4

20) 5

21) 660 553 CD910-SW1

22) 660 557 SW2/SW2Q

23) 660 557 dup

24) 660 557 spike

25) 660 557 serial dilution

26) 660 561 TB

27) 660 565 FB

28) cal BLK

29) DIG BLK

30) 2

31) 3

32) 4

33) 5

Analyze Samples JMH 09-28-1985 @ 13:20:08 -- 4

Begin Analysis - Sample Number 1

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	570	570
SE	196.09	No Peak!	562	562
CR	205.552	No Peak!	382	382
SB	206.833	No Peak!	584	584
ZN	213.856	No Peak!	386	386
CD	214.438	No Peak!	264	264
PB	220.353	No Peak!	331	331
NI	231.604	No Peak!	893	893
BE	234.661	No Peak!	210	210
CU	324.754	No Peak!	465	465
AG	328.068	No Peak!	1746	1746

Calculating Concentrations for Sample Number 1

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	584	-0.015		< 0.060
BE	234.861	210	0.000		< 0.005
CD	214.438	264	-0.001		< 0.005
CR	205.552	382	-0.001		< 0.010
CU	324.754	465	0.004		< 0.025
NI	231.604	893	-0.001		< 0.040
AG	328.068	1746	-0.002		< 0.000
ZN	213.856	386	0.001		< 0.020
PB	220.353	331	0.005		0.005
AS	193.759	570	-0.014		< 0.030
SE	196.09	562	0.030		< 0.040

Inst check std 1

Begin Analysis - Sample Number 2

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity

AS	193.759	-0.0004	3114	3114
BE	196.09	-0.0003	1894	1894
CR	205.552	-0.0003	5422	5422
ZN	213.856	-0.0003	18642	18642
CD	214.438	-0.0004	6980	6980
PB	220.353	-0.0005	2706	2706
NI	231.604	-0.0004	6351	6351

Analyze Samples JMH 09-29-1986 @ 13:31:43 -- 5

BE	234.861	-0.0006	13255	13255
CU	324.754	-0.0007	6822	6822
AG	328.068	-0.0004	25751	25751

Calculating Concentrations for Sample Number 2 INST. CHECK STD (1)

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	90/110 range % rec
BE	234.861	13255	0.495		0.495	0.5	99
CD	214.438	6980	1.478		1.478	1.5	99
CR	205.552	5422	1.503		1.503	1.5	100
CU	324.754	6822	1.473		1.473	1.5	98
NI	231.604	6351	1.477		1.477	1.5	99
AG	328.068	25751	1.486		1.486	1.5	99
ZN	213.856	18642	1.466		1.466	1.5	98
PB	220.353	2706	4.950		4.950	5.0	—
AS	193.759	3114	4.702		4.702	5.0	—
BE	196.09	1894	2.481		2.481	5.0	—

Inst. check std 2

Begin Analysis - Sample Number 3

49

JMH 9-20-86

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
SB	206.833	-0.0002	5812	5812

Calculating Concentrations for Sample Number 3 INST CHECK STD (2) range 80/120

Elem. Sym.	Wavs-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	% rec
SB	206.833	5812	4.781		4.781	5.0	96

mmsl icap-19

Begin Analysis - Sample Number 4

Elem. Sym.	Wave-length	Mean Peak Position	Peak Intensity	Net Peak Intensity
AS	193.759	-0.0012	1102	1102
SE	196.09	-0.0004	1039	1039
CR	205.552	-0.0005	3752	3752
SB	206.833	0.0000	1608	1608

Analyze Samples JMH 09-29-1986 @ 13:36:32 -- 6

ZN	213.856	-0.0002	12201	12201
CD	214.438	-0.0004	4280	4280
PB	220.353	-0.0009	796	796
NI	231.604	-0.0003	4438	4438
BE	234.861	-0.0006	24702	24702
CU	324.754	-0.0006	4621	4621

Calculating Concentrations for Sample Number 4 EMSL ICAP-19

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	90/110 range % rec
SB	206.833	1608	0.925		0.925	.99	94
BE	234.861	24702	0.930		0.930	.96	108
CD	214.438	4280	0.884		0.884	.94	94
CR	205.552	3752	1.005		1.005	1.03	98
CU	324.754	4621	0.964		0.964	1.03	93
NI	231.604	4438	0.959		0.959	1.02	94
ZN	213.856	12201	0.949		0.949	1.01	94
PB	220.353	796	0.973		0.973	1.01	99
AS	193.759	1102	0.972		0.972	1.00	98
SE	196.09	1039	0.908		0.908	.99	92

emsl icap-7

Begin Analysis - Sample Number 5

9-28-86 JMH

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AG	328.068	-0.0003	18069	18069

90/110 range

Calculating Concentrations for Sample Number 5 EMSL ICAP-7

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	% rec
AG	328.068	18069	1.010		1.010	.99	98

Digested blank

Begin Analysis - Sample Number 6

495

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	561	561

Analyze Samples JMH 09-29-1986 @ 13:41:30 -- 7

SE	196.09	No Peak!	551	551
CR	205.552	No Peak!	405	405
SB	206.833	No Peak!	594	594
ZN	213.856	No Peak!	385	385
CD	214.438	No Peak!	267	267
PB	220.353	No Peak!	324	324
NI	231.604	No Peak!	903	903
BE	234.861	No Peak!	213	213
CU	324.754	No Peak!	465	465
AG	328.068	No Peak!	1761	1761

Calculating Concentrations for Sample Number 6 DIGESTED BLANK

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	594	-0.005		< 0.060
BE	234.861	213	0.000		< 0.005
CD	214.438	267	-0.001		< 0.005
CR	205.552	405	0.005		< 0.010
CU	324.754	465	0.004		< 0.025
NI	231.604	903	0.002		< 0.040
AG	328.068	1761	-0.001		< 0.000
ZN	213.856	385	0.001		< 0.020
PB	220.353	324	-0.010		< 0.005
AS	193.759	561	-0.031		< 0.030
SE	196.09	551	0.010		< 0.040

860533 CD 910-SEDI

Begin Analysis - Sample Number 7

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	1225	1225
SE	196.09	No Peak	707	707
CR	205.552	-0.0007	1161	1161
SB	206.833	No Peak!	792	792
ZN	213.856	-0.0003	26383	26383
CD	214.438	0.0016	701	701
PB	220.353	-0.0007	810	810
NI	231.604	-0.0001	2360	2360
BE	234.861	-0.0005	1691	1691
CU	324.754	-0.0006	5630	5630
AG	328.068	No Peak!	1937	1937

Analyze Samples JMH 09-29-1986 @ 13:48:16 -- 8

Calculating Concentrations for Sample Number 7 660533 CD 910-SED1

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	792	0.176		0.176
BE	234.861	1691	0.056		0.056
CD	214.438	701	0.095		0.095
CR	205.552	1161	0.231		0.231
CU	324.754	5630	1.197		1.197
NI	231.604	2360	0.397		0.397
AG	328.068	1937	0.010		0.010
ZN	213.856	26383	2.088		2.088
PB	220.353	810	1.002		1.002
AS	193.759	1225	1.200		1.200
SE	196.09	707	0.297		0.297

660537 CD 910-SED2

Begin Analysis - Sample Number 8

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	747	747
SE	196.09	No Peak!	591	591
CR	205.552	0.0000	680	680
SB	206.833	No Peak!	631	631
ZN	213.856	-0.0002	8870	8870
CD	214.438	0.0011	408	408
PB	220.353	-0.0006	736	736
NI	231.604	-0.0007	1384	1384
BE	234.861	-0.0005	404	404
CU	324.754	-0.0007	1590	1590
AG	328.068	No Peak!	1893	1893

Calculating Concentrations for Sample Number 8 660657 CD-910-SED2

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	631	0.028	(	0.060
BE	234.861	404	0.008		0.008
CD	214.438	408	0.030		0.030
CR	205.552	680	0.088		0.088
CU	324.754	1590	0.264		0.264
NI	231.604	1384	0.132		0.132
AG	328.066	1893	0.007		0.007

Analyze Samples JMH 09-29-1988 @ 13:52:23 -- 9

ZN	213.856	8870	0.682	0.682
PB	220.353	736	0.848	0.848
AS	193.759	747	0.314	0.314
SE	196.09	591	0.084	0.084

560341 CD 910-S1

Begin Analysis - Sample Number 9

9-29-86 JMH

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	918	918
SE	196.09	No Peak!	594	594
CR	205.552	-0.0001	1206	1206
SB	206.833	No Peak!	701	701
ZN	213.856	0.0000	17068	17068
CD	214.438	0.0007	553	553
PB	220.353	-0.0009	940	940
NI	231.604	-0.0004	1568	1568
BE	234.861	-0.0011	516	516
CU	324.754	-0.0008	3471	3471
AG	328.068	-0.0002	2362	2362

Calculating Concentrations for Sample Number 9 660541 CD-910-S1

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	701	0.093		0.093
BE	234.861	516	0.012		0.012
CD	214.438	553	0.062		0.062
CR	205.552	1206	0.245		0.245
CU	324.754	3471	0.699		0.699
NI	231.604	1568	0.182		0.182
AG	328.068	2362	0.036		0.036
ZN	213.856	17068	1.340		1.340
PB	220.353	940	1.273		1.273
AS	193.759	918	0.631		0.631
SE	196.09	594	0.089		0.089

660541 duplicate

Begin Analysis - Sample Number 10

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity

Analyze Samples 09-26-1986 @ 13:57:09 -- 10

AS	193.759	No Peak!	883	883
SE	196.09	No Peak!	623	623
CR	205.552	-0.0003	1168	1168
SB	206.833	No Peak!	695	695
ZN	213.856	-0.0001	16730	16730
CD	214.438	0.0004	536	536
PB	220.353	-0.0006	933	933
NI	231.604	0.0002	1520	1520
BE	234.861	-0.0005	512	512
CU	324.754	-0.0008	3409	3409
AG	328.068	0.0000	2365	2365

± DL if <5xCRDL

Calculating Concentrations for Sample Number 10 660541 duplicate

range ±20% >5xCRDL

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction 4-dilution	Net Concentration	% RPD
SB	206.633	695	0.087	.022	0.087	.07
BE	234.861	512	0.012	.003	0.012	0
CD	214.438	536	0.059	.015	0.059	.07
CR	205.552	1168	0.233	.058	0.233	.05
CU	324.754	3409	0.684	.171	0.684	.02
NI	231.604	1520	0.169	.042	0.169	.07
AG	328.068	2365	0.037	.009	0.037	.03
ZN	213.856	16730	1.313	.329	1.313	.02
PB	220.353	933	1.258	.315	1.258	.02
AS	193.759	883	~~0.505~~		~~0.505~~	
SE	196.09	623	~~0.143~~		~~0.143~~	

660541 spike

Begin Analysis - Sample Number 11

500

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	918	918
SE	196.09	No Peak!	635	635
CR	205.552	-0.0001	1855	1855
SB	206.833	-0.0004	1106	1106
ZN	213.856	-0.0002	18641	18641
CD	214.438	0.0002	733	733
PB	220.353	-0.0007	1103	1103
NI	231.604	-0.0003	2969	2969
BE	234.861	-0.0005	1679	1679
CU	324.754	-0.0006	4446	4446
AG	328.068	0.0001	2700	2700

Analyze Samples JMH 09-29-1986 @ 14:03:48 -- 11

Calculating Concentrations for Sample Number 11 860541 spike

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	spike ~~ppm~~	% rec
SB	206.833	1106	0.464		0.464	0.5	74.2
BE	234.861	1679	0.056		0.056	0.05	88.0
CD	214.438	733	0.102		0.102	0.05	80.0
CR	205.552	1855	0.438		0.438	.20	97.0
CU	324.754	4446	0.924		0.924	.25	90.0
NI	231.604	2969	0.561		0.561	.40	94.8
AG	328.068	2700	0.057		0.057	.05	42.0
ZN	213.856	18641	1.466		1.466	.20	63.0
PB	220.353	1103	1.612		~~1.612~~	~~50~~	
AS	193.759	918	0.631		~~0.631~~		
SE	196.09	635	0.165		~~0.165~~		

860541/4 (serial dilution)

Begin Analysis - Sample Number 12

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	678	678
SE	196.09	No Peak!	581	581
CR	205.552	0.0003	617	617
SB	206.833	No Peak!	611	611
ZN	213.856	-0.0001	4748	4748
CD	214.438	No Peak!	332	332
PB	220.353	-0.0016	483	483
NI	231.604	No Peak!	1060	1060
BE	234.861	No Peak!	282	282
CU	324.754	-0.0008	1248	1248
AG	328.068	No Peak!	1925	1925

Calculating Concentrations for Sample Number 12 660541 ÷ 4

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction x4 =	Net Concentration	±10% range
SB	206.833	611	0.010		< 0.060	No <10xIDL OK
BE	234.861	282	0.003		< 0.003	~~yes~~
CD	214.436	332	0.014	56	0.014	yes
CR	205.552	617	0.069	276	0.069	yes
CU	324.754	1248	0.185	740	0.185	yes
NI	231.604	1060	0.045	180	0.045	yes

Analyze Samples JMH 09-29-1986 @ 14:07:50 -- 12

AG 328.068	1925	0.009	36	0.009	yes	2.7
ZN 213.856	4748	0.351	1404	0.351	yes	
PB 220.353	483	0.321		0.321	yes	
AS 193.759	678	0.186		~~0.186~~		
SE 196.09	581	0.065		~~0.065~~		

660545 CD 910-82

Begin Analysis - Sample Number 13

502

9-29-86 JMH

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	676	676
BE	196.09	No Peak!	579	579
CR	205.552	0.0003	620	620
SB	206.833	No Peak!	616	616
ZN	213.856	0.0000	4101	4101
CD	214.438	No Peak!	336	336
PB	220.353	-0.0005	1659	1659
NI	231.604	-0.0001	1176	1176
BE	234.861	No Peak!	339	339
CU	324.754	-0.0007	1701	1701
AG	328.068	No Peak!	1945	1945

Calculating Concentrations for Sample Number 13 660545 CD-910-S2

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	616	0.013		< 0.060
BE	234.861	339	0.005		0.005
CD	214.438	336	0.015		0.015
CR	205.552	620	0.070		0.070
CU	324.754	1701	0.290		0.290
NI	231.604	1176	0.076		0.076
AG	328.068	1945	0.011		0.011
ZN	213.856	4101	0.299		0.299
PB	220.353	1659	2.770		2.770
AS	193.759	676	0.182		0.182
BE	196.09	579	0.062		0.062

660549 CD 910-63

Begin Analysis - Sample Number 14

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity

Analyze Samples JMH 09-29-1986 @ 14:13:34 -- 13

AS	193.759	No Peak!	978	978
SE	196.09	No Peak!	681	681
CR	205.552	0.0002	4044	4044
SB	206.833	No Peak!	749	749
ZN	213.856	0.0000	101399	101399
CD	214.438	0.0006	1401	1401
PB	220.353	-0.0006	4545	4545
NI	231.604	-0.0001	10695	10695
BE	234.861	No Peak!	551	551
CU	324.754	-0.0007	31622	31622
AG	328.068	-0.0001	2573	2573

Calculating Concentrations for Sample Number 14 650 549 CD-910-53

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	749	0.137		0.137
BE	234.861	551	0.013		0.013
CD	214.438	1401	0.249		0.249
CR	205.552	4044	1.092		1.092
CU	324.754	31622	7.201		7.201
NI	231.604	10695	2.653		2.653
AG	328.068	2573	0.050		0.050
ZN	213.856	101399	8.110		8.110
PB	220.353	4545	8.779		8.779
AS	193.759	978	0.742		0.742
SE	196.09	681	0.249		0.249

calibration blank

Begin Analysis - Sample Number 15

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity

AS	193.759	No Peak!	609	[illegible]
BE	196.09	No Peak!	545	[illegible]
CR	205.552	No Peak!	400	[illegible]
BB	206.833	No Peak!	584	[illegible]
ZN	213.856	No Peak!	423	423
CD	214.438	No Peak!	275	275
PB	220.353	No Peak!	323	323
NI	231.604	No Peak!	923	923
BE	234.861	No Peak!	217	217
CU	324.754	No Peak!	482	482
AG	328.068	No Peak!	1786	1786

Analyze Samples

Jmt 09-29-1986 @ 14:20:36 -- 14

Calculating Concentrations for Sample Number 15 CALIBRATION BLANK

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
BB	206.833	584	-0.015		< 0.060
BE	234.861	217	0.001		< 0.005
CD	214.438	275	0.001		< 0.005
CR	205.552	400	0.004		< 0.010
CU	324.754	482	0.008		< 0.025
NI	231.604	923	0.007		< 0.040
AG	328.068	1786	0.001		0.001
ZN	213.856	423	0.004		0.020
PB	220.353	323	-0.012		0.005
AS	193.759	609	0.058		0.058
BE	196.09	545	-0.001		0.040

Digested Blank

Begin Analysis - Sample Number 16

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	577	577
SE	196.09	No Peak!	553	553
CR	205.552	No Peak!	399	399
SB	206.833	No Peak!	596	596
ZN	213.856	No Peak!	399	399
CD	214.438	No Peak!	268	268
PB	220.353	No Peak!	321	321
NI	231.604	No Peak!	927	927
BE	234.861	No Peak!	210	210
CU	324.754	No Peak!	476	476
AG	328.068	No Peak!	1746	1746

Calculating Concentrations for Sample Number 16 DIG BLANK

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	596	-0.004	<	0.060
BE	234.861	210	0.000	<	0.005
CD	214.438	266	0.000	<	0.005
CR	205.552	399	0.004	<	0.010
CU	324.754	476	0.007	<	0.025

Analyze Samples JMH 09-29-1986 @ 14:24:44 -- 15

NI	231.604	927	0.009	< 0.040
AG	328.068	1746	-0.002	< 0.000
ZN	213.856	399	0.002	< 0.020
PB	220.353	321	-0.016	< 0.005
AS	193.759	577	-0.001	< 0.030
SE	196.09	553	0.014	< 0.040

Inst. check std. 1

Begin Analysis - Sample Number 17

50

9-29-86 JMH

Elm. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	-0.0001	3049	3049
SE	196.09	0.0004	1807	1807
CR	205.552	0.0003	5202	5202
ZN	213.856	0.0002	18366	18366
CD	214.438	0.0000	7009	7009
PB	220.353	-0.0005	2731	2731
NI	231.604	-0.0001	6274	6274
BE	234.861	-0.0004	12777	12777
CU	324.754	-0.0005	6600	6600
AG	328.068	-0.0002	25263	25263

Calculating Concentrations for Sample Number 17 FIRST. CHECK STD (1) 90/110 range

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	% rec
BE	234.861	12777	0.477		0.477	0.50	96
CD	214.438	7009	1.485		1.485	1.50	99
CR	205.552	5202	1.438		1.438	1.50	96
CU	324.754	6600	1.421		1.421	↓	95
NI	231.604	6274	1.456		1.456		98
AG	328.068	25263	1.456		1.456		98
ZN	213.856	18366	1.444		1.444	↓	96
PB	220.353	2731	5.002		5.002	5.0	100
AS	193.759	3049	4.582		~~4.582~~		
SE	196.09	1807	2.321		~~2.321~~		

Inst. check std 2

Begin Analysis - Sample Number 18

Elm. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity

Analyze Samples 09-29-1986 @ 14:29:17 -- 16

SB	206.833	0.0000	5780	5780

Calculating Concentrations for Sample Number 18 INST. CHECK STD (2)

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	
SB	206.833	5780	4.752		4.752	5.0	95%

emsl icap-19

Begin Analysis - Sample Number 19

508

9-29-86 JMH

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	-0.0014	1057	1057
SE	196.09	0.0002	1070	1070
CR	205.552	0.0003	3561	3561
SB	206.833	0.0002	1640	1640
IN	213.856	0.0002	12187	12187
CD	214.436	0.0001	4343	4343
PB	220.353	-0.0005	791	791
NI	231.604	0.0000	4460	4460
SE	234.861	-0.0003	23872	23872
CU	324.754	-0.0005	4451	4451

Calculating Concentrations for Sample Number 19 EMSL ICAP-19 range 90-110

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	% rec
SB	206.833	1640	0.954		0.954	.99	96
SE	234.861	23872	0.898		0.898	.96	94
CD	214.438	4343	0.897		0.897	.94	95
CR	205.552	3561	0.948		0.948	1.03	92
CU	324.754	4451	0.925		0.925	1.03	90
NI	231.604	4460	0.965		0.965	1.02	95
IN	213.856	12187	0.948		0.948	1.01	94
PB	220.353	791	0.962		0.962	1.01	95
AS	193.759	1057	0.889		0.889	1.00	—
SE	196.09	1070	0.965		0.965	.99	—

emsl icap-7

Begin Analysis - Sample Number 20

Analyze Samples Imot 09-29-1986 @ 14:34:19 -- 17

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AG	328.068	-0.0001	17666	17666

Calculating Concentrations for Sample Number 20 EMSL ICAP-7

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	TV	rec
AG	328.068	17666	0.985		0.985	1.01	98%

860553 CD 910-SW1

Begin Analysis - Sample Number 21

510

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	603	603
BE	196.09	No Peak!	569	569
CR	205.552	No Peak!	426	426
SB	206.833	No Peak!	596	596
ZN	213.856	0.0001	2830	2830
CD	214.438	No Peak!	310	310
PB	220.353	No Peak!	374	374
NI	231.604	No Peak!	975	975
SE	234.861	No Peak!	238	238
CU	324.754	-0.0001	794	794
AG	328.068	No Peak!	1781	1781

Calculating Concentrations for Sample Number 21 660553 CD-910-SW2

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	596	-0.004	<	0.060
SE	234.861	238	0.001	<	0.005
CD	214.438	310	0.009		0.009
CR	205.552	426	0.012		0.012
CU	324.754	794	0.080		0.080
NI	231.604	975	0.022	<	0.040
AG	328.068	1781	0.000		0.000
ZN	213.856	2830	0.197		0.197
PB	220.353	374	0.094		0.094
AS	193.759	603	0.047		0.047
BE	196.09	569	0.043		0.043

Analyze Samples JMH 09-29-1986 @ 14:39:08 -- 18

360557 CD 910-SW2/SW2Q

Begin Analysis - Sample Number 22

511

9-29-86 JMH

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	605	605
BE	196.09	No Peak!	545	545
CR	205.552	No Peak!	408	408
SB	206.833	No Peak!	614	614
ZN	213.856	-0.0002	655	655
CD	214.438	No Peak!	283	283
PB	220.353	No Peak!	334	334
NI	231.604	No Peak!	995	995
BE	234.861	No Peak!	221	221
CU	324.754	No Peak!	554	554
AG	328.068	No Peak!	1912	1912

Calculating Concentrations for Sample Number 22 660557 SW2/SW2Q

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	614	0.013	<	0.060
BE	234.861	221	0.001	<	0.005
CD	214.438	283	0.003	<	0.005
CR	205.552	408	0.006	<	0.010
CU	324.754	554	0.025		0.025
NI	231.604	995	0.027	<	0.040
AG	328.068	1912	0.009		0.009
ZN	213.856	655	0.022		0.022
PB	220.353	334	0.011		~~0.011~~
AS	193.759	605	0.051		~~0.051~~
BE	196.09	545	-0.001	<	~~0.005~~

660557 duplicate

Begin Analysis - Sample Number 23

Elm. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	580	580
SE	196.09	No Peak!	586	588
CR	205.552	No Peak!	410	410
SB	206.833	No Peak!	598	598

Analyze Samples JMH 09-29-1986 @ 14:49:08 -- 19

ZN	213.856	0.0001	629	629
CD	214.438	No Peak!	278	278
PB	220.353	No Peak!	332	332
NI	231.604	No Peak!	1002	1002
BE	234.861	No Peak!	217	217
CU	324.754	No Peak!	553	553
AG	328.068	No Peak!	1907	1907

Calculating Concentrations for Sample Number 23 660557 duplicate

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	% RPD
SB	206.833	598	-0.002		< 0.060	NC
SE	234.861	217	0.001		< 0.005	↓
CD	214.438	278	0.002		< 0.005	0
CR	205.552	410	0.007		< 0.010	NC
CU	324.754	553	0.025		0.025	NC
NI	231.604	1002	0.029		< 0.040	9.5
AG	328.068	1907	0.008		< .01 0.008	
ZN	213.856	629	0.020		0.020	
PB	220.353	332	0.007		~~0.007~~	
AS	193.759	580	0.004		< ~~0.030~~	
SE	196.09	588	0.078		~~0.078~~	

660557 spike

Ssgin Analysis - Sample Number 24

513

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	606	606
BE	196.09	No Peak!	550	550
CR	205.552	-0.0001	1011	1011
SB	206.833	-0.0002	1093	1093
ZN	213.856	0.0000	2793	2793
CD	214.438	0.0004	475	475
PB	220.353	-0.0002	480	480
NI	231.604	-0.0002	2200	2200
BE	234.861	-0.0005	1175	1175
CU	324.754	-0.0007	1330	1330
AG	328.068	-0.0004	2715	2715

Calculating Concentrations for Sample Number 24 660557 spike

Elem.	Wave-	Net Peak	Calculated	Interference	Net

Analyze Samples 09-26-1986 @ 14:54:50 -- 20

Sym.	length	Intensity	Concentration	Correction	Concentration	spike	% rec
SB	206.833	1093	0.452		0.452	0.5	90
BE	234.861	1175	0.037		0.037	.05	74
CD	214.438	475	0.045		0.045	.05	90
CR	205.552	1011	0.186		0.186	.20	95
CU	324.754	1330	0.204		0.204	.25	72
NI	231.604	2200	0.353		0.353	.40	82
AG	328.068	2715	0.058		0.058	.05	98
ZN	213.856	2793	0.194		0.194	.20	86
PB	220.353	480	0.315		~~0.315~~		
AS	193.759	606	0.052		~~0.052~~		
BE	196.09	550	0.008	<	~~0.008~~		

360557/4 (serial dilution)

Begin Analysis - Sample Number 25

514

9-29-86 JMH

Ele. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Peak Intensity
AS	193.759	No Peak!	620	620
SE	196.09	No Peak!	552	552
CR	205.552	No Peak!	393	393
SB	206.833	No Peak!	622	622
ZN	213.856	No Peak!	408	408
CD	214.438	No Peak!	287	287
PB	220.353	No Peak!	335	335
NI	231.604	No Peak!	992	992
BE	234.861	No Peak!	225	225
CU	324.754	No Peak!	514	514
AG	328.068	No Peak!	1935	1935

Calculating Concentrations for Sample Number 26 660561 CD-910 - TB

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration
SB	206.833	622	0.020	<	0.060
SE	234.861	225	0.001	<	0.005
CD	214.438	287	0.004	<	0.005
CR	205.552	393	0.002	<	0.010
CU	324.754	514	0.016	<	0.025
NI	231.604	992	0.026	<	0.040
AG	328.068	1935	0.010		0.010
ZN	213.856	408	0.002	<	0.020
PB	220.353	335	0.013		0.013
AS	193.759	620	0.078		0.078
SE	196.09	552	0.012	<	0.040

660565 CD 910-FB

Begin Analysis - Sample Number 27

9-29-86 [illegible]

Elem. Sym.	Wave-length	[illegible]	Mean Peak Intensity	[illegible]
AS	193.759	[illegible]	1013	1013
BE	196.09	[illegible]	966	966
CR	205.552	0.0001	3125	3125
SB	206.833	0.0004	1407	1407
ZN	213.856	[illegible]	10674	10674
CD	214.438	0.0002	3728	3728
PB	220.353	0.0000	747	747
NI	231.604	-0.0002	3910	3910
BE	234.861	-0.0003	21378	21378
CU	324.754	-0.0003	3942	3942

Calculating Concentrations for Sample Number [illegible] EMSL ICAP-19

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correct.	Net Concentration	TV	% rec
SB	206.833	1407	0.913		0.913	.99	92
BE	234.861	21378	0.980		0.980	.96	102
CD	214.438	3728	0.919		0.919	.94	98
CR	205.552	3125	1.030		1.030	1.03	100
CU	324.754	3942	1.012		1.012	1.03	98
NI	231.604	3910	1.018		1.018	1.02	100
ZN	213.856	10674	0.975		0.975	1.01	97
PB	220.353	747	1.091		1.091	1.01	108
AS	193.759	1013	1.088		~~1.088~~		
BE	196.09	966	0.952		~~0.952~~		

Elem. Sym.	Wave-length	Mean Peak Position	Mean Peak Intensity	Net Intensity
AG	328.068	-0.0005	16707	16707

Analyze Samples jmct 09-29-1986 @ 15:30:47 -- 26

Calculating Concentrations for Sample Number 33 EMSL ICAB-7

Elem. Sym.	Wave-length	Net Peak Intensity	Calculated Concentration	Interference Correction	Net Concentration	T✓	
AG	328.066	16707	0.926		0.926	.99	94%

517

ANALYST [illegible]

Page No. 3 1 of 2 DATE 10/6/86-10/7/86

TEST: CN

CLIENT	LAB No	mls sample Distilled	mls absorbing sol'n	%T	µg	mg/l	NOTES	FRCN
1 TS = 56% NJDEP	660533	1.2174g in 500	50	99.8	—	<7.3 mg/kg DRY	BOT # K-[illegible] I.D. CD-910-S01 <5µg × 50/50 / 1.2174g @ 50/100 = <7.3 mg/kg	
2 TS = 70% NJDEP	537	1.0030g in 500	50	99.7	—	<7.1 mg/kg DRY	BOT # K-[illegible]3 I.D. CD-910-S02 <5µg @ 50/50 / 1.0030g @ 70/100 = <7.1 mg/kg DRY	
3 TS = 70% NJDEP (DUP)	537	1.0094g in 500	50	99.8	—	<7.1 mg/kg DRY	BOT # K-4C5 I.D. CD-910-S02 <5µg @ 50/50 / 1.0094 @ 70/100 = <7.1 mg/kg DRY	Δ = 0
4 TS = 70% NJDEP (100µg SPIKE)	537	1.2008g in 500	10	85.0	8.7µg		BOT # K-4C5 I.D. CD-910-S02 Would be 8.7 should be 10 = D/[illegible] × 100 = 87%	87% Rec
5 CRDL STANDARD	1 ml of 1.5µg → 250 ml	—	50	91.8	4.5µg		4.5/5.0 @ 100% = 90%	90% Rec
6 TS = 59% NJDEP	660541	1.1415g → 500	50	100.3	—	<7.4 mg/kg DRY	BOT # K-4C[illegible] I.D. CD910-S1 <5µg @ 50/50 / 1.1415g @ 59/100 = <7.4 mg/kg DRY	
7 TS = 93% NJDEP	545	1.1405g → 500	50	97.8	—	<4.7 mg/kg DRY	BOT # K-4C4 I.D. CD-910-S2 <5µg @ 50/50 / 1.1405g @ 93/100 = <4.7 mg/kg DRY	
8 TS = 90% NJDEP	549	1.6078 → 500	50	98.3	—	<3.5 mg/kg DRY	BOT # K-4C8 I.D. CD 910-S3 <5µg @ 50/50 / 1.6078g @ 90/100 = <3.5 mg/kg DRY	
9 4 ml of 1.5µg → 500 mls	40 µg/l STANDARD	* 500	50	70.6	19.0µg	38*	38*/40* @ 100% = 95%	95% Rec
10 NJDEP	660882	500	50	98.7	—	<10*	BOT # H-52[illegible] MW-1	
11 NJDEP	886	500	50	100.0	—	<10*	BOT # H-514 MW-2A	
12 NJDEP (DUP)	886	500	50	99.3	—	<10*	BOT # H-514 MW-2A	Δ = 0
13 NJDEP (100µg SPIKE)	886	500	10	85.5	8.5µg	85*	BOT # 509 MW-2A 85* - 0* / 100* @ 100% = 85% Rec	85% Rec
14 BLANK (50µg)	BLANK	500	50	99.4	—	<10*		
15 STANDARD	10 ml of 1.5µg → 250 ml	—	50	44.9	44µg		44µg / 50µg @ 100% = 88%	88% Rec
16			Continued next page					

$$\%REC = \frac{\text{SPIKED RESULT} - \text{DUPLICATE}}{\text{SPIKED AMT}} \times 100$$

* = µg/l

518

ANALYST Lyn M Daniels

Page No. 4

2 of 2

DATE 10/6 - 10/7/86

TEST : CN

CLIENT	LAB NO	ml Sample Distilled	ml absorbing sol'n	%T	µg	mg/l	NOTES	FRCN
NJDEP	660890	500	50	95.8	—	<10*	BOT #: H-506 I.D. MW-5	
NJDEP	894	500	50	100.9	—	<10*	BOT #: H-513 I.D. MW-6	
NJDEP	898	500	50	99.2	—	<10*	BOT #: H-510 I.D. DUP-1	
NJDEP	902	500	50	99.7	—	<10*	BOT #: H-500 I.D. TB-1	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

$$\%REC = \frac{\text{SPIKED RESULT} - \text{DUPLICATE}}{\text{SPIKED AMT}} \times 100$$

* = µg/l

5/9

ANALYST [illegible]

Page No. 2

DATE 10/3/06

TEST: CN

CLIENT	LAB NO	ml sample Distilled	ml absorbing sol'n	%T	µg	mg/l	NOTES	FRCN
NJDEP	660553	500	50	99.4	—	<10*	Bot. # H-404 I.D. CD910-SW1	
NJDEP	660557	500	50	99.4	—	<10*	Bot. # H-401 I.D. CD910-SW2	
NJDEP (DUPLICATE)	660557	500	50	99.5	—	<10*	Bot. # H-401 I.D. CD910-SW2	Δ = 0%
NJDEP (100 ug SPIKE)	↓ 557	500	10	83.4	9.7 ug	97*	Bot # H-405 I.D. CD910-SW2 $\frac{9.7 \times 100c}{500} @ \frac{50}{10} = 97$ ug/l	97% Rec
NJDEP	660565	500	50	100.9	—	<10*	Bot # H-402 I.D. CD910-FB	
NJDEP	561	500	50	100.7	—	<10*	Bot # H- I.D. CD910-TB	
4 mls/500 (2 ml 19.5 ug std) (LTD)	40 ug/l STANDARD	500	50	69.9	19.5 µg	39*	$\frac{39*}{40*} @ 100\% = 97.5\%$	97.5%
8 BLANK	BLANK	500	50	100.7	—	<10*		
(CRDL) 9 STD	1 ml of 1.5 ug std → 250 ml	—	50	92.0	4.5 ug		5 ug/250 ml $\frac{4.5 ug}{5.0 ug} @ 100\% = 90\%$	90%
10 STD	5 ml of 1.5 ug std → 250	—	50	59.6	27 ug		25 ug/250 ml $\frac{27 ug}{25 ug} @ 100\% = 108\%$	108%
11								
12								
13								
14								
15								
16								

$$\%REC = \frac{\text{SPIKED RESULT} - \text{DUPLICATE}}{\text{SPIKED AMT}} \times 100$$

* = ug/l

ANALYST Patricia W. Pat

DATE: Sept 23, 1986

PHENOLS

CLIENT N.J.DEP.	LEB NO/BOTTLE#	ML SAMPLE	%T	ug	ug mg/kg
1. CD910-SED1	660533/K400	10g/500	97.2	.6	.11
2. CD910-SED2	660537/K403	10g/500	100.3	—	<.07
3. CD910-S-1	660541/K407	10g/500	100.8	—	<.085
4. CD910-S-2	660545 Rep/K404	10g/500	97.0	.6	.065
5. CD910-S-3	660549/K408	10g/500	96.6	.6	.067
6. CD910-SW1	660553/I(P)404	400	109.0	—	<
7. CD910-TB	660561/I(P)400	500	112.6	—	<
8.	660977	200	91.	1.4	7
9/24/86 9. CD910-SW2/I	660557/I(P)403	500	108.7	—	<.11
10.					

UPLICATE

CD-910-SW2 LAB # 660557 ML SAMPLE 500 %T 110.4 ug — ug/l <
(1) I(P)403

SPIKE

CD-910-SW2Q LAB # 660557 ML SAMPLE 500 %T 100.2 ug — ug/l —
I(P)411 (BOTTLE)

SAMPLE INTERFERENCE

MICROGRAMS SPIKED 5 % RECOVERY —

Insufficient sample for a Re Run

STANDARD 1ml = 10ug

1. ML STANDARD .45	%T 88	ug 2.2	ug/l	P.N. .94
2. ML STANDARD	%T	ug	ug/l	

REFERENCE NO. 22

Preliminary Assessment

Cornell Dubilier Electronics Inc.
333 Hamilton Boulevard
South Plainfield
Middlesex County, New Jersey

PRELIMINARY ASSESSMENT FILE SEARCH

NJDEP

DIVISION OF WATER RESOURCES:

A. Enforcement _____

B. Groundwater _____

C. Other Central Files 3-6620 nothing

DIVISION OF WASTE MANAGEMENT:

A. HSMA Mike Belvisio 3-7710 nothing

B. Enforcement BFO Central Region Hightstown 426-0700 - has file

C. Solid Waste Nancy-file room 2-6070 nothing

ENVIRONMENTAL QUALITY:

A. Air Pollution 426-0796 nothing

B. Pesticides _____

C. Other _____

DIVISION OF FISH AND GAME: _____

OFFICE OF SCIENCE AND RESEARCH: _____

A. Industrial Survey 4-3026 nothing

B. Other _____

N.J. DEPARTMENT OF HEALTH: _____

LOCAL AUTHORITIES:

A. Health Department S. Plainfield 201 754-9000 Donna Ostman

B. Town or County Clerk Tax Assessor 754-9000

UNITED STATES GOVERNMENT:

A. EPA _____

B. other _____

Cornell Dubilier Electronics Inc.
333 Hamilton Blvd.
South Plainfield
Middlesex County, New Jersey

Cornell - Dubilier Electronics Inc. was located at 333 Hamilton Boulevard in South Plainfield, Middlesex County. The company tested transformer oils at this location for an unknown period of time until they vacated the site in 1961. The site is now known as the Hamilton Industrial Park and is occupied by approximately 20 industries.

Cornell - Dubilier allegedly dumped PCB contaminated transformer oil directly onto soil at this site during the 1950's and 1960's. Former employees also claim that transformers were buried behind the facility. A 1985 inspection conducted by Mike Proietti of NJDEP and Donna Ostman of the South Plainfield Health Department revealed stained soil in the rear of the facility. However, there are no records indicating that any samples were taken to confirm the presence of PCB contamination at the site.

A high priority for inspection has been given to this site based upon the lack of analytical data to verify potential PCB contamination.

Submitted by:

Leslie Solomon
HSMS IV
MSCA Project
August 11, 1986

Hours to complete 20

LS/dlh

EPA

POTENTIAL HAZARDOUS WASTE SITE. PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER

II. SITE NAME AND LOCATION

01 SITE NAME	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Cornell Dubilier Electronics Inc.	333 Hamilton Blvd.

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
South Plainfield	NJ	07080	Middlesex		

09 COORDINATES LATITUDE	LONGITUDE	
40° 34' 35"	74° 24' 51"	Block: 256 Lot: 1

10 DIRECTIONS TO SITE

Route 1 North take Plainfield Ave. jughandle across route 1 and follow road about 2 miles to Hadley Road. Make a ri ht on Hadley Rd. and follow to end. ~~Make a left on Durham Ave. bear right at fork (becomes Hamilton Blvd.) Facility is~~ 3/4 mile down on right

III. RESPONSIBLE PARTIES

01 OWNER	02 STREET
nsr of Newark	70 Blanchard Street

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Newark	NJ	07100	(201) 589-4200

07 OPERATOR	08 STREET
Cornell-Dubilier Electronics Inc.	145 Highway 46

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Wayne	NJ	07470	(201) 256-2000

13 TYPE OF OWNERSHIP (Check one)

☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. CERCLA 3001 DATE RECEIVED _____ (Month Day Year) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED _____ (Month Day Year) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

☒ YES DATE 1 4 85 (Month Day Year)
☐ NO

02 (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)

CONTRACTOR NAME(S): _____

03 SITE STATUS (Check one)	04 YEARS OF OPERATION
☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN	unknown (Beginning Year) 1961 (Ending Year) ☒ UNKNOWN

05 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Polychlorinated biphenyls

06 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

PCB contaminated transformer oil was allegedly dumped on site. Areas of soil contamination have been observed and potential for ground water contamination and direct contact exists.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☒ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Mike Proietti	DHWM - Bureau of Field Operations	(609) 426-0700

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Leslie Solomon	DEP	DHWM-BSA	(609) 633-3317	8 11 86 (Month Day Year)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER _____ (Specify)
- ☒ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS _____
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☒ A. TOXIC
- ☐ B. CORROSIVE
- ☒ C. RADIOACTIVE
- ☒ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE	approx. 1000	gallons	
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	component	of oily waste	
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently used CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENT
OLW	~~transformer oil~~	ggg	dumped on soil		
OCC	PCB	1336-36-3	same as above	unknown	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Memo from Mike Proietti, 3/12/85 - Div. of Waste Management, Field Operations file
Incident report 11/30/84- Div. of Waste Management, Field Operations Files

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [ ] A GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

PCB contaminated transformer oil dumped directly on soil may have contaminated ground water beneath site. (Attachments B and C)

01 [ ] B SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 [ ] C CONTAMINATION OF AIR — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 [ ] D FIRE/EXPLOSIVE CONDITIONS — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 [ ] E DIRECT CONTACT — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

Potential for direct contact exists since transformer oil was dumped directly on open land in the rear of the facility.
(Attachments B and C)

01 [X] F CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE 3-12-85) — [ ] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (acres) — 04 NARRATIVE DESCRIPTION

A portion of the lot located in back of the facility was found to contain a black soil unnatural to this area. This was presumed to be where the transformer oil was dumped. (Attachments B and C)

01 [ ] G DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

Workers may have been exposed to PCB's present in the transformer oil.
(Attachments B and C)

01 [ ] H WORKER EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 [ ] I POPULATION EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ J. DAMAGE TO FLORA
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ K. DAMAGE TO FAUNA
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ L. CONTAMINATION OF FOOD CHAIN
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

PCB contaminated transformer oil was allegedly dumped outside facility.
Stained soil was observed in a lot in the back of the facility. (attachments B and C)

01 ☐ N. DAMAGE TO OFFSITE PROPERTY
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

Former employees of Cornell - Dubilier claim that transformers were buried on site.

V. SOURCES OF INFORMATION

Attachment A- Memo regarding Cornell Dubilier from South Plainfield Dept. of Health.
Attachment B- Memo from Mike Proietti, 3/12/85-Waste Management, Field Operations files
Attachment C- Incident Report 11/30/84-Waste Management, Field Operations files

EPA FORM 2070-12 (7-81)

REFERENCE NO. 23

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION
01 STATE: NJD | 02 SITE NUMBER: 8815578 79

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	Cornell Dubilier Electronics Inc.
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER	333 Hamilton Blvd.
03 CITY	South Plainfield
04 STATE	NJ
05 ZIP CODE	07080
06 COUNTY	Middlesex
07 COUNTY CODE	12
08 CONG DIST	
09 COORDINATES LATITUDE	40 34 35.
LONGITUDE	74 24 51.
10 TYPE OF OWNERSHIP (Check one)	XX A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION (MONTH DAY YEAR)	9, 11, 86
02 SITE STATUS	☐ ACTIVE XX INACTIVE
03 YEARS OF OPERATION (BEGINNING YEAR / ENDING YEAR)	unknown / 1961 — X UNKNOWN
04 AGENCY PERFORMING INSPECTION (Check all that apply)	☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR XX E. STATE ☐ F. STATE CONTRACTOR ☐ G. OTHER

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
Richard Gervasio	Supervising Environ. Tech.	NJDEP/HWM	609 292-7695

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO
Leslie Solomon	HSMS IV	"	( ) "
Debbie Mazur	HSMS III	"	( ) "
Frank Faranca	HSMS IV	"	( ) "
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Lester Pave	Supervisor	333 Hamilton Blvd.	( )
Harry Sprague	Maintenance	S. Plainfield, N.J.07080	( )
			( )
			( )
			( )
			( )

BLOCK 256 LOT 1

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	9:35 a.m.	Overcast, 72° F, slight breeze

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Mike Proietti	NJDEP/Hazardous Site Mitigation Admin	609 426-0700

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE (MONTH DAY YEAR)
Frank Faranca	BSA	NJDEP	633-2219	99 12 86

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, PELLETS
- ☐ C. SLUDGE
- ☐ D. OTHER _____ (Specify)
- ☒ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☒ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☒ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OIL WASTE	approx.	1,000	gallons
SOL	SOLVENTS			
PSO	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	components of oily waste		
IOC	INORGANIC CHEMICALS			
ACO	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OLW	Transformer oil	999	dumped on soil	unknown	
	PCB	1336-36-3	same as above	"	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NJDEP - BSA
65 Prospect St
Trenton

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: N.J
02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

PCB contaminated transformer oil dumped directly on soil may have contaminated groundwater beneath site.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

A tributary to Bound Brook lies on the northeast border of the site. PCB contamination may have migrated to this stream.

01 [ ] C. CONTAMINATION OF AIR — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

01 [ ] D. FIRE/EXPLOSIVE CONDITIONS — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

01 [X] E. DIRECT CONTACT — 03 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

Potential for direct contact exists since transformer oil was dumped directly on open land in the rear of the facility.

01 [X] F. CONTAMINATION OF SOIL — 02 [X] OBSERVED (DATE 3/12/85) — [ ] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

A portion of the lot located in the back of the facility was found to contain a black soil unnatural to this area. This was presumed to be where the transformer oil was dumped.

01 [X] G. DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

Workers may have been exposed to PCB's present in the transformer oil.

01 [ ] H. WORKER EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None reported.

01 [ ] I. POPULATION EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☒ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

PCB contaminated transformer oil was allegedly dumped outside of the facility. Stained soil was observed in a lot in the back of the facility.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

Transformer oils contaminated with PCB's were alleged to be dumped on the ground.

03 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

Former employees of Cornell-Dubilier claim that the transformers were buried on site.

V. SOURCES OF INFORMATION

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A NPDES				
☐ B UIC				
☐ C AIR				
☐ D RCRA				
☐ E RCRA INTERIM STATUS				
☐ F SPCC PLAN				
☐ G STATE (Specify)				
☐ H LOCAL (Specify)				
☐ I OTHER (Specify)				
☐ J NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
XX C. DRUMS, ABOVE GROUND	observed in stream	
XX D. TANK, ABOVE GROUND	4 tanks	
☐ E. TANK, BELOW GROUND		
XX F. LANDFILL	unknown	
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER _____ (Specify)		

04 TREATMENT (Check all that apply)
☐ A. INCINERATION
☐ B. UNDERGROUND INJECTION
☐ C. CHEMICAL/PHYSICAL
☐ D. BIOLOGICAL
☐ E. WASTE OIL PROCESSING
☐ F. SOLVENT RECOVERY
☐ G. OTHER RECYCLING/RECOVERY
☐ H. OTHER _____ (Specify)

05 OTHER
☐ A. BUILDINGS ON SITE

06 AREA OF SITE
_____ (Acres)

07 COMMENTS

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKES, LINERS, BARRIERS, ETC.

4 large black tanks were observed on the edge of a large filled-in area. These tanks are at the top of an embankment leading down to the stream.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: XX YES ☐ NO

02 COMMENTS

Property not fenced. Easily accessable to unauthorized personnel.

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as appropriate)

	SURFACE	WELL
COMMUNITY	A. ☐	B. ☐
NON-COMMUNITY	C. ☐	D. ☒

02 STATUS

	ENDANGERED	AFFECTED	MONITORED
	A. ☐	B. ☐	C. ☐
	D. ☒	E. ☐	F. ☐

03 DISTANCE TO SITE

A. _____ (mi)
B. ½ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Unused other sources available) ☐ D. NOT USED, UNUSABLE

02 POPULATION SERVED BY GROUND WATER _____

03 DISTANCE TO NEAREST DRINKING WATER WELL _____ (mi)

04 DEPTH TO GROUNDWATER _____ (ft)

05 DIRECTION OF GROUNDWATER FLOW _____

06 DEPTH TO AQUIFER OF CONCERN _____ (ft)

07 POTENTIAL YIELD OF AQUIFER _____ (Gal)

08 SOLE SOURCE AQUIFER ☐ YES ☐ NO

09 DESCRIPTION OF WELLS (Including storage, depth, and location relative to population and buildings)

10 RECHARGE AREA
☒ YES
☐ NO
COMMENTS

11 DISCHARGE AREA
☐ YES
☐ NO
COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Tributary to Bound Brook	☐	on site (mi)
Spring Lake	☐	½ (mi)
	C	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE A. thousands (NO. OF PERSONS)
TWO (2) MILES OF SITE B. thousands (NO. OF PERSONS)
THREE (3) MILES OF SITE C. thousands (NO. OF PERSONS)

02 DISTANCE TO NEAREST POPULATION ½ (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE _____

04 DISTANCE TO NEAREST OFF-SITE BUILDING _____ (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE

☐ A. 10^{-6} – 10^{-8} cm/sec ☐ B. 10^{-4} – 10^{-6} cm/sec ☐ C. 10^{-4} – 10^{-6} cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK

☐ A. IMPERMEABLE ☐ B. RELATIVELY IMPERMEABLE ☐ C. RELATIVELY PERMEABLE ☐ D. VERY PERMEABLE

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
_____ (ft)	_____ (ft)	_____

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
2.75 (in)	_____ (in)	_____ %		_____ %

09 FLOOD POTENTIAL	10
SITE IS IN _____ YEAR FLOODPLAIN	☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS	12 DISTANCE TO CRITICAL HABITAT
ESTUARINE: A. _____ (mi) OTHER: B. ¼ (mi)	_____ (mi) ENDANGERED SPECIES: _____

12 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS, NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS PRIME AG LAND	AGRICULTURAL LANDS AG LAND
A. _____ (in)	B. _____ (mi)	C. ¼ (in)	D. _____ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site is characterized by an area of 7 to 10 industrial buildings clustered on the north-west section of the property. Proceeding towards the back of the property (south-east), a large open field is encountered. This field apprears to be recently filled, and may have been a wetland area at one time. Based upon the large wetland off-site to the southwest. A tributary to Bound Brook lies on the north east border of the property.

VII. SOURCES OF INFORMATION

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	none		
SURFACE WATER	2	H2M, Melville, N.Y.	
WASTE	none		
AIR	none		
RUNOFF	none		
SPILL	none		
SOIL	3	H2M, Melville, N.Y.	
VEGETATION	none		
OTHER	2	(Trip blank & field blank).	

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF N.IDEP
(Name of organization or individual)

03 MAPS ☐ YES ☒ NO

04 LOCATION OF MAPS

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. CURRENT OWNER(S)				PARENT COMPANY (If applicable)			
01 NAME DSC of Newark		02 D+B NUMBER		08 NAME		09 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.) 70 Blanchard Street		04 SIC CODE		10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE	
05 CITY Newark	06 STATE N.J	07 ZIP CODE 07100		12 CITY	13 STATE	14 ZIP CODE	
01 NAME		03 D+B NUMBER		08 NAME		09 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		12 CITY	13 STATE	14 ZIP CODE	
01 NAME		02 D+B NUMBER		08 NAME		09 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		12 CITY	13 STATE	14 ZIP CODE	
01 NAME		02 D+B NUMBER		08 NAME		09 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		12 CITY	13 STATE	14 ZIP CODE	

III. PREVIOUS OWNER(S) (List most recent first)				IV. REALTY OWNER(S) (If applicable, list most recent first)			
01 NAME		02 D+B NUMBER		01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		05 CITY	06 STATE	07 ZIP CODE	
01 NAME		02 D+B NUMBER		01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		05 CITY	06 STATE	07 ZIP CODE	
01 NAME		02 D+B NUMBER		01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		05 CITY	06 STATE	07 ZIP CODE	

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. CURRENT OPERATOR			OPERATOR'S PARENT COMPANY		
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER				

III. PREVIOUS OPERATOR(S)			PREVIOUS OPERATORS' PARENT COMPANIES		
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD				
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD				
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD				

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. ON-SITE GENERATOR

01 NAME	03 D+B NUMBER	
02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	03 D+B NUMBER	01 NAME	03 D+B NUMBER
02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	03 D+B NUMBER	01 NAME	03 D+B NUMBER
02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	03 D+B NUMBER	01 NAME	03 D+B NUMBER
02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	03 D+B NUMBER	01 NAME	03 D+B NUMBER
02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	02 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling records, reports)

EPA FORM 3070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS WASTE MANAGEMENT
John J. Trela, Ph.D., Acting Director
CN 028
Trenton, N.J. 08625
609 - 292 - 1250

CORNELL DUBILIER ELECTRONICS INC.
333 Hamilton Blvd.
South Plainfield / Middlesex County

Cornell - Dubilier Electronics Inc. (CDE) was located at 333 Hamilton Blvd. 1: South Plainfield, Middlesex County. The company tested transformer oils at thi location for an unknown period of time until they vacated the site in 1961. Th site is now known as the Hamilton Industrial Park and is occupied b approximately 20 industries. CDE allegedly dumped PCB contaminated transforme oil directly on to soil at this site during the 1950's and 1960's.

A pre-sampling assessment was performed at the site on 8/20/86 by Leslie Solomo and Richard Gervasio of the Bureau of Site Assessment. Measurements fo volatile organic compounds were taken throughout the site using the OVA and Ti Instruments to determine potential sampling sites. Readings taken at the sit showed levels well above background, expressing a need for sampling.

A site inspection was conducted on September 11, 1986. Two surface wate samples, three soil samples, trip blank, quality control and field blank sample were taken. NJDEP personnel sampling were Dick Gervasio, Leslie Solomon, Debbi Mazur and Frank Faranca.

The surface water sample #1 and sediment sample #1 were taken at an upstrea location beyond two large 8'x50' circular concrete pipes. Surface water sampl #2, surface water #2 (quality control) and sediment sample #2 were take downstream of the culverts. Soil samples #1, #2 and #3 were taken at variou locations on the site. A trip blank accompained the samples. Field blank wa prepared on site.

Since groundwater sampling was not possible, an area of concern for futur sampling could be a domestic well from a homeowner directly off site.

Submitted by,

Frank Faranca
HSMS IV
NJDEP/DHWM/BSA

New Jersey Is An Equal Opportunity Employer

REFERENCE NO. 24

Form ADM-012

MEMO

NEW JERSEY STATE DEPARTMSNT OF ENVIRONMENTAL PROTECTION

TO Vince Krisak and File MP

DATE March 12, 1985

FROM Mike Proietti through Bruce Comfort

SUBJECT Cornell Dubellier - New Market Road & Hanilton Blvd.
South Plainfield DWM #84-11-30-03C

November 30, 1984

Charles Grimm, a former employee of Federal Pacific Electric called to report that F.F.E. bought the Cornell Dubellier Company years ago and since have been abandoned for many years. The lot behind this abandoned company was saturated with transformer oil. It was dumped at this site during the 1950's and 1960's along with the possibility of electric transformer burial. The site is now known as Hamilton Industrial Park with many different companies occupying the existing buildings.

December 5, 1984

1145 hrs. - I spoke with Laszio Szabo (Middlesex County Health Dept.) to verify locations of said company. He reported that the Cornell Dubellier company moved out of the area 20+ years ago. They were in the business of testing transformer oils at this facility and allegedly discarded them to the rear of the property near a swampy area. Mr. Szabo said he would have one of his inspectors check the site out.

December 19, 1984

1036 hrs. - I called MCHD and was referred to Mr. Hershey at the Middlesex County Environmental Commission. I could not contact him. I then called Mr. Grimm to procure any additional information on the C.D. site. He explained that F.P.E. bought C.D. and was running a similar operation here. The whole rear of the property waa saturated with PCB contaminated transformer oil and he believes that some transformers were also buried there. He got his information from former employees of Cornell Dubellier.

December 26. 1984

1140 hrs. - Mr. Hershey called regarding C.D. He said he was not familiar with it but took all of the information and will brief Dennis Malinowski on it so a meeting could be arranged.

1610 hrs. - Donna Ostman, South Plainfield H.D. (201-754-9000 Ext. 32), called and was assigned the case. She was out to the site and reported that the soil appeared unnaturally dark but was not able to determine if there was any transformer burial. She said a lot of the site was a swampy area and was rather inaccessible. She added that the company closed in the late 1950's and that other businesses were occupying the site. I told her I would call before setting up the investigation.

Attachment

1615 hrs. - Dennis Malinowski called and wanted to know what tests we would perform to determine contamination. I told him that a visual inspection would be done first. I would determine the property owner and request that he take soil samples in the alleged contaminated area. Perhaps a water sample should be taken in the swamp area to delineate full scope of contamination.

January 4, 1985

1000 hrs. - I arrived at New Market Road and Hamilton Blvd. location to a large group of buildings with a sign, Hamilton Industrial Park. I took down two phone numbers which indicated they belonged to the owner. I met with Donna Ostman from South Plainfield H.D. and proceeded to the rear of the property behind the various companies occupying the buildings on site. At the rear of this property is a large vacant field, roughly 2-3 acres which is being unused. An area of approx. 100' X 100' next to the parking areas access road was found to contain very dark, almost black soil. This, according to Donna Ostman is unnatural to this area. In digging down 2" to 4" this soil remained the same color and consistenty. Thre was also much demolition debris and solid waste debris partially buried back here. It appears that the grade of this area has been increased dramatically from the original with the filling in of earth and the debris. In continuing to the far corner of the field area there Is a swamp area which Is roughly 5'- 8' lower than the large portion of the empty field. This may have been closer to the original grade of the property before the foreign material was moved here. The on site superintendent was found out to be a Steve Bushel but he was not in. We proceeded to inspect other areas on the site and found unlabeled drums with small amounts of oil in them. The tenant approached us and I told him not to have these unlabeled, uncovered drums stored to the rear of the property. He imoediately proceeded to have a truck and cleaned them up. I then explained to him what I was here for and he said he would let Mr. Bushel know when he sees him. Some of the other activities occupying this complex are: a brake lining grinding company, a beauty and cosmetic produtts company, Tire Warehouse, machine shop, excavation contractor, paper company. I will be notifying the owner by phone and ask him to take a soil sample for PCB transformer oil content. Also, there was no sign of spillage or contamination being caused by the existing companies occupying the Hamilton Industrial Park.

January 11, 1985

1011 hrs. - Called Steve Bushel (201-589-4200) Not in. Will return call: X (201-753-4004).

Febrnary 4, 1985

Spot checked site while in area. No evidence of any dumping or unusual activity. Arrived 1045. Reported 1100.

March 12, 1985

Will be contacting Steve Bushel regarding soil sampling.

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Policies and Practices for Managing Middlesex County's Groundwater Resources

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middlesex county planning board, n.j.

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POLICIES AND PRACTICES FOR MANAGING MIDDLESEX COUNTY'S GROUNDWATER RESOURCES

PREPARED BY THE
ENVIRONMENTAL SYSTEMS SECTION
MIDDLESEX COUNTY PLANNING BOARD
NEW BRUNSWICK, N.J.
SEPTEMBER 1974

TEXT REVISED AND REPRINTED
JANUARY 1979

05936

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Middlesex County
Board of Chosen Freeholders

Middlesex County
Planning Board

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ACKNOWLEDGEMENT

Many people have contributed their tiae and expertise during chis study. The Middlesex Councy Water Supply Advisory Committee provided support and encouragement for che scudy and several members of che Committee provided data and information. Mr. Joseph Miller and Mr. Daniel Dombroski, Jr., of the N.J. Departaent of Environmental Protection - Bureau of Geology and Topography provided information on specific well locations and Mr. Raymond Webster of the NJDEP Bureau of Water Allocating provided data on groundwater withdrawals in the County. Mr. William Kann and Mr. George Farlekas of the United State Geological Survey provided useful water quality data and geophysical logs during the early stages of this study. We are thankful of these gentlemen for cheir cooperation and assistance.

The members of the Middlesex County Water Supply Advisory Committee provided significant advice and assistance during the preparation of this study and reviewed the final reporc.

At its meeting of Noveaber 21, 1974 the Committee unanimously adopted a motion approving and accepting this study and directed that ic be forwarded to che Middlesex County Planning Board for its consideration.

Middlesex County
Water Supply Advisory Committee

Mr. Elaer Dieker, Chairman
Mr. Edward Bastian -Middlesex Water Company
Mr. Thomas Cawley - Elizabethtown Water Company
Mr. Martin E. Langenohl - Perth Amboy Water Department
General William Whipple - Water Resources Research Institute - Rutgers Univ.
Mr. Alvin Zach - Newark Department of Engineering
Mr. Robert Frisch - Attorney
Mr. Russell Fleming - Attorney
Mr. John Marshall - Duhernal Water Company
Mr. Donald Carey - New Brnnswick Water Department

PREFACE

Under county planning enabling legislation adopted by the Stace of New Jersey in 1935, the Middlesex County Planning Board has the responsibility for developing a County-wide comprehensive master planning proeram. Such a program must consider the patterns, relationships and impacts of land use development within the context of promoting che public health and welfare. This concern for public health and welfare requires that comprehensive land use planning consider the impacts of such development on Middlesex County's natural resources and features.

During recent years the Middlesex County Planning Board has been engaged in identifying and assessing the environmental impact of land use development to such areas as air and water quality, natural resources, solid waste and water supply.

The preparation of this report has been carried out as a means to identify the availability of groundwater supplies in Middlesex County and the determination of how such supplies can best ben protected to insure che continued availability co che County.

This report represents a first step in the process of addressing che interrelationships of water supply and water quality and will become an integral component of the County's water supply and water quality planning programs which are being carried out in response to the need for greater understanding and awareness of the major water supply needs and problems facing State, regional and local decision-makers so that agreements can be reached to insure the future water supply needs of che County's residents, businesses and industries are properly and adequately met.

Over the period of time chis report was prepared Middlesex County has been the recipient of federal funds under Section 208 of the Water Pollution Control Act Amendments (PL 92-500). Such funds have been used to develop Middlesex County's Water Resource Management Program of which groundwater management planning forms a significant element. This report has been revised and updated to account for study efforts undertaken since 1975.

The staff responsible for the preparation of this report included:

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I. INTRODUCTION

The Middlesex County Planning Board and the Middlesex Councy Wacer Supply Advisory Committee have long supported research in the area of water supply planning and management in Middlesex County. As part che che Board's comprehensive planning program specific plans for the provision of water supplies through the year 2000 have been prepared and adopted. In order to meet the needs of Middlesex County in the year 2000, under growth levels projected by the Planning Board Staff in 1978, the County would reauire a supply of 160 million gallons of water per day compared against 1975 estimated demands of 102 million gallons per day.

Table 1 below compares the estimated (1970) sources of water supply available to Middlesex County against those called for in the Middlesex County Planning Board's adopted water supply plan:

TABLE 1

Water Supply Resources - Raritan Basin
(million gallons/day)

	1970	2000
Delaware and Raritan Canal	36	36
Six Mile Run Reservoir	Programmed for Construction	14 of 38*
Allocated Raritan River Surface Diversion	24 of 80	50 of 80*
Spruce Run/Round Valley Reservoir System	190*	190*
Confluence Reservoir	Programmed for Construction	15 of 60*
Crab Island Reservoir	Feasibility Studies to be Completed	100**
Lawrence Brook System	6.5	6.5
Middlesex County Groundwater	63 of 130	130
	129.5	351.5

* No committment has been made to provide water from supply source to Middlesex County - Other areas in N.J. are in competition for this water.

** Should this project be found unfeasible for environmental or economic reasons, an alternative source of 100 mgd will need co be found.

Water supply sources for the year 2000, shown in Table 1, indicate that over half the water supplied to Middlesex County will be from surface and groundwater sources within the County's borders. The need for the County to insure its future water supply is underscored by the fact that Middlesex County lies at the lower end of the Rarlcan River Easin and furthest away from the major surface water supply reservoirs at the Spruce Run/Round Valley complex. The County presently relies on surface water supplies from the Delaware and Raritan Canal, the Lawrence Brook reservoir system and from the Raritan River in addition to groundwater sources within its borders. In addition the State of New Jersey has estimated that the urbanized northeastern region must rely more on the Raritan River Basin for water supplies for three reasons: surface supplies in the northern portion of the State are limited in capacity; new large-scale reservoir sites no longer remain in this area; the development of the proposed Tocks Island Dam and Reservoir project on the Delaware River as a major New Jersey water supply sourte appears, at the presenc time unlikely. This will mean thac the major wacer supply facilities in the Raritan River Basin will need to serve noc only the councies of Morris, Huncerdon, Somerset and Middlesex, but aust provide some level of supply to Union, Essex, Hudson, and perhaps Passaic and Bergen Counties. This will in turn require Middlesex County to tontinue to rely heavily on water supply sources within or near its borders. In this light the Middlesex Councy Water Supply Master Plan recomaends that the County undertake programs to encourage proper management and protection of water resources and to include the development of a water resource management plan to include recommendations for resource protection and areawide management of water supply sources and distribution systems.

A. Resource Inventory and Capacity Analysis

Following the tompletion of the Water Supply Master Plan the Middlesex County Planning Board recognized that additional research and evaluation of its environmencal resource base were necessary in order to better understand the potential impacts of the growth projected by the Planning Board through the year 2000. Rather than merely planning for systems to provide resources to support a given level of growth it was instead proposed to develop a program of research and study to identify those resourtes available to Middlesex County, the degree to which they are presently utilized and the estimated capacity to support additional growth leading to a better balancing between projected growth and available resourtes. The Middlesex County Planning Board's Environmental Systems Staff prepared a work program for a Resource Inventory and Capacity Analysis (RICA) which would include the analysis of air, water and land resource capacities. An important element in the RICA's water resource analysis is the identifitation of the availability of groundwater supplies in Middlesex County and the determination of how such supplies can best be protected to insure their future availability.

B. Goals and Objectives

This analysis of Middlesex County's groundwater supplies is designed to neet the following goals and objectives as established by the Middlesex County Planning Board's comprehensive planning program:

Goals and Objeccives

1. Provide Adeouace Capacity

   - Identify the amount and location of groundwater supplies available to Middlesex County.

   - Identify the demand for groundwater supplies.

   - Identify areas persently providing recharge to the groundwater system. Estimate potential recharge capability under present development characteristics within recharge areas and identify appropriate developments which may be safely supported within such areas.

2. Insure Economy and Effieiency

   - Recommend methods of aaintaining or augmenting groundwater recharge in a aanner that insures availability of groundwater as a water supply in the face of the need to later compete for higher cost water supplies to meet needs.

3. Provide for Protection of Public Healch and Safety

   - Insure that recharge area protection includes consideration of water pollution control.

4. Insure Eoual Attention to Water Supply Needs in All Areas of the County

   - Identify, analyze and recommend groundwater management programs with application to areas throughout Middlesex County.

5. Provide for Citizen Participacion and Incergovernmencal Cooperation

   - Work closely with the Middlesex County Water Supply Advisory Committee.

   - Coordinate this study with work accomplished by other agencies including those of federal. State, local governments and authorities.

   - Recommend an approach to recharge area protection which can be presented to affected municipalities, neighboring counties, and State authorities.

6. Provide for Protection of the Natural Environment, Maintain Existing Amenities and Enhance Aesthetics

   - Maximize groundwater protection chrough measures which protect che natural environment.

   - Address the maintehance of open space as a groundwater recharge protection measure as well as a method of providing much needed recreation and aesthetic resources.

C. Scope of Studv

The scope of this study covers the entire area of Middlesex County. Section II describes and evaluates the hydrogeologic characteristics of the aquifers along with their specific water carrying and water producing characteristics and safe yield. Natural and artificial recharge capacities of varioua aquifers is outlined along with estimated groundwater withdrawals for both 1966 a 1973. Section III serves to describe the extent of urbanization withia the recharge areaa and Its impact on groundwater quality and quantity together with the need for protecting the County's aquifers. Section IV briefly describes methods that are available for the protection and preservation of critical resources of che County. Section V outlines specific recommendations for the preservation of varioua conservation areas which will serve to protect the County's groundwater resources. Section VI presents a recommended program of next steps which should be undertaken to carry forth the work begun by this study.

II. HYDROGEOLOGY OF MIDDLESEX COUNTY

A. Background

Middlesex County lies within two major physiographic provinces - che Aclanclc Coastal Plain and the Piedmont Province. That portion of the County west of the Lawrence Brook and north of the Raritan River are generally within the Piedmont Province while the remainder of che County is within the Atlantic Plain. That portion within the Piedmont Province is generally characterized by clay and shale formations with relatively high surface runoff rates while the Coastal Plain is characterized by sand and gravel formations along with a higher infiltration rate. The topography of the County is generally level or rolling with maximum elevations of approximately 240 feet in the southwestern part of South Brunswick Township. The remainder of the County averages some 100 feet in elevation. The lowest elevations approach sea level at the tidal areas on Raritan Bay and at the mouth of the Raritan River. As a result of its natural topography and its proximity to Raritan Bay the County contains numerous natural drainage ways the majority of which drain to the mainstem of the Raritan River and into Raritan Bay. Several streams in the eastern area of che County drain directly to the Raritan Bay and several in the northeastern portion of the County are tributaries of the Rahway River or drain directly to the Arthur Kill (See Figure 1).

Middlesex County's climate is described as temperate with the average annual temperature between 50°F and 55°F. January and February are the coldest months having a mean temperature of 32°F with July the warmest month having a mean temperature of 75°F. Water temperatures follow a similar pattern, also ranging from 32°F to 75°F. Prevailing winds are from the northwest during the winter months and from south to southwest during the warmer months.

The average annual precipitation within the County is approximately 44 inches with February having the lowest monthly average and July the highest. The period from May to September has the highest average rainfall. Annual snowfall averages between 20 and 30 inches. Complete precipitation and temperature data for the New Brunswick meteorological station are shown in Table 2 on the following page.

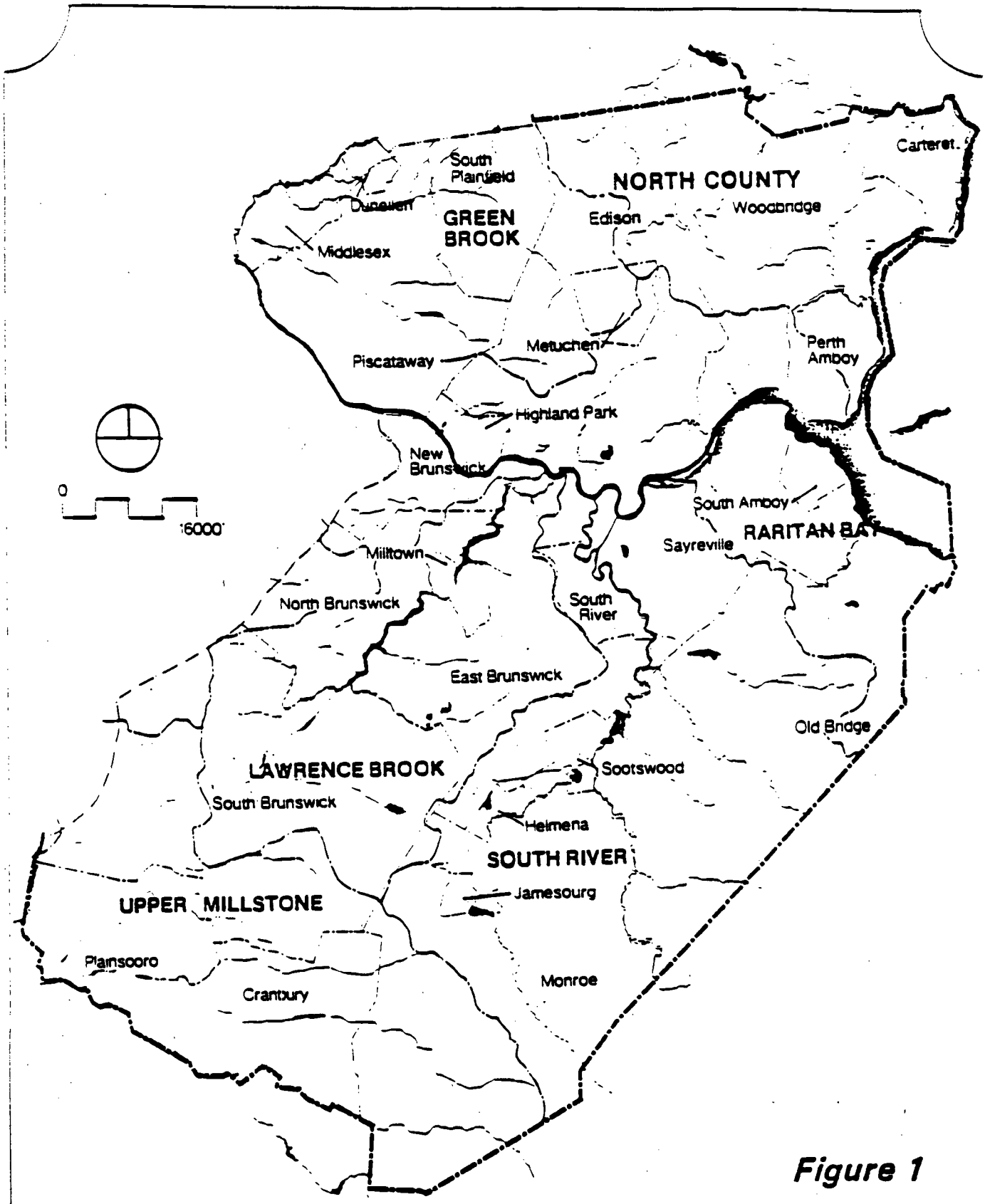


Figure 1

MAJOR DRAINAGE BASINS & STUDY AREA MUNICIPALITIES

TABLE 2

Average Precipitation and Temperature
At New Brunswick. N.J.

Month	Precipitation[1] (inches)	Temperature[2] °F
January	3.25	31.2
February	2.96	32.8
March	3.59	40.6
April	3.47	51.6
May	3.77	61.4
June	3.67	70.2
July	4.89	74.9
August	4.73	73.1
September	3.68	66.7
October	3.22	56.5
November	3.16	45.6
December	3.26	33.9
Annual Average	43.65	53.2°

B. Hydrogeology

Geologic sequence in Middlesex County is listed in Table 3 with those formations which are both sufficiently thick and iaportant County water supply sourtes highlighted. A generalized northwest-southeast cross section froa the Stelton to Runyon areas shown in Figure 2.

The areal extent of aajor aquifer recharge areas in Middlesex County have been identified in Figure 3. These are the locations where water bearing geologic formations are at the surface or have a water permeable ground cover. These recharge or outcrop areas provide the majority of the water to the wells drilled to the aquifers. It is estimated that there are more than eight thousand wells tapping groundwater ih Middlesex County. The largest majority of these wells are of low capacity and are used primarily for domestit purposes, however, 293 wells can each produce at least 100,000 gallons per day[3].

The two distinct aquifer formations that provide the largest portion of the groundwater in Middlesex County are the unconsolidated sand and gravel of Upper Cretaceous Age and the consolidated rocks of Triassic Age. The principal sources of groundwater in order of their importance are: the Old Bridge Sand and Farrington Sand aquifers of the Raritan Formation, the Brunswick shale of Newark Group (Triassic formation) and the Undifferentiated Sands of Upper Cretaceous Age. Although more water is drawn from the Newark Group than from the Undifferentiated Sands and Engiishtown Sand, Newark Group rocks are not as uniformaly reliable as the Cretaceous Sand.

A detailed discussion of the geologic and hydrologic characteristics of each strata is provided in the report by Henry C. Barksdale et. al[4]. In

TABLE 3

Hydrostratigraphic Sequence in Middlesex County[5]

Cenozoic Sequence
- Quarternary System
  - Recent Series
    - Alluvium
    - Eolln deposits
  - Pleistocene series
    - Wisconsin drift
    - Cape May formation
    - Pensauken formation

Unconformity

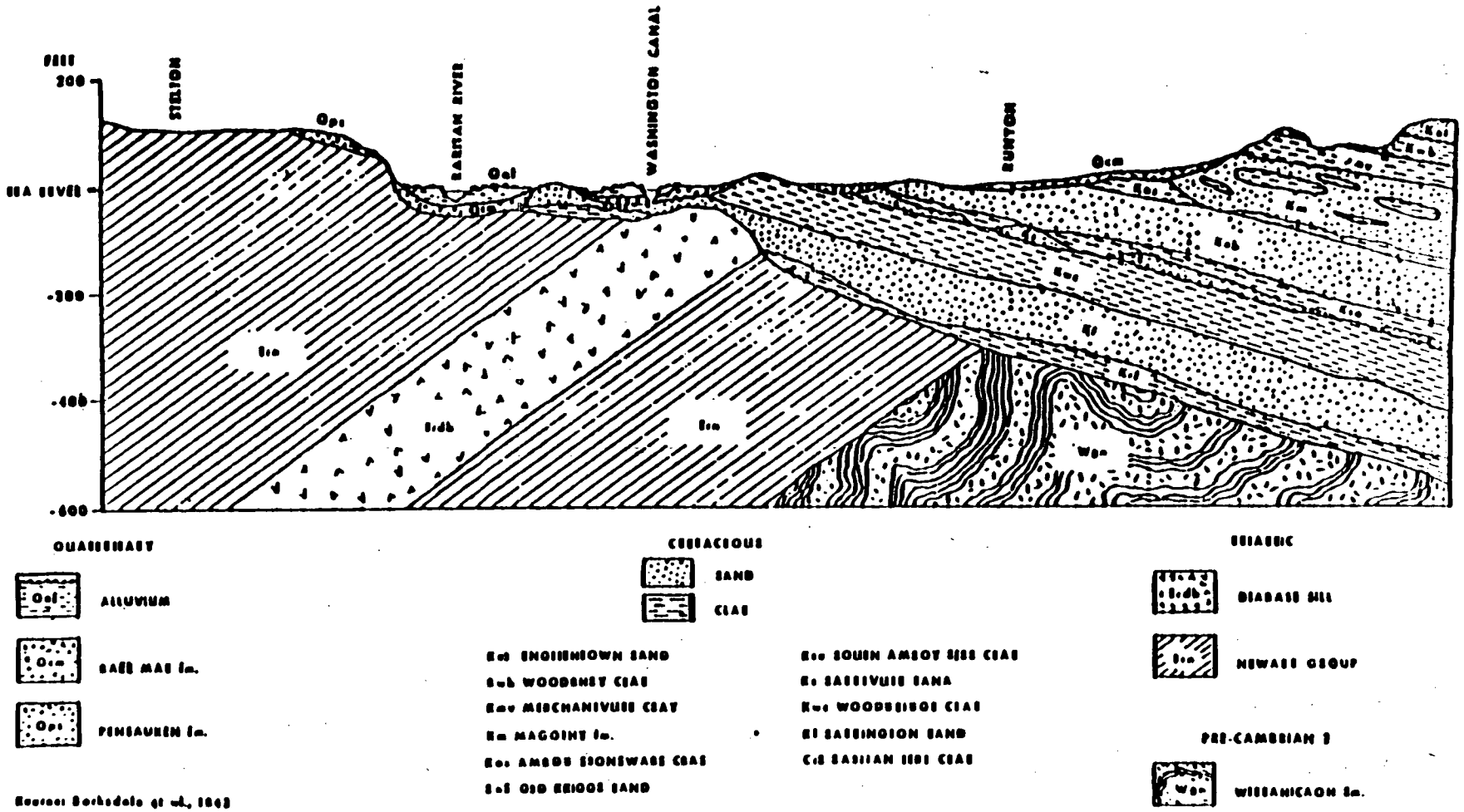
Mesozoic Sequence
- Cretaceous System
  - Upper Cretaceous series
    - Mount Laurel and Wenonah Sands
    - Marshalltown formation
    - Engiishtown sand
    - Woodbury clay
    - Merchantville clay
    - Magothy formation
    - Raritan formation
      - Amboy stoneware clay
      - Old Bridge sand
      - South Amboy fire-clay
      - Sayreville sand
      - Woodbridge clay
      - Farrington sand
      - Raritan fire-clay

Unconformity

Triassic System
- Upper Triassic series (Newark group)
  - Brunswick shale
  - Lockatong formation
  - Stockton formation

Unconformity

Proterozoic Sequence
- Pre-Cambrlan
  - Wlssahickon formation



Source: Barksdale et al., 1943

Figure 2

GENERALIZED GEOLOGIC SECTION - Middlesex County

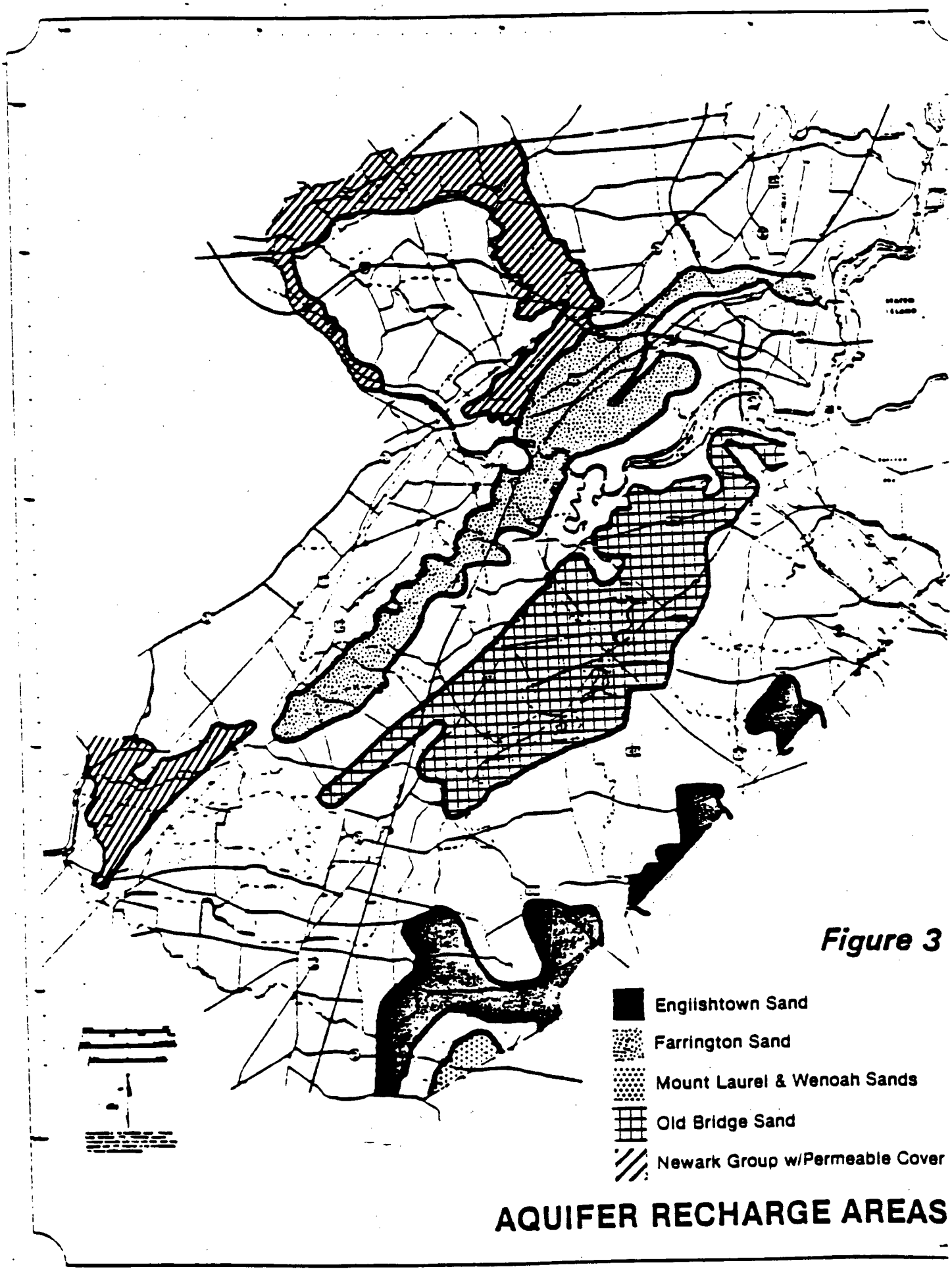
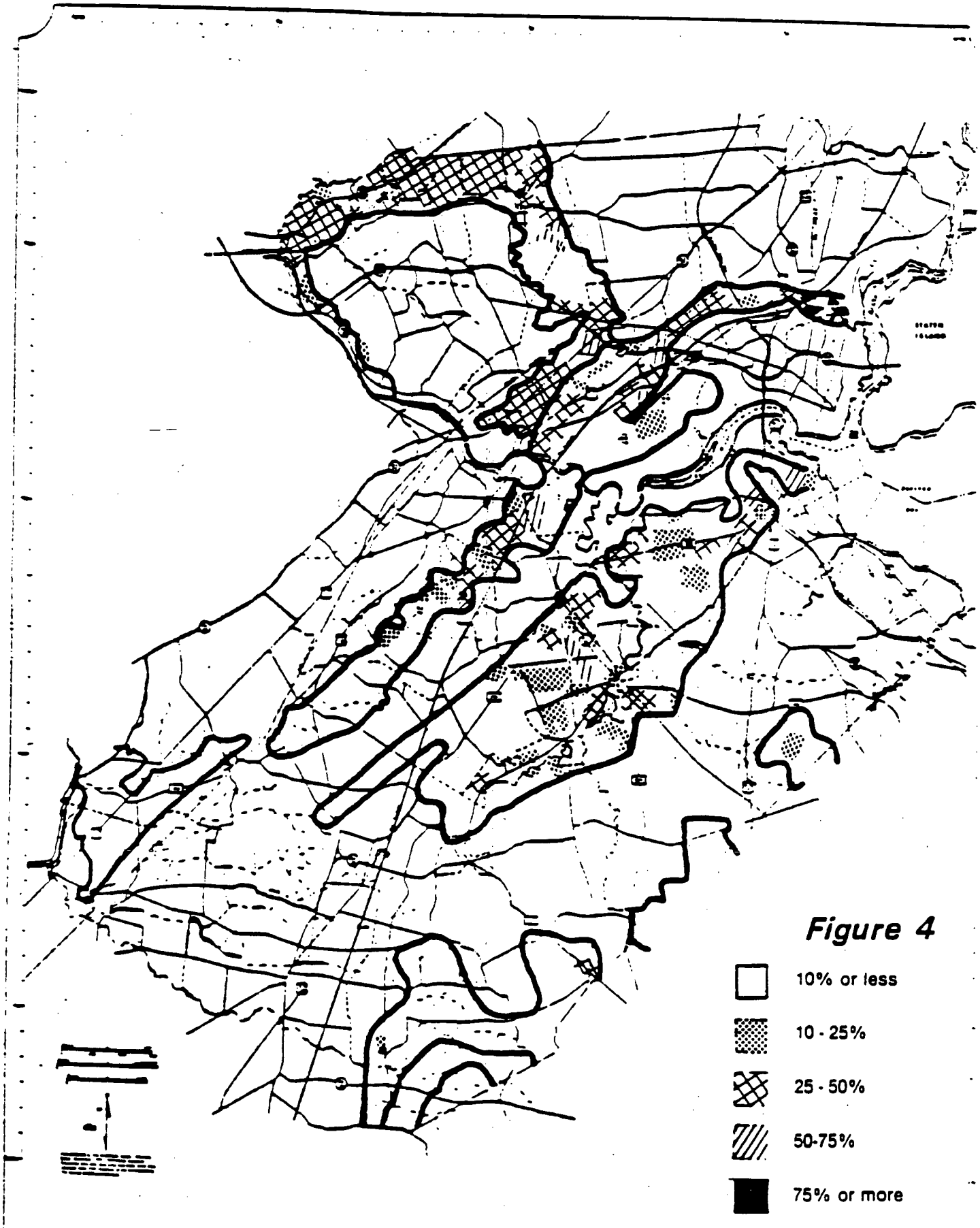


Figure 3
Englishtown Sand
Farrington Sand
Mount Laurel & Wenoah Sands
Old Bridge Sand
Newark Group w/Permeable Cover
AQUIFER RECHARGE AREAS



DEVELOPMENT WITHIN AQUIFER RECHARGE AREAS 1973

this study an attempt has been made to evaluate and summarize the geologic characteristics of the rocks as they relate to their water carrying and vater producing capacity.

C. Quarternary System

1. Wisconsin Drift

The Wisconsin Drift was deposited by the last four continental ice sheets of the Pllestoncene Age which covered large portions of the northern United States. It foras a nearly continuous mantle over the underlying Triassic and Cretaceous rocks in the northeastern part of Middlesex County. The southern limit reached by the Wisconsin glacier in Middlesex County is roughly along a line from Plainfield to Metuchen and over to the mouth of the Rarltan River at Perth Amboy.[8] The Wisconsin Drift is of importance from a water supply standpoint primarily because some portions are peraeable enough to absorb water directly from precipitation and transmit it readily into underlying beds.

The outwash plain found between Metuchen, Plainfield and east Bound Brook covers an estimated 16 square miles and consists of layers of sand and gravel which together are called stratified drift. The stratified drift is approximately 10 to 60 feet thick on the eastern edge near the moraine. In general the stratified drift is quite permeable but it is too shallow and covers too small an area to be in itself an Important water supply source. However, it holds water which percolates into the underlying Brnnswick formation and has increased the yield of many wells located on the drift.[9]

2. Cape May Formation

The Cape May formation is a pinkish-yellow fine to mediua grained quartz sand forming a chin mantle 3 to 10 feet thick over the Cretaceous formation in the South River valley as well as along the south shore of the Raritan River.

The average porosity of the Cape May formation is 43% and the average specific yield is 38%. The coefficient of permeability ranges between 180 to 900 with a weighted average of 450. A block of Cape May Sand one square mile in area and one foot thick is capable of storing approximately 80 million gallons of water.[10]

The iaportant hydrologic feature of the Cape May formation is that it overlies the Old Bridge Sand aquifer and increases its recharge capacity. No major water supplies are drawn directly from the Cape May formation at the present time.

3. Pensauken Formation

In the souchern porcion of Middlesex Councy mosc of the hills and upland areas (above 60 feec elevation) are covered with a layer of yellow to brown, clayey sand and gravel known as the Pensauken formation. The largest

area is between the Lawrence Brook and South River extending southwest to Cranbury. The Pensauken formation in this area is of importance ia that it covers the truncated sand members of the Raritan formation.

The Pensauken formation ranges in thickness to 70 feet with the average porosity and specific yield estimated to be 40% and 30% respectively. The toefficient of permeability is considerably less than the Cape May formation, ranging between 120 and 200 and averages approximately 170. A block of the Pensauken formation 1 square mile in area and 1 foot thick could store an estimated 64 million gallons of available water.

No large vater supplies have been developed from the Pensauken formation however it does yield small supplies of vater to a large number of wells for domestic and farm use. Its importance from an hydrologic standpoint is in that it readily absorbs water from precipitation and transmits it to underlying aquifers resulting in an increase in the effective recharge area. Much of the intake area of the Farrington Sand and a portion of the intake area of the Old Bridge Sand is overlain by che Pensauken formation.

D. Cretaceous System

1. Engiishtown Sand

The Engiishtown Sand occurs near the southeastern border of the County and is a fine to medium-grained white or yellow sand whlch is occasionally micaceous, lignitic and llmonltlc. The Engiishtown Sand in Middlesex County is approximately 100 feet thick and is overlain by the relatively impermeable Marshalltown formation.

Physical properties of the formation vary widely. The weighted average toefficient of permeability is 525 with the average porosity 442 and specific yield 302. On the basis of the physical properties and the performance of wells tapping this resourte in Monmouth County, the Engiishtown Sand is in all probability the third most productive Coastal Plain in Middlesex County. At the present time however, no large water supplies have been developed from this formation in Middlesex County because of its relatively remote location from population and industrial centers. It should be noted that the Engiishtown Sand is the second major source of water supply to Monmouth County. A number of wells in this formation yield more than 0.5 mgd. It is possible to develop a water supply of approximately 5.0 million gallons per day from this source in the County.[11]

2. Magothy-Raritan Formations

Although the Magothy and Raritan formation are distinct geologic units, they are frequently in direct hydraulic contact and are considered part of the same aquifer system. Northeast of Jamesburg, the Raritan formation has been divided into seven aembers, three of which are wacer bearing. Even though ic is possible to divide the Rarican formation into seven distincc

members, accempcs to crace recognized units in the outcrop areas, both along the strike and downdip, have been only moderately successful.[12] Hydrogeologic characteristics of units in Raritan formation have been summarized in Table 4.

3. Magothy Formation

The Magothy formation lies immediately above the Raritan formation and is separated from the Old Bridge Sand aember by the Amboy Stoneware Clay. Average porosity of che Magothy formation is 46% and specific yield is approximately 41%. The coefficient of permeability ranges between 60 and 925 with a weighted average of 296. A block of Magothy formation one square aile in area and one foot chick can store 85 million gallons of water.

While the Magothy formation is capable of storing large quantities of water it does not transmit it freely due to its low coefficient of permeability. At the present time no significant supply of water is drawn from this formation although numerous wells for domestic and agricultural uses draw water from this source. Due to its low permeability and transaissivity, successful developaent of large capacity wells in the Magothy fonnation would be difficult if not impossible co accoaplish.

4. Old Bridge Sand

The Old Bridge Sand member of the Raritan formation is the most productive and intensely developed aquifer in Middlesex County. It outcrops or is exposed beneath permeable Pliestocene deposits in an irregular band that extends from Raritan Bay near South Amboy to and probably beyond Jamesburg. It has an intake area of approximately 25 square miles, a thickness of 80 to 110 feet and dips gently to che soucheasc ac 40 co 45 feec per mile.

The Old Bridge Sand is well sorced and is composed of fairly fine to coarse sand or fine gravel. The average porosicy of the Old Bridge Sand is esclmaced co be 42% and specific yield is 40%. The coefflcienc of permeability ranges between 1000 and 1500. The Old Bridge Sand is capable of storing and transmitting large quantities of water; for example, a block of Old Bridge Sand one square mile in area and one foot chick would score abouc 84 million gallons of available water. The sand can transmit approximately 1 mgd for each square mile of aquifer.[13]

5. Farrington Sand

The Farrington Sand outcrops in a contiguous band nearly a aile wide along the southeast edge of Farrington Lake in East Brunswick. It has a cotal outcrop area of approxlnately 22.8 square alles, of which 10.9 square miles lie south of the Raritan River and 11.4 square mile lie north. The effective recharge area of the Farrlngton Sand is 16.9 square miles and has an average thickness of 80 feet, dipping gently to the southeast at the rate of 45 to 55 feet per mile.

The Farrington Sand is a medium to coarse grained sand wich an average porosity estimated at 34% and specific yield 32%. The coefficient of per-aeability ranges between 210 and 3500 with a weighted average between 1,200 and 1,500. The Farrington Sand is also capable of storing and transmiccing large quantities of water. A block of the Farrington Sand one square mile in area and 1 foot in thickness would be capable of storing almost 67 million gallons of available water. Ic can transmit more than 2.5 mgd for each square mile of aquifer.[14]

E. Triassic System

1. Newark Group

The rocks of the Newark Group are the third most important aquifer in the County (behind the Old Bridge Sand and Farrington Sand) because of their areal extent and large amount of water developed from them. The oldest is the Stockcon formation consisting of conglomerate and sandstone interbedded with red shale. Next oldest is the Locatong formation consisting of hard shale and argullice. The cwo rocks are found in a small area near che southwestern border of the County. The Brunswick formation is a red shale interbedded with siltstone and occassional layers of sandstone and covers the entire area north of a line between Carteret and Plainsboro.

These formations are rather impermeable except along numerous cracks which traverse che beds at high angles to the bedding. Some water may flow along the bedding planes but such movements are limited. These rocks dip to the northwest at angles ranging from 5o to 15o

The fact that these rocks are usually fine grained, relatively impermeable and are water bearing by virtue of their cracks and crevices, introduces problems in any attempt to appraise their water bearing capacity. The permeability and specific yield of the Newark Group depends upon the degree of cracking. Since the degree of cracking decreases with the depth, the permeability and specific yield also decreases with the depth. The cracks in the rocks of the Newark Group intersect one another at many angles; the result being that water can move almost in any direction. Figure 3 shows the area of the Brunswick formation covered with permeable material to a thickness of 40 to 45 feet.

The coefficient of transmlsslblllty of the Brunswick Shale is approximately 25,000 (as compared to 96,000 for the Farrington Sand and 108,000 for the Old Bridge Sand) and the storage coefficient is approximately 0.0044.[15] This means that Farrington and Old Bridge Sands can transmit four times as much water as the rocks of Newark Group under a given hydraulic head and through a given width of section. The difference in the capacity of the Newark Group to store water is even more striking. For one square mile area and 300 feet of saturated thickness Newark Group rocks would hold only 275 million gallons of water. By comparison 80 feet of the Farrington Sand would hold 5,360 million gallons of water for the same area. The low storage capacity explains the high rate of run-off and low ground water flows observed in streams draining areas underlain by Newark Group formations where there is no permeable cover material.

TABLE 4

HYDROGEOLOGIC CHARACTERISTICS OF UNITS OF THE RARITAN FORMATION - MIDDLESEX COUNTY

Unit	Lithologic Description	Physical Properties: Average Porosity (percent by volume)	Permeability[1]	Remarks
Amboy Stoneware Clay	Light-gray to nearly black clay; abundant carbonaceous materials; locally has mottled red appearance; in some places gray to black sandy clay; Lignitic. Thickness to 30 feet.	-	-	An aquiclude[2]
Old Bridge Sand	White to light-yellow, fine to medium grained, occasionally coarse grained, slightly micaceous sand; locally contains thin, irregular clay beds. Thickness 80 to 110 feet. Dips southeast 40 to 45 feet per mile.	40	1000 - 1500	Most productive aquifer in the Raritan Formation and the County. Effective intake area is 33 square miles.
South Amboy Fire Clay	Varicolored light-gray, white or brick-red clay; locally sandy. Thickness to 55 feet.	-	-	An aquiclude
Sayreville Sand	Layers of fine white micaceous sand, fine to coarse grained white sand, with or without clay and arkosic sand beds. Usually thin and lacks continuity. Thickness to 40 feet.	44	10 - 500	Owing to thinness and lack of continuity, this sand member is unimportant as an aquifer. So far as known, no wells in this area draw water entirely from this aquifer.
Woodbridge Clay	Dark-gray clay to sandy clay and clayey sands. The basal part is varicolored white, light-gray, and brick-red compact clay. Thickness 50 to 100 feet.	-	-	An aquiclude
Farrington Sand	Light-gray or light-yellow, fine to medium grained sand grading into coarse arkosic sand sprinkled with small pebbles and gravel in the lower part. This sand is commonly divided by clay layers into two or more parts. Thickness 35 to 115 feet. Dips southeast 55 feet per mile.	34	1200 - 1500	Second in importance as a productive aquifer to the Old Bridge Sand. Total intake area is 17 square miles.
Raritan Fire Clay	Varicolored blue, green, gray or red clay. Basic component has brick-red color. Thickness to 90 feet.	-	-	An aquiclude

Note: Summarized from "The Groundwater Supplies of Middlesex County, N.J." Henry C. Barksdale, et. al., State Water Policy Commission, Special Report No. 8., 1943.

[1]Coefficient of permeability is the rate of flow of water in gallons per day through a cross sectional area of one square foot under a hydraulic gradient of 100% at the prevailing temperature.

[2]A geologic formation, although porous and capable of absorbing water slowly, will not transmit it fast enough to furnish an appreciable supply

F. Groundwater Recharge

1. Natural Recharge

As was previously stated the Old Bridge Sand is the most productive aquifer in Middlesex County and may be the most productive in New Jersey. On the whole the intake area of the Old Bridge Sand is exceptionally well suited for absorbing water from precipitation and streamflow and transmitting it to the water table. It outcrops in an Irregular band that extends from the Raritan Bay near South Amboy to and probably beyond Jamesburg. The intake area south of Jamesburg is deeply covered by the Cape May and Pensauken formations which themselves are quite porous and absorb and transmit water readily. Where it has been defined and mapped the intake area is approximately 25 square miles with the effective intake area estimated to be some 33 square miles.[16] Over much of the intake area the land surface is relatively flat, hence water doesn't run off rapidly and Instead has an opportunity to percolate into the ground. The sandy nature of the soil reduces the losses by direct evaporation from soil. The vegetation on the soil is not very rank so that evapo-transpiration losses are only moderate. The Farrington Sand is, for much of its area, overlain by permeable soils having excellent drainage which in turn allows for natural recharge.

Henry C. Barksdale estimated that 20 inches of precipitation are available annually for recharging the Old Bridge and Farrington Sands.[17] This is approximately 950,000 gallons/day/square mile. On this basis total natural recharge of the Old Bridge Sand would be 31.35 mgd for an effective intake area of 33 square miles. Natural recharge for the Farrington Sand, for an effective intake area of 17 square miles, would be approximately 16.2 mgd.

It is difficult to estimate natural recharge rate for the undifferentiated Magothy-Raritan formation due at this time to the lack of a detailed investigation. However, while the Magothy formation is capable of storing large quantities of water, it does not generally transmit it freely. This means that recharge rates would be much lower than has been estimated in Middlesex County's Comprehensive Master Plan.[18] Inference from hydrogeological properties leads us to believe that the natural rate of recharge for the Undifferentiated Magothy-Raritan formation is approximately half of the Old Bridge and Farrington Sands or about 0.5 mgd/square mile.

2. Artificial Recharge

As a means of increasing the supply of groundwater, atteapts have been made to use man-made groundwater recharge basins. Artificial recharge is defined as augmenting the natural infiltration of precipitation or surface water into underground aquifers by artificially changing natural conditions to allow water to recharge. A variety of methods have been developed, including increasing the extent of water recharge ponds, recharging through pits excavations, wells and shafts and pumping to induce recharge from surface water sources. The choice of a particular method is governed by local topographic, geologic and soils conditions, the quantity of water to be recharged and ultimate water use.

Recharge ponds are presently functioning co varying degrees of success within the Old Bridge Sand outcrop in the Old Bridge-Spotswood area. The Duhernal Water System along with the P.J. Schweitzer and Anheuser Busch Companies pump for wells adjacent to Duheranl Lake which was constructed in 1938 in order to enhance recharge to the Old Bridge Sand . Although the amount of water that is recharged varies, estimates made in 1969 identified that the average rate of recharge for the 173 acre Duhernal Lake is 67,000 gallona/day/acre or approximately 12 agd is artificially recharged.[19] In recent years, the Duhernal Coapany has excavated additional recharge ponds adjacent to the lake increasing the recharge area to 221 acres. Total recharge now exceeds 15 mgd.

The Perth Amboy Water Departaent utilizes Tennent Pond within the Runyon Watershed for artificial recharge purposes. This 63 acre pond recharges the groundwater at a rate of 80,000 to 90,000 gallons/day/acre. A study conducted by Henry C. Barksdale in 1941 indicated that approxiaately 5 mgd, or virtually the entire flow of Tennent Brook, was being used to recharge the Old Bridge Sand.[20] An additional 100 acre recharge pond on the Deep Run, now in the planning and design stage, is expected to increase the yield of the Perth Amboy wellfield by an additional 7 agd.[21] The Sayreville Water Departaent has recently constructed an artificial recharge pond having a total surface area of 66 acres. This pond has been designed to recharge the Old Bridge Sand and is estimated to increase the yield of che Bordentown wellfield by about 4 mgd.

In brief, the safe yield and natural recharge capacity of the Old Bridge Sand has been augmented by some 21.0 mgd, as shown in Table 5 below. Groundwater withdrawal from Old Bridge Sand in the County is within the natural safe yield of 31.0 mgd and tocal safe yield of 52 mgd.

At che presenc time arcificial recharge is noc taking place in Middlesex Coaacy to increase the productivicy of the Farringcon Sand. As noted earlier, groundwater withdrawal from the Farrington Sand is in excess of 18.5 mgd while the safe yield is only 16.2 agd.[22] This strongly suggests that the safe yield of che Farringcon Sand is being exceeded evidenced by the decline in the water table and resulting salt water incrusion in the Sayreville area. Due to the location of several wells near the Washington Canal and in the zone of

TABLE 5

Artificial Recharge Operations in Middlesex County - 1974

	Area of Recharge Pond (acres)	Safe Yield
Duhernal Water Coapany	221	15.0
Perth Aaboy Water Dept.	63	5.0
Perth Amboy Water Dept. (Planned)	100 (est.)	7.0 (es
Sayreville Water Dept.	66	4.0
Total	450	31.0

tidal influence of che South River, the salt wacer interface has advanced some one co two miles inland. Several production wells between che lower Rarican and South River tidal reaches have had to be abandoned because of high chloride concentrations. In this area no more water can be pumped from the Farrington without further accentuating the salt water intrusion problem.

As a result of artificial recharge operations within the Old Bridge Sand and the similarity in hydrogeological characteristics of the Farrington and Old Bridge Sands it may be concluded that the productivity and safe yield of the Farrington can be augmented by artificial recharge. For example , the nmtural rate of recharge to Old Bridge and Farrington Sands is approximately 1,500 to 1,600 gallons/day/acre. The rate of artificial recharge to the Old Bridge Sands and Duherual Lake and Tennent Pond ranges between 67,000 to 90,000 gallohs/day/acre. By proper location, construction and operation of recharge ponds on the Farrington outcrop and by proper location of pumping wells, the safe yield of the Farrington Sand could be increased significantly. Specific recommendations for the protection of Farrington and Old Bridge aquifers are included in Section V.

The feasibility for artificially recharging the Brunswick Shale should be viewed from the perspective that the Brunswick Shale is not as uniform and as predictable an aquifer as the Old Bridge or Farrington Sands. Due to the nature of the rock openings it would not be as feasible to practice artificial recharge with the Brunswick Shale. It is recommended however chat the natural recharge be protected through che provision of open space areas.

G. Groundwater Withdrawal

It is estimated that in 1975 93% of the County's population was served with public water supply systems. In the more urbanized areas of the Councy, namely che northern and eastern sections, public water system serves close to 100% of che developed area. In che soucheru porcion of the scudy area, there is ac presenc greacer dependence on privace wacer supply syscems. However, numbers served by privace syscems are relacively small and are expecced to be even less significant in the future.

Due to the lack of detailed reporting there is presently a problem in monitoring just how much water is being pumped from the County's aquifers. Many wells are accurately reported but many private wells and "grandfather" wells are not adequately monitored.[23] Through this study an attempt has been made to locate all wells pimping more than 70 gallons/minute or 100,000 gallons/day.

Groundwater withdrawal from the Raritan formation for the years 1966 and 1973 is shown in Table 6 . It should be noted that total groundwater withdrawal declined from 51.8 mgd in 1966 to 49.0 mgd in 1973. Groundwater withdrawal from the Old Bridge Sand amounted to 29.0 mgd in 1966 and 25.9 mgd in 1973. Groundwater production from Farrington Sand was 17.7 mgd in 1966 and 18.5 mgd in 1973. Withdrawal from the Undifferentiated Sands remained

TABLE 6

Average Groundwater Withdrawal
from the Raritan Formation - Middlesex County
(million gallons per day)

Purveyors	Old Bridge Sand 1966	Old Bridge Sand 1973	Farrington Sand 1966	Farrington Sand 1973	Undifferentiated Sands 1966	Undifferentiated Sands 1973	Total 1966	Total 1973
Cranbury	-	-	-	-	0.141	0.135	0.141	0.133
East Brunswick	-	-	2.330	2.393	-	-	2.550	2.393
Edison	-	-	4.250	-0-	-	-	4.25	-0-
Helmetta	-	-	-	-	0.021	0.023	0.021	0.023
Jamesburg	-	-	-	-	0.345	0.423	0.345	0.423
Old Bridge	1.179	1.130	0.743	2.780	-	-	1.924	3.910
Monroe	-	-	0.500	0.645	-	-	0.500	0.645
(Forsgate Water Co., Forsgate Farm, Reliable Water Co., NJ State Home for Boys)	-	-	-	-	0.620	0.784	0.620	0.784
Perth Amboy	6.538	4.669	2.793	3.000	-	-	9.381	7.669
Plainsboro	-	-	-	-	-	-	-	-
Sayreville	2.437	1.311	-0-	1.852	-	-	2.437	3.164
South Amboy	0.455	0.733	0.623	0.568	-	-	1.078	1.630
South Brunswick	-	-	0.910	1.630	-	-	0.910	1.630
South River	0.306	0.335	0.874	1.075	-	-	1.130	1.405
Spotswood	0.396	0.645	-	-	-	-	0.396	0.645
Unreported Private Wells	-	-	-	-	2.000	2.000	2.000	2.000
Subtotal	11.361	8.856	13.245	13.943	3.127	3.365	27.727	26.157
Industries								
Anheuser Busch, Inc.	0.503	0.961	0.963	1.001	-	-	1.468	1.962
Chevron Oil Co.	-	-	-	-	0.250	0.250	0.250	0.250
Duhernal Water Co.	13.959	13.000	0.828	0.048	-	-	14.785	13.048
E.I. DuPont Co.	0.32[illegible]	0.144	0.052	0.014	-	-	0.376	0.138
Hercules Power Co.	-	-	0.044	0.004	-	-	0.044	0.004
National Lead Inc.	-	-	0.085	0.317	-	-	0.085	0.317
P.J. Schwaltzer Inc.	2.38A	2.959	2.401	2.595	-	-	5.286	5.554
BASF Products	-	-	-	0.467	-	-	-	0.467
Unreported Wells	-	-	-	-	1.000	1.000	1.000	1.000
Subtotal	17.672	17.072	4.373	4.446	.0.250	0.250	23.050	22.768
Total	29.033	28.928	17.618	18.389	4.377	4.615	51.677	48.935

relatively constant between 1966 and 1973 at approximately 4.5 mgd.

Reduction ia groundwater withdrawal for public use can be attributed to decline in groundwater use by the City of Perth Amboy and Edison Township. Perth Amboy hmd to close a portion of its well-fields tapping che Old Bridge Sand due to industrial pollution in 1972-73. Total pumpage from Old Bridge Sand declined from 6.6 mgd to 4.7 mgd. The Borough of Sayreville was pumping 2.4 mgd from Old Bridge Sand in 1966 while it pumped only 1.3 mgd in 1973. These two major munlclpal withdrawals amount to a 3.0 mgd reduction over the 1966-1973 period.

Conversely, groundwater withdrawml for public supplies from the Farrington Sand increased from 13.4 mgd in 1966 to 14.0 mgd in 1973. Suring this period Edison Township switched to surface water supplied by the Elizabethtown Water Company thereby releasing 4.25 mgd in groundwater now available to other users. Major public water users of the Farrington Sand include Perth Amboy, Old Bridge, East Brunswick, Sayreville, South Brunswick, and South River. Old Bridge increased its groundwater withdrawal from the Farrington Sand from 0.75 mgd in 1966 to 2.78 mgd in 1973. Sayreville pumped 1.85 mgd in 1973 while in 1966 it pumped no water from the Farrington Sand. South Brunswick pumped 0.91 mgd in 1966 which rose to 1.63 mgd in 1973.

Industrial groundwater withdrawal from the Old Bridge and Farrington Sands has not changed significantly in recent years. The Duhernal Water Company and the P.J. Schweitzer and Anheuser Busch Companies pump approximmtely 17.5 mgd from the Old Bridge Sand and with Schweitzer and Anheuser Busch pumping approximately 4.25 mgd from the Farrington Sand.

Total groundwater withdrawal from the Undifferentiated Sands could not be accurately estimated due to a lack of complete data. In 1973 about 3.5 mgd of water was pumped for domestic and agricultural purposes and 1.25 mgd was pumped for industrial uses in southern Middlesex County. However, these escimates should be used with caution because even though a large number of private wells have been located, the groundwacer withdrawal from these wells is not precisely known.

Information on groundwater withdrawals from the Newark Group also remains incomplete at this time. In order to estimate the total water withdrawal from these rocks, all wells pumping 70 gpm or 100,000 gpd were plotted from information provided by the N.J. Department of Environmental Protection. Owners of these wells were also contracted by telephone and through a written questionnaire. Most of the respondents replied that either the well is not in use at the present time or chat records of pumpage are not kept.

The Middlesex, Kingston, and Elizabethtown Water Companies are the three important public water purveyors pumping the Newark Group within the County. The Middlesex Water Company pumped 13.45 mgd from the Brunswick Shale in 1969 and 4.96 mgd in 1973. The reason for the decline in pumpage is that the Middlesex Water Company started to utilize the Delaware and Raritan Canal

in 1970 as its primary supply source. However, it should be noted chat groundwater withdrawal increased from 3.55 mgd in 1972 to 4.96 mgd in 1974. The Middlesex Water Company has been selling approximately 2.5 mgd co the Perth Amboy Water Deparccent due to the closing of some Old Bridge wells in 1973 as noted earlier. The Elizabethtown Water Company pumped 12.S3 mgd in 1969 and 15.02 mgd in 1974 from the wells in Middlesex County. The Kingston Water Company pumped 0.114 mgd for public water supply from the Lockatong and Stockton formations in the southwestern corner of the County in 1974. Total withdrawal for public supplies was approximately 19 mgd in 1974.

It is difficult to escimace the groundwater withdrawal for industrial use due to the reasons cited earlier. There are approximately 60 industrial weils which supply cooling water to industrial plants. The information gathered from telephone interviews revealed that a least half of these wella are not currently in operation or operate only during emergencies. The groundwater withdrawal from 13 wells was accounted for and averages approxiaately 0.8S7 mgd as shown in Table 7. Groundwater withdrawal from the remaining unreported industrial wells is estiaated at approxiaately 3.0 mgd.

It should be pointed out chat aany industrial wells which are not in full use at chls tiae should not be considered peraanently inactive. These weils represent iaportant potential water supply sources and should be carefully protected from any pollution which might make them unsuitable for future use.

Additional details regarding groundwater withdrawals during the period I9SO-197S can be found in Appendix C.

H. Diversion Rights for the Withdrawal of Groundwater

By law the State of New Jersey, through the Water Policy and Supply Council, regulates all groundwater withdrawals. Some domestic well users are generally exempt from State statutes, however, permits are required for the withdrawal of groundwater in excess of 100,000 gallons per day (roughly equivalent to a continous pumping rate of 70 gallons per minute). Users of groundwater prior to 1947 (the time of promulgation of the water law) were granted "grandfather rights" which were based largely on the pump capacity of the well system in operation at that time. Those granted "grandfather rights" were not required to file for authorization in order to continue to withdraw groundwater and maintain withdrawal rights.

Information on present groundwater diversion rights to the Farrington and Old Bridge aquifers, compiled from the NJDEP-Bureau of Water Supply Planning and Management, is presented in Table 8. This table lists well owners in addition to che authorized and grandfathered diversion rights of each owner as of 1975. As shown, authorized diversion rights for the Farrington Sand were 44 mgd and grandfather rights amount to another 24.5 mgd, for a total of 68.5 mgd. The quantity of permitted diversions was approximately four times greater than the amount of water actually pumped from the Farrington in 1974.

TABLE 7

Average Groundwater Withdrawal
from the Newark Group - Middlesex County
(millions gallons per day)

Public Supplies	1969	1970*	1973*	1974	1975*
Elizabethtown Water Company	12.827	N.A.	N.A.	15.018	N.A.
Middlesex Water Company	13.447	7.910	4.960	3.944	3.328
Kingston Water Company	0.121	0.102	0.116	0.114	0.116
Subtotal	26.395	8.012	5.076	19.076	3.444

Industrial Supplies	1969*	1970*	1973*	1974*	1975*
Am Col (Edison)			0.042		
Dreyfus Co. (S. Plain.)			0.250		
Holophane (Edison)			0.007		
Kentile Inc. (S. Plain.)			0.350		
Parkway Plastics (Piscat.)			0.200		
Rhodia Inc. (New Bruns.)			0.008		
Other industrial supplies (Estimated)			3.000		
Subtotal			3.857		

* The data for these years remains incomplete
N.A. - Not Available

In the case of the Old Bridge aquifer, authorized diversions amount to 34.7 mgd and grandfather rights were an additional 19.6 mgd, for a total of 54.3 agd. This total contrasts with 30 mgd withdrawn from the Old Bridge aquifer in 1974.

TABLE 8

1975 Authorized and Grandfather Diversion Rights from the Farrington and Old Bridge Sands in Middlesex County

Farringcon Sand (south of the Raritan River)

Well Owner	Diversion - MGD Authorized	Grandfather
Anheuser-Busch Co.	1.044	0.778 (a)
P.J. Schweitzer, Inc.	(1.000)	3.460
Sunshine Laundry	-	0.070
Hercules Powder Co.	-	7.488
Thomas & Chadwlck	-	0.215
Milltown Industrial Sites	-	0.288
W.R. & C.W. Dey	-	0.865
Mustephla Ahmed	-	0.865
Charles H. Holster, Jr.	-	0.710
Badische Products Co. - BASF (Formally United Cork Co.)	-	0.288
Phelps Dodge Copper Co. (former owner)	-	0.864
Joseph Guerrlero	0.360	-
Duherual Water System	-	4.610
Joseph Konuk	0.140	-
Charles Bonkoskl	0.500	-
Edward Collins	0.100	-
Marvin Halllck	0.360	-
Arthur Perrine	0.300	-
Lawrence J. Smith	0.400	-
Great Bay Chemical Co.	0.576	-
Cranbury Township	0.400 (a)	0.149
South River Borough	1.500	-
East Brunswick Township	3.000	-
N.J. State Home for Boys	1.080	-
Old Bridge Township M.U.A.	5.375	-
South Brunswick Township	2.750	-
South Amboy	0.650	-
Forsgate Water Co. (purchased by Monroe M.U.A.)	4.570	-
Forsgate Farms	0.540	-
National Lead, Inc.	5.000	-
Perth Amboy City	10.000	-
E.I. Dupont deNemours Co.	-	5.000
Sayreville Water Departaent	2.940	-
Spotswood Water Department	0.382	-
	44.467	26.650

(a) Total Diversion Liait

TABLE 8 CONT.

Old Bridge Sand

Well Owner	Diversion - MGD Authorized	Grandfather
Duhernal Water System	10.622	23.872 (a)
W.R. & C.W. Dey	-	0.086
Mustepha Ahmed	-	0.086
J.F. Abeel	-	0.144
E.I. DuPont deNemours Co.	-	0.800
H.H. Monteath	-	0.288
Anheuser-Busch Co.	1.670	-
P.J. Schweitzer, Inc.	2.160	6.540 (a)
Forsgate Water Company (purchased by Monroe M.U.A.)	0.540	-
Perth Amboy City	10.000	-
Sayreville Borough	2.500	-
Spotswood Borough	1.500	-
George W. Helme Co.	-	0.111
N.J. Water Co. - Jamesburg District	0.850	-
Old Bridge Township M.U.A.	2.375	-
South River Borough	0.500	-
South Amboy	2.000	-
Kerr Glass Co. (formally Armstrong Cork Co.)	-	0.288
Cranbury Township	-	0.149
Monroe Township M.U.A.	-	-
	34.717	32.364

(a) Total Diversion Limit

1974	Farrington Sand	Old Bridge Sand
Authorized Diversion by Water Policy and Supply Council and predecessors	44.085 mgd	34.717 mgd
Grandfather Rights (in addition to authorized diversion)	24.501 mgd	19.582 mgd
TOTAL:	68.586 mgd	54.299 mgd

III. EFFECTS OF URBANIZATION ON GROUNDWATER RESOURCES

The capacity of a watershed to provide surface and groundwater depends upon aany factors, including the amount and duration of precipitation, the geological characteristics of underlying rocks, the structure and condition of the soil, ground topography, the nature of forest cover, infiltration, surface detention and the land use pattern. A greater amount of surface runoff is generated on consolidated rocks than on sandy soils. Infiltration occurs more readily on natural (pervious) surfaces. While the infiltration on sandy soils and rocks is great, infiltration in areas which are covered or paved with buildings, parking lots, roads and sidewalks is very low. At the same time runoff in these areas is great.

Surface detention is the process by which rainwater and surface runoff is collected and held in depressions and are not allowed to enter a natural or man-made drainage system. Natural detention is greater on natural ground than on urbanized surfaces. The land use pattern and slope signifitantly affect runoff, infiltration and surface detention. The greater the surface slope, be it grass, roads or roof tops, the greater the runoff and the lower the infiltration and surface detention. A significant reduction to infiltration results in a reduction of groundwater supply available to aquifers.

A. Urbanization of Recharge Areas

The following discussion serves to briefly describe the extent and impact of urban development on the groundwater resources of Middlesex County. Under traditional residential development practices, 40 to 70 percent of the land area is paved for buildings, roads, utilities, parking areas, etc., depending upon the density of development. In industrial and commercial developments, approxiaately 60 to 100 percent of the land area is paved for access roads, buildings, parking lots, etc. Figure 4 shows the extent of urban development on the groundwater recharge areas. The area was measured using a point area measurement technique utilizing U.S. Geological Survey topographic quadrangles and 1973 aerial photographs (See Appendix A). Table 9 shows the total recharge area ard developed and paved areas on each of the major aquifers in the Raritan formation.

It should be noted that the Farrington and Old Bridge Sands are the most urbanized outcrops of the Raritan formation. Of the Farrington Sand's 14,286 acre (22.3 aq. miles) effective recharge area 3,472 acres (5.4 sq. miles) have already been developed and 1,947 acres (3.04 sq. miles) has been completely paved. Fully 24.3 % of the Farrington Sand recharge area has been urbanized and 13.6% has been completely paved. Of the 21,530 acres (33.6 sq. miles) of effective recharge area of the Old Bridge Sand, 4,295 acres (6.7 sq. miles) has become urbanized and 2,260 acres (3.53 aq. miles) have been completely paved. This is 19.9% and 10.5% of the total recharge area of the Old Bridge Sands. Urbanization of the Engiishtown and Mt. Laurel-Wenonah Sands is somewhat less severe.

Urban development on the Brunswick shale is more intensive than on the Raritan formation. In this study, the Brunswick shale with permeable cover (sand and gravel) has been identified covering 10,225 acres (15.98 sq. miles) and over 5,860 acres (9.2 sq. miles) hava been developed. This constitutes 57.3% of the mapped area. Total paved area haa noc been estimated but if we use a conservative figure of 60% paved surface for the developed area, it would result ia approximately 3,510 acres (5.48 sq. miles)

During the conversion of land from open space and agriculture use to urban/suburban dewelopmcnc, the natural characteristics of the recharge area are significantly altered due to tha removal of vegetation, the compaction of soils resulting from movement of construction equipment, and the placement of cover resulting from the construction of buildings, parking lots, roads, etc.. Although some 30% to 60% of the area within a typical residential development remains in open space, this open space is adversely affected for the purposes of groundwater recharge. Athough theae areas provide much needed open space for a pleasant living environment, the infiltration capability of the area is slgglficantly reduced due to soll compaction. For the purposes of groundwater manageaent only SD% of tha remaining open space area in residential development should be considered aa effectively recharging the groundwater system.

B. Impact on Groundwater Dualitv and Quantity

The impact of urban development on groundwater recharge is also reflected in a reduction in the quality and quantity of water. The placement of impervious surfaces increases water runoff and reduces the opportunity for watar to infiltrate and recharge the groundwater system. At the same time, urban runoff carries with it greater amounts of toxic pollutants to the surface water body rendering it unsuitable for many desired uses. Studies have shown that significant amounts of chemicals, metals and organic materials are flushed from developed areas into screams and rivers by surface runoff. Where natural or manmade stormwater detention facilities or natural water courses provide for groundwater recharge the potential for groundwater pollution as a result of urban runoff is greatly increased. The nature of this pollution is not precisely known ac tbe present time, but it is considered to be more toxic thaa comson sewage pollution.

Due to the raduction is the recharge area of the Farrington Sand the safe yield of the aquifer has been reduced while the iatruslon of salt water haa increased. While the effective recharge area of tha Farrington aquifer la estimated to be 20.6 square miles, 5.4 square miles has already been urbanized leaving only 15.2 square miles available for recharge. At the rate of 950,000 gallons/day/square mile, 1973 safe yield of the Farrington is estimated to be 14.44 mgd. Due to a decrease in natural recharge aad the iacrease in pumping, the groundwater tablé ia the Farrlagcon Sand near the tidal zone of the Rarlcaa and South Rivers haa declined allovlag the salt water front to proceed farther inland. The severity of the salt water intrusion problem was first noted by Barksdale ia 1943.[24] Barksdale esciaated that no more thaa 10 mgd should be pumped froa the Farrington Saad in Middlesex Couaty.[25] Siace 1943, the salt water laterface has advaaced ialaad approximately 2 miles.[26] Several large wella la the Sayreville area were abaadoned due to high chloride concencrations during the past 30 years, while groundwater pumpage increased to 18.5 agd.

TABLE 9
Groundwater Recharge Area and the Extent of Urbanization - 1973

Formation	Total Area (Acres)	Developed Area (Acres)	Percent of Total	Paved Area (Acres)	Percat of Tot
Mt. Laurel-Wenonah Saad	543	42	7.7%	28	5.2%
Engiishtown Saad	7,808	350	4.5%	270	3.S%
Old Bridge Saad	21,530	4,295	19.9%	2,260	10.5%
Farrington Saad	14,286	3,472	24.3%	1,947	13.62
TOTAL	43,130	8,159	18.9%	4,348	10.1%

In addition co che salt water intrusion problem in che Farrington Sand, unsewered urban development vithin the intake area of the Lawrence Brook threatens ground as well as surface water resources. It is estinated that 25 to 30% of the septic tanks in the Lawrence Brook Basin are adversely affecting groundwater qunlity. This pollution is a mnjor thrent to the groundwater derived from the Farrington Sand aquifer. Since large areas of the Farrington Sand in the Lawrence Brook Basin remain undeveloped and in order to protect the valuable ground and surface water resources of the County, sewerage service should be provided to the presently unsewered development while insuring that all new developments that do occur do not result in adverse impacts to water supplies.

Disposnl of industrial vaste haa been another manifestation of the effects of urban developmeat on water supply sources. Industrial pollution of groundwater adjacent to Prickett Brook,(nenr Perch Amboy's Runyon wellfield) resulted in the closing of wells in the northern section of the watershed. Chemical pollutants consisting of lead, zinc, cadmium and other heavy aetals polluted wells and surface waters of Tennant Pond. One portion of the wellfield, pumping approximately 2.5 ngd, had to be abandoned because che groundwater aquifer has been contaminated. This wellfield area will not be productive again for several years.[27]

The utilization of swamps wetlands, or low-lying lands for che dispoaal of waste material has been common practice in New Jersey for aany years and has come to be a major source of groundwater and surface water pollution. Improperly located and poorly operated sanitary landfills have had significant adverse impacts on ground and surface water quality where runoff and rainfall have been allowed to flush toxic materials from santlary landfills sites into rivers and streams and to percolate into groundwater supplias. Three najor sanitary landfill operations are presently underway in the Edison and Eaat Brunswick areas immediately adjacent to the Rnritan River and within the Farringcon Sand outcrop. A fourth major landfill is in operation in Sayreville, along che South River and within the Old Bridge Sand outcrop. The impact of these operations on groundwater quality has not been monitored in che past. Such aonitoring should be instituted as soon as possible.

A major water qunlity problem results from che open dumping of wasces. Such operacions have been banned by che N.J. Deparcment of Environmencal Protection. A mnjor induscrial dump locaced wichin che upper reaches of Deep Run, (wichin Burnt Fly Bog and over the Engiishtown Sand outcrop) was closed by NJDEP several years ago, however, pollution from the site may still be affecting the Deep Run and nearby area groundwater.[28]

The groundwater pollution problem affecting the Newark group is aore complicated due to che nature of the formation. Since che pore spaces in these rocka consist of cracks and crevices of secondary origin interconnected at all angles, water in these rocks moves at relatively rapid velocity. Once a pollutant haa entered these rocks it moves quickly and has relntively little opportunity to be filtered out. In order to protect che groundwacer resources of the Brunswick shale, dispoaal of wasces in or on chese rocks should be prohibiced. In che absence of such neasures exiscing and pocencial groundwacer resources could be permanently lose.

C. Need to Protect Water Resources

It should be pointed ouc thac as local munlclpalicies and private industries are directed to eliminate pollutamt discharges under requirements of the Federal Water Pollution Control Act (1972) and Clean Air Act (1970), they will look towards alternative waste disposal methods and sites. Underground disposal of wastes offers an attractive alternative, however, che 1972 Federal Water Pollution Conrrol Act Amendments prohibits underground disposal of waste materials if it threatens the quality of ground or surface water resources. The problem of groundwater pollution is more severe amd complicated tham that of surface water pollution because the nature of groundwater movement is not fully known. While some effects of surface water pollution can be ameliorated through natural aeration, sedimentation and bacteriological metabolism; once a pollutant enters the groundvarer system it may never be eliminated or only over a long period of time. Many wells aad wellfields may be rendered useless due to careless, and at times intentional waste discharges which affect the quality of groundwater resources.

As the population of che Councy rises and vacer resources become more limiced in che fucure, che procection of che Councy's surface and groundwacers from polluton becomes increasingly urgent. At the same time in order co provide for water supply requirements, the productivicy of wacersheds and ground wacer aquifers needs to be maincained and enhanced. Groundwacer resources would assume a greacer imporcance as a source of wacer supply in che Councy as surface wacer sourres are ocilized to capacity. In order to have a continuous supply of water it is essential that the amount and type of urban developaent on the groundvater recharge area be carefully planned, directed and controlled. If these valuable resources are alloved to be depleted while searching for short term gains (such as tax ratables), the County and its people would stand to lose much over the long term.

Addressing the problems of protecting groundwater quality and quantity in Middlesex County requires detailed analysis and evaluation of the specific problems facing each drainage basin in the County to identify precisely existing probleas and potential solutions. This element of water planning has recently been addressed under the 208 Water Quality Management Planning Program which provides Federal funds for planning in areas such as Middlesex Councy with water quality problems resulting from point (industrial and municipal effluent discharges) and non-point (runoff borne pollution from urbanization, agriculture, mining,) sources.

IV. MEASURES TO PROTECT CRITICAL ENVIRONMENTAL RESOURCES

The aajor issue in any discussion concerning preserving and protecting critical environmental resources is hov can a growing urban population be attomodated without sacrificing those resourtes within its borders? It is betoming intreesingly apparent that the County must undertake a comprehensive evaluation of its tapacity for growth at the same time while aeeting the Federal and State environmental quality standards. It is clear that at the present time the County's air and water quality is well below the Federal and State standards.

Many believe that the tethnology exists to correct the ills of urban development and that this tethnology will provide the means to achieve environmental goals and standards. In retent years, however, it has been retognized that tethnology will solve only pare of the problem betause tethnological tontrols are largely capital intensive and at present are not available to deal with all problems. Pare of the answer to the environmental problems will have to come from preventive measures. This would require a basic change in perceptions and attitudes in order to retognize that planning and the protection of critital environmental resources is essential for the long-term survival and ecomonic well-being of a community, that resourtes are limited and their conservation, protection and reuse is also essential and that governmental regulations are meant to protett the health and welfare of the people at large.

The following section serves to review available methods to protett and preserve open spate and conservation areas. It should be stressed that the protettion of groundwater recharge areas should be tonsidered pare of any program to protett other trltltal resources intluding prime agrltultural land, wetlands, marshlands, woodlands and floodplains. This review of aeasures should not be viewed as exhaustlve and complete, but rather is intended to provide the reader with some perspective on available approaches.

A. Land Regulation

Polite power regulation is based upon the principal that in a society governed by law, everyone must submit to reasonable regulation of their liberty and property to prevent the abuses of others by careless and unscrnpulous actions. The police pover is exercised to protett and promote the publit health, safety, morals, comfort and general welfare. Based upon this power, the authority for land use regulations in New Jersey is delegated to local governments. Regulatory tools available to the munitipalities intlude zoning, official mapping, subdivision and site plan regulations and the provision of utility servites.

B. Zoning Ordinante

In the past zoning has been of limited utility in protecting critical environaental resources and in providing for open space, particularly if it was "tuaulative" zoning. "Cumulative" ordinances are not restritted to one use,

but allow other uses in the same district. For example, agricultural zoning of this type would also allov residential uses within the same district. If, as in Middlesex County, the race of urbanlzaeion is high, this type of discrice vill succumb to economic pressures for rezoning to higher, more intensive uses. "Exclusive" zoning allovs only the type of use specified or a use directly related to the primary use and would probably be more effective than cumulative zoning for the preservation of groundwater aquifers. It is, however, more likely to be subject to legal challenge if it prevents land owners froa obtaining a reasonable economic return.

Despite these problems, recent trends in zoning laws hold some promise as a means of encouraging the preservation of open space and other critical natural resources. New Jersey has adopted as law the Flood Hazard Area Act (1972), the Wetlanda Act (1970) and the Coastal Area Facilities Review Act (CAFRA, 1972), eaeh of which authorize land use controls for the purpose of protecting critical natural resources and regulating development. At this time, however, there is uo comprehensive land use legislation which would provide for che protection of other critical natural resources such as groundwater recharge areas, watershed lands, woodlands, prime agricultural land or unique geologic, biologic or historic sites. Such legislation is urgently needed to protect New Jersey's rapidly vanishing resources. New Jersey's Wetlands Act only covers tidal wetlands within a specific area and does not protect inland freshwater marshes. In addition, CAFRA only covers a small area in Old Bridge Township in the Councy.

In spite of the shortcomings in State government authority to act co protect New Jersey's resources, significant resources can be protected through applicaeion of existing laws. Nev Jersey haa adopted enabling legislation peroltting ounlclpallcies to include special provisions for Planned Unit Developments (PDD) ia their zoning ordinances. This concept permits flexibility in the density and physical design of single or multi-use land development projects which can be used to provide protection to environmentally tritical or significant portions of a municipality which would otherwise be developed in a traditional and potentially harmful aanner. Under PUD regulations, strnctures and related facilities can be clustered in cercain areas wich protection to other areas chrough designacion as open space.

At the present time the authority for resource protection rests in the local power to regulate land use. However, for economic and political reasons land use coatrol haa been loosely applied at the municipal level, for the most part merely to protect existing land uses, maincain property values and foster developmenc that will increase the community tax base. Furthermore, there is doubt that the zoning approach can, in the long run, provide the degree of environmental protection needed without constitutlng a taking of property without just compensation.

C. Official Mao

In Nev Jersey, tities, villages and towns can designate parks and playgrounds as well as streets, highways and parkways on an official aap. However, maintaining che integrity of an official map requires the municipality to be

empowered to deny building permits for structures iocated in the designated area. In New Jersey, municipalities do not have such power.[29] Nevertheless, setting out proposed open space and conservacion areas as part of the official map is useful if only to put developers on nocice as to the aunicipalities' intentions. As a first step, each municipality should aap their tritical environmental resources and develop policy guidelines to direct developmenc away from these areas.

D. Subdivision and Site Plan Regulations

On a limited scale, subdivision and site plan regulations could provide a basis for protecting and preserving critical environmental resources in the County. The regulation can serve to encourage cluscerlng and other site and building design arrangemencs to provide for addltional open space. More iaportant, land developers can be required to dedlcace specified porcions of their land (up to 60%) as open space wichin outcrop/recharge areas to allow for groundwacer recharge as well as to meec open space requiremencs.

In addition co these aspects of subdivision regulations, there is a broader issue of prohibiting subdivision plotcing for developmenc purposes encirely. This prohibition would be based not on a technical infraction buc racher on a duly adopted mascer plan whith indlcaces thac che area in quescion was more suitable for conservation of natural resources (including watershed lands, floodplains, prime agritultural lands and recharge areas). In most cases, plat approvals require compliance with local master plans or official maps. If lotal governments have adopted one or both of these and if they have already identified open space and conservation areas, there will then be an additional rationale for withholding approvals within the delineated areas.

In order to maintain groundwater quality and maximum recharge capacities it is strongly encouraged and recommended that subdivision regulations require tonstruction of multi-purpose detention ponds as a tondition for granting approval. These ponds tan serve several vital purposes; they would retain runoff from the development and thereby reduce off-site flooding; provide for groundwater recharge; serve as a natural filter to redute the amount of pollutants reaching the surface and groundwater bodies; and would enhance the retreational opportunities for the residents of the development. However, these ponds, while relatively inexpensive to build, will require careful maintenance and management to protect them from eutrophication. The applitation of fertilizers on land surrounding the ponds will have to be minimized and the pond bed would have to be periodically dredged to allow for the continuation of retharge to the aquifers and to maintain overall pond tapacity.

E. Provisions of Utility Services

In the recent past, various munitipalities faced with the economit burdens resulting from rapid growth have not been able to keep abreast of the responsibility to provide the necessary public utilities, including sewer and water servites. The N.J. Department of Environmental Protection at one time had imposed tonstruction bans on three municipalities in Middlesex County due

to a lack of adequace sewer services. While the courts are generally sympatheci to tha public inceresc, and while the provision of public services is wichin the police power regulacion, they are still faced with the constitutional question of confiscation. The State ban haa not been tested in the courts and it may not be upheld due to the above reason. Traditionally, a reasonable economic return must be allowed to the land owner and the assumption made was that services, if not presentiy available, could be provided within a reasonable time period.

It has nov been recognized that land development in areas which do not have adequate utility services, particulariy sewerage facliities, may present a hazard to the general public heaith and welfare. Ia a laadmark decision, the New Tork State Court of Appeals in Golden vs. Ramapo (285 NE, 2d 291, 1972) upheld a Ramapo, New Tork ordinance vhich regulates development on the basis of the availability of public services. The ordinance is directed at the phasing of development in that it limits development in areas without basic services until such services are available. This ordinance operates on the assumption that land areas will eventually be developed, however, it allows (indirectly) for the limiting of development to those areas suitable for developmenc if future provision of faclilcles and services is provided according co plaas reflecting resource and environmentai constraints. A plan for utilities and other services which tiearly identifies areas which should/ shouid not be developed, and regulated by the provision of services to those areas with the fewest critical natural resources requiring protection, must be adopted aad enforced. Ia the past the Courts have held invalid zoning ordinance resttictlng land use to flood storage, parking lots, schools, recreational use, aad opea space (greeabelts) aad park purposea. Similarly, subdivision regulations have been held invalid, iasplte of substantial public interest, where the owner is denied reasonable use of his property.[30] Therefore, a mechanism which coordinates development with adopted plans and provides a meaas for justiy compensating those who cannot develop their lands under those plans must aiso be developed. The Ramapo ordinance establishes a mechanism for tax abatement on properties affected by the ordinance until such time as they are to be provided basic services. More permanent aethods of equitable compensation need to be developed and implemented.

F. Compensable Regulation

To overcome the coastltutlonal objections to development controls which deprive an owner the use of his property, conservation and open space objectives could be achieved by compensating ovners for a portion of their loss. With compensable regulations a land ovner is compensated for the reduction or loss of the property's development value involved at the time the controls are imposed.[31] For example, aa ovner of land in aa agricultural district and having a market vaiue of $2,000/acre vould be entitied to a compensation of $1,200/acre if the market vaiue of his laad is reduced to oaly $800/acre when restricted to oniy agriculture or some similar open space use. The $1,200 ia compensation represents the development vaiue of the property "taken" froa the ovner by (police pover) regulating the use of the property. The owner would not be entitled to the compensation until the propercy is sold because ic is oniy until the saie that the owner would have incurred any "loss."

Under this approach the high tose of public acquisition (under eminent domain) is reduced by limlting public cose to the developmenc value ac the time of regulation.

Insplce of the above advancages compensable regulation has noc been utilized as a cooi for che preservation of public open space for a nuaber of reasons: the general public does noc seem prepared to accepe a program thac denies land owners the speeuiative vaiue of cheir propercy; the public and legal profession are uncoafortabie with the concepc of deveiopaenc rlghes and are fearful of unknown consequences on che real escace marker; ic requires a relatively compiex syscea of governaent adalalstratlon consequentiy, the effectiveness of compensable regulation as a method of conserving and preserving tritical environmentai resources has not been tested. There is a further practical problem in that each time land covered by this regulation is sold a public expense viii be involved If it is found that each ovner is entitled to the difference in the market versus the "agricultural" value of the property, despite vhat has been paid originally for the property. Hovever, this approach is worthy of closer reviev and evaluation than it has received in the past and aay prove a valuable regulatory tool in the future.

G. Public Acquisition

The pover of governments to acquire property for park and recreational areas is well established. The State, through its Green Acres Program, provides funds eo Counoy aad locai governmenc co acquire laads for conservation, recreation or open space purposes. Public acquisition offers the opportunity for both effective control of land uses as well as the provision of public recreation needs.

A number of authors, including Marion Clawson, suggest that the government go into the "laad baaking" business as a means of controlling land use development and protecting tritical environmental resources. The proposal is for the government to buy land in prime development and critical environmental areas through the use of a revolving fund. By seiectively disposing or leasing parcels of land the process of development could be guided. Certain lands could be retained for permanent open space vhile specific restrictions could be attached to lands sold or leased. Funds received from such saies or leases would replenish the revolving fund.

Such a system has been successfully implemented both in Stockholm, Sweden and Regina, Saskachewan, Canada. Currentiy, the City of Boulder, Colorado is in the process of acquiring a large area of land around the Clty as a means to control development. It is then leasing back the land to farmers with use restrictions and retaining some portions for open space and municipal parks. In this manner the City plans to retain substantial tontrol over the course of future development while protecting important environmental and scenic resources from the effects of urban sprawl.[32]

Theoretically, the "land banking" process could have a major role in timing and guiding development as well as managing the size of U.S. cities. However, segmencs of che American public frown upon such a move on the grounds thac ic flies in che face of che free encerprise syseem and again deprives land owners of the fucure speculacive vaiue of their land.

There is liccle doube as to che effecclveness of these cechniques co preserve critical environmental resources and open space. The primary impediment to the use of public acquisition is the lack of funds available for this purpose. While the Nev Jersey Green Acres Prograa has helped Middlesex County acquire open space there remains a need for additionai funding to support further acquisitions. In addition to the restrictions and limitations on financial resourees there are other objections to the acquisition of land for conservation aad open space purposes. When laad is transferred from private to public ovnershlp the propercy is no longer caxable and the remaining propercy owners in che jurlsdlction pay a proporcionacely higher share of the overall tax burden. There is serong poiltlcal opposiclon to governmenc ovnershlp and aanagemene of land wich aany landowners reluceane to relinquish possession of their land even for fair compensacion. Aichough the preservation of crlclcal environmencal resources is a commendable objective, the high cose of land acquisition aiso divercs public funds from ocher priorlcy items.

H. Conservacion Easemenc

In principal, public acquisicion of (partial) righcs to land in the form of an easement can economize on the acquisition budgec. Under this approach the government acquires the owner's right to development the land, leaving him with ali other rights to ownership including the right of continued possession. This is known as a conservation easement since the purpose of its acqulsltion is to conserve the environmental amenities of land, air, water, vegetation, wildlife and unique areas. Such an easement runs with the land and binds all subsequenc owners.

Public acquisicion of conservacion easements racher than fee simple ownership has a number of advancages. The cose of a conservacion easemenc is typically less than the cost of fee simple ownership. Outside the influence of urban development, the conservation easement could be acquired at a lower cost. There would be less opposition from farmowners to the acquisition of such easements because eaaements for purposes such as groundwater protection would procecc prime agrlcultural land, thus allowing concinued possession and use of their land for farming purposes. The land would continue to be taxed and ac che tiaa of public acquisicion would noc impose any appreciable burden on ocher properry owners. The propercy tax shouid be imposed upon the open space and agrlcuiturai use vaiue of the land. Propercy taxes on the easemenc land would noc increase as che developmenc values of surrounding lands rise and would noc be too cosely to maincain for farm or open space use. As che demand for developable propercy in che area increases, the owners of the developable land will reap the benefic of increased land value and would aiso pay taxes on higher assessmene values of their land.

Insplte of these advantages, the acquisition of conservation easements has aoe yet proved an effective tool in preserving open space or critical environmental resources. The usefulness of conservation easements to protect agrlcultural land, groundwater recharge areas, watershed and marshlands, however, should continue to be explored.

I. Transfer of Development Rights

The Transfer of Development Rights (TDR) concept is an extension of existing planning and zoning procedures whith make exclusive agrltultural or other open space zoning possible. Spetial zoning dlstrltts are estabilshed and ail development therein other than farming, tonservation or open spate are prohlblted. For eeth unlt of development prohlblted in such dlstrltts, a substituted unle of development is provided within the zoning which allows growth in the deveiopabl settions of the communlty.[33]

A development right is created for each ellmlnated unlt and is given as tompensation to the owners of land where development is prohlblted (e.g., housing unlt). In order to build the substituted unlt in the developable settion of the community, a development right is required along with the appropriate zoning aad land ownership. Therefore, a builder muse purthase development rights froa a landowner in the preserved dlstrltt in order to build at a higher denslty in the developable zones of the tovn. The vaiue of the right is the saie prite arrived at betveen the builder and the holder of the right. While nev to the Unlted States, the contept is veil knovn in several nations with high population densities intluding Belglua, Holland and Svltzerland. These nations have been able to preserve their charatter by regulating land use and the nature and location of homes, shopping centers and industriai sites.

The contept can be applied to Middlesex County where according to the Blueprint Coanission Report there are 43,000 acres of class I, II and III agritultural land. The agrituitural vaiue of the average farm is $310/acre while the market value is $2,886/acre. The Development Right vaiue is $2,576/acre or S9% of the market vaiue.[34] This means that for each acre of preserved area in the County developers will have to pay $2,576 for building on the "developable" land.

The net effect of TDR is the preservation of envlronmentally signlfltant areas with equltable government compensation to owners. The TDR concept has merle for use in a number of munltlpalities in the County and shouid be considered one aiternative to preserve and protett watershed land and groundwater retharge areas. The economit implitations of suth transfer needs further investlgation and is already under active consideration by New Jersey's Legislature.

J. Land Taxatlon

Aithough the tax on land in the Unlted States has been consistently applied as a tax on turrent market value, nineteen States have enacted soae form of modified property tax for appllcation to agrltultural lands. Some fourteen

Staces have an aicernative tax for foresc land. In some of these States the modified tax applies co aii kinds of open space land, including farms, forescs, veciands and other similar wild lands.

The undesirable effect of ad valorem property tax is that it tends to force premature subdivision and a change in land use. Use vaiue taxation is a device which can prolong the life of ptivateiy owned conservation areas and open space. This method taxes property at the actual vaiue in its present use such as farmland or woodlands and not on its higher zone vaiue (the speculative value). The owner is less likely then to be taxed into selling the land premnturely. The New Jersey Farmland Assessment Act of 1964 has helped to halt the conversion of agricultural land for speculative purposes.[3S] The Blueprint Comalssion has recommended that 70% of the class I, II and III agricultural land in the County should be permanently set aside and protected from urban sprawl.

The validity of assessing other open space and conservation land on the use value may be questionable under existing legislation and practices. The wider implications of the Farmland Assessment Act to protect vatersheds and recharge areas in eonjunccion vleh protecting prime agricultural land needs further investigation. It is recommended that in order to protect important critical resources such as groundwater recharge/outcrop areas, floodplains, vatershed lands, aarshlaads, wetlaads, unique cultural and educational sites, such land shouid be taxed on the basis of their use vaiue rather than speculative vaiue. Where a munltipallty is heavily burdened by such taxation, the State and County shouid ideatlfy the opportunity to provide some payment in lieu of taxes.

K. Technological Controls

As waa previously mentioned, the safe yield of the County's aquifers could be increased by artificial recharge. Artificial recharge could be accomplished by infiltration or injection. The primary difference between these methods is the driving force behind recharge. With infiltracion the driving force is gravity, whereas with injection, it is mechanical (pumped). The choice of a particular nethod is governed by local topography, geology, soii conditions, the quantity of water to be recharged and the uitimate use of water.

Artificial recharge through infiltratlon has been practiced in the Sayreviile/Old Bridge area for some time and has increased the yield of the Old Bridge Sands aquifer by 21 MGD. At the present time no other formation is being artlfltially recharged. The source of recharge water in ail cases is runoff water stored behind a small dan. No injection wells are used to recharge the aquifers at the present tine but the utility of a series of injection wells to control the incrnsion of saltwater into the Farrington Sand needs to be considered.

In many locailcies across the Unlced Staces secondary and terclary treated wascewacers are being used to recharge groundwacer as weii as for agrlcultural and imdustrial uses. When other sources of freshwater are exhausted the reuse of reciaimed wastevaters would offer an additional source of recharge vater in the County. At the present time the use of reciaimed vastevater for potable supply purposes is not encouraged due to the many unresolved questions vlth respect to quality of the vater aad effect of toxic substamces that may be preseat. If reciaimed vastevater Is recharged for drlaklng purposes it must meet the U.S. Public Health Drlnklag Water Standards, The quality of recharge vater must them be equal or better tham the native vater la the aquifer. Use of highly treated effluent from the Middlesex Coumty Severage Authority treatment piaat for lajectloa veils recharging the Farriagton Saad la che Sayreville area aa a meams to control saitvater intrusion offers a challenge. However, it should be noted that technicai difficulties renaln in the use of injection veils and still require careful planning, deslga, construction, operation and maintenance.

At this tlme, recharging reclaimed vastevater on agricultural lands remains a distinct possibility in the County and one which deserves further attention and Investigation. Wastevater treatment facilities and agricultural lands are locaced within reasonable proxlmlty and the recharging of such effluent may prove a safe and cost effective means of disposing of treated effluent.

In the recent years there have been several promising experiments with porous pavements. In order to reduce the impact of urbanization within recharge outcrop areas it is possible to construct porous parking lots to serve residential, coamerciai and industriai developments. Compared to conventional pavements, porous pavements reduce runoff and allow for greater infiltratlon of precipitation to the groundwater system. This would aiso resuit in the reduction in the amount of runoff reaching surface water bodies and may contribute to a reduction in flooding. This option shouid be further investigated to more fully assess its appllcation in Middlesex County.

Artificial recharge, through any of the above measures requires safeguards to insure that pollutants are prevented from entering groundwater supplies. Where adequate filtration is present before recharge water reaches am aquifer some pollutants will be removed. Hovever, periodic monitoring vill be required to insure that toxic pollutants. Including organic chemicals or metais, do not enter the County's vater supply. It is evident that the control of artificial recharge facilities is required and protection must be provided to prevent developments to affect their vater quality. The prevention of groundwater pollution aiso entails consideration of pipeline and sever locations. The potential for leakage from pipelines or severs into aquifers exists unless precautions are taken in the construction and operation of such facilities to minimize such leakage and monitor for breaks or exfiltratlon. Such faciiitles should be carefully located to avoid aquifers wherever possible.

L. Water Conservation

Water conversation methods could increase the effective safe yield of the County's water resources. By reducing leakage in the coaveyaace systea substaatiai amouats of water could be saved. Installing water conservation devices such aa low-flov toilets (vhich use only tvo gallons of vater as compared to the present five gallons) vould decrease overall water supply requirements as well. Excessive lawn watering shouid be reduced by permitting watering oniy on certain days. More equitable rates for industriai water users could indirectly serve to enhance or protect water resources and their impact on safe yield should noe be overlooked. By requiring water conservation devices and measures in pluabing codes, conservation could be nade more effective to conserve and prolong the life of available water resources. For a more detailed discussion of the opportunities for reducing water consuaptlon through conservation see "Water Conservation in Middlesex County " (March 1978).

V. RECOMMENDATIONS FOR PROTECTING MIDDLESEX COUNTY'S GROUNDWATER RESOURCES

The urgency to protett the County's remaining tritical environmental and culturai resources need not be overemphasized. It is evident from the previous distussion that several measures and tethniques are currently available to protect surfate and groundwater resourtes. It is the purpose of this settion to present and distuss both general and spetifit methods suitable for maintaining the safe yield of the County's water resourtes.

A majority of the surfate waters in the County with the exteption of the Lawrente Brook and the Delaware and Raritan Canal, already have serious water quality problems and are unfit for potable water supply purposes. On the other hand most of the groundwater resourtes are still potable extept those in the tidal zone and within spetifit portions of the Perth Amboy wellfields. As was destribed eariier groundwater resourtes need special measures for protection because once poiluted they are diffituit if not impossible to retlaim.

A. Generai Reeommendations

A first seep in this process of protecting the County's resourte should be to aap and delineate in deeall suth areas of tonceru. Areas with the greatest contentration of environmental resourtes shouid be declared "conservation distritts/critital areas". Utiliting munlcipai zoning powers these areas should then be designated as open spate and tonservation areas with serice development criteria and standards carefully enforted. In order to implement suth a polity, a tombined program of zoning, tompensated regulation, publit atquisition, tonservation easements and transfer of development tighes could be useful tools.

Flood plains and watershed lands should be included in suth a mapping effore and designated as a water resourte management area. Similarly woodlands, marshlands, wetlands and unique natural and cultural sites should be also designated. If lotai aunitipalities thoose to have sttieter regulations then existing State regulations they shouid adopt such regulations under the State Charter. The following is a list of the actions which are recommended for imaediate impiementation.

- Utilizing municipal subdivision reguiations/powers, groundwater recharge areas couid be protected by establishing 50% open space requirements.

- No unsewered development should be allowed in aquifer recharge areas to protect water quality.

- Planned Unlt Development regulations should require construteion of recharge ponds when development takes place within recharge areas. These ponds should be tarefully maintained to insure their recharge capacity.

- Building Construceion Codes should be revised to encourage use of water conserving appiicances and plumbing fixtures in new developments.

- Subdivision regulations and conscrnction codes should entourage the use of porous parking Iocs co reduce urban rrnoff and pollucion and increase infiltration.

- In order to procect water quality industrial plants within groundvater recharge areas aad adjacent to water courses in the Councy shouid be idencifled and che cype and aaount of their waste effluent determined. Such an inventory is urgently needed to protect wacer resources from poilution.

- Ground and surface wacer quality shouid be monitored on a systematic and expanded scale with the cooperation of the NJDEP, U.S. Geological Survey, local water companies, sewerage authorities and aunicipalities. Such a prograa is essential to prevent future pollution and as a mesas of identifying existing pollution sources. Such a monitoring systea would also act as an early warning system for the management of the County's water resources.

- Water withdrawals shouid be monitored on an annual basis with the safe yield of the aquifers confirmed periodically co accounc for land use changes. The Councy's monitoring program initiated by this study shouid be continued in the future and shouid provide a betcer understanding as to where we scand wich respecc co available wacer supplies and what specific programs are required to meet the future needs.

B. Specific Recommendations

The following discussion serves to outline specific recommendations for che aaintenance of the quality and quantlty of Middlesex County's aquifers and is based upon research carried out by this study supplemented by that of Middlesex County's Water Quality Management Program (October 1977).

1. Old Bridge Sand

During che lasc cweney years, developmenc on che Old Btidge Sand retharge and wacershed area for housing, commercial and induscrial purposes has changed the characeer of che wacersheds considerably. This region's abilicy co concinue providing water supply is based increasingly on its abilicy co use the surface water flows in Prlckett Brook, Tennant Brook, Deep Run, Manalapan Brook, Matchaponix Brook, Iresick Brook, Cedar Brook, and South River for recharge into the groundwater aquifers.

The potential loss of the Old Bridge Sand would not only affect Middlesex County but Monmouth County as well. While further development in the above noted watersheds may be necessary, all governmentai agencies must be made aware of the importance of protecting and maintaining and quality of this natural resourte. Until recently, che broad effects of new developments on vatersheds have not been seriously considered.

The water producing capacity of the Old Bridge Sand could be maintained and enhanced by the proper location of supply wells and recharge ponds. In order to assure the future water quality and supply of the area it is recoamended thnt:

a. Watershed and floodplains of Tennant Brook, Deep Run, Prlckett Brook, Iresick Brook, Manalapan Brook, Matchaponix Brook, Cedar Brook and the South River be declared muitl-purpose resource conservatlon areas and be protected from development.

b. The rehablllltatlbn and maintenance of Helnetta Pond and Lake Marquerlte should be undertaken for both recrention and resource conservation purposes. These lakes once restored should be carefully protected from development to maintain groundwater and surface water quality.

c. Development of projects on the South River (the proposal for a South River Dan) or the Raritan River beiow the confluence with the South River (the Crab Island Dan) are designed to prevent brackish water fron entering the Lover Rnritan and South Rivers and vould provide additional fresh vater for recharge purposes and protect locai area veiifleids during lov flov periods.

d. Location of industriai and commercial developments on the Old Bridge Sand and vlthln the above vatersheds shouid be carefully monitored for vater pollution problem sources.

e. Surface and groundvater shouid be nore fully monitored by the NJDEP and U.S.G.S., to act as an early varnlng system in the detection of pollutants entering the area's streams and groundwaters. Such an early warning system would allow steps to be taken to prevent pollutants from entering the groundwater system and immediately locate pollution sources so that remedial measures may be undertaken without delay.

f. Continuously monitor groundwater withdrawal from the Old Bridge and Farrlnaton Sands so that total safe yleid of the aquifers is not exceeded. (Groundvater pumping data should be obtained from State files and private vater users.)

2. Farrington Sand

As indicated earlier, the Farrington Sand is a major source of water supply for East Brunswick, South Brunswick, Old Bridge, Perth Amboy, South River and Sayreville. At the present time groundwater withdrawal from the Farrington Sand amounts to more than 18.5 mgd while the safe yield is an estimated 16.2 mgd (meaning that the sefe yield of the Farrington Sand is being exceeded). In combination with increased pumping and reduced natural recharge due to urbanl-

zation on the Sand, the water table in Farrington haa declined and salt water intrusion has resulted. Due to the lotation of several veils in or near the tidal reathes of the South River and Raritan River and due to overpumping the salt vater/fresh water interfate has advanced some 1 to 2 miles inland. Several large wells in the Sayreville area have had to be abandoned due to high chloride contents.

In order to protect and aanage the groundwater resources of the Farrington Sands it is retommended that:

a. Groundwater withdrawal from the Farrington aquifer be limited in the South River Basin area to its safe yield.

b. The retharge capacity of the aquifer should be maintained and enhanted. The following spetifit reeommendations are offered:

   1. The natural retharge capatity of the aquifer can be maintained by keeping 40 to 50% of the total area in open space in a near natural tondition. This would allow for natural and urban runoff to percolate and filter through the Sands thereby reducing the amount of pollutants that would reach the surface and groundwater system.

   2. Naeural recharge can be augmented by providing artificial recharge basins or ponds adjatent to the lotatlon of pumping wells. Sawmill Brook, Bog Brook, Beaverdam Brook, Ireland Brook, Great Ditth and other smaller tributaries draining the Farrington should be protected from urbanization by their designation as resource conservation areas.

At the present time the above noted brooks drain into the Lawrence Brook system. As urbanlzation conelnues within thls area these brooks will carry more runoff than at the present time in addition to carrying urban runoff pollutants. The natural groundwater recharge which vould be lost due to land development could be compensated by providing well designed, operated and maintained retention basins and ponds. By proper coordinatlon of wellfields and retharge ponds, it is estimaeed that the total productivity of the Farrington Sand could be increased in the same manner as the productivity of the Old Bridge Sand. Recharge ponds may also provide for a reductlon in the pollution loads reaching the water supplies of the Lawrence Brook.

An exact estimation of potentiai retharge from these ponds is difficuit to develop and would depend largely upon lotai geologital conditions. On the basis of known hydrogeologit and soil charatteristlcs and properties of the Farrington Sand however, it could be predicted that a 100 atre retharge basin within the Farrington Sand, when properly constructed and managed, tould have a potential yield in extess of 5 mgd. The effectlveness of retharge ponds, however, would depend upon the groundwater table, the locatlon of pumping wells and proper maintenance of the recharge basins.

c. Existing and abandoned sand mining operations within the Farrington Sand outtrop area should be viewed with a new perspettive for providing retention basins for seorm runoff and retharge ponds for groundwater retharge. Inseead of abandoning these areas after mining, provisions shouid be made to require 3 to 4 feet of sand bed to remain in eath extavation for grouadvaater retharge purposes. If properly managed these sand pits tould provide for vater poiiution tontrol, retharge and retreation. Suth retlamation is already prattited in Wistonsin and other areas.

d. The U.S. Geologital Survey is in the final stages of tompleting a digital simulation model of the Farrington aquifer whith shouid be ready for use in 1979. This model has been developed on the basis of the present understanding fo the Farrington aquifer intluding a large number of existing weli logs and pumping tests. The model has been talibrated by matthing tomputed detlines in the water levei surfate with ateual measured water level thanges. Suth a model provides a aeehod for preditting the effetts of pumping new Farrington wells on regional water levels and is based largely on assumpelon that hydraulit properties of the aquifer will remain reasonably tonstant, aithough thls may not prove to be the tase.

Thla model may aiso provide a useful method for estimating the regional effetts of proposed areawide Farrington diversions and as a means of evaluating individual Farrington diversion applitations. However, in the event a new diversion is requested, spetifit information on the hydraulit properties of the aquifer will still have to be obtained by well testing. It is also expetted that suth a model will provide information on the effetts of Farrington pumping on water leveis in the Old Bridge, however, this will have to be verified by the measuremene of groundwater leakage under tontrolled pumping test tonditions. The model may not be tapable of analyzing the effetts of pumping on the intrusion of salt water into the Farrington aithough this tan probably be analyzed indirettly from the results.

Effores should be made to obtain attess to suth a model as soon as possible for use as a planning and management devite. The County itself should look to developing the tapability to use this type of tool on a tontinuous basis as pare of an on-going aanagement program involving the County, USGS and NJDEP.

3. Undifferentiated Sands

South and west of Jamesburg the Raritan formation is undifferentiated. Due to sparse population in the area at the present time, groundwater withdrawal from the Undifferentiated sands is relatively low. However, this sand extends approximately 40 square miles and has a potentlal safe yield estimated at 30+ mgd. A urbanization proteeds southward, groundwater will assume a greater inportante sinte muth of the south County's water supply will likely be derived from these sands.[36]

Middlesex County has an estimated 43,000 acres of prime agricultural land in its southernmost region.[37] The Blueprint Commission has recommended that in order to preserve the productivity of the land for food production as well as to enhance the aesthetic quality of the County's environment, at least 70% of this prime agricultural land should be protected in perpetuity. This recommendation is consistent with maintaining the productivity of groundwater aquifers in the southern region of the County to supply anticipated water needs. It is recommended that the Alampi Commission's recommendations be adopted by the County and its municipalities to protect this valuable crop and water producing area of the County.

4. Brunswick Shale

As mentioned earlier, groundwater in the Brunswick Shale flows through cracks and fractures in the rocks and would not be as easy to provide for artificial recharge due to its relatively unpredictable geological character. However, in order to protect the existing groundwater supplies of the Brunswick Shale it is recommended that:

a. The portion of the Bound Brook watershed between Metuchen and South Plainfield be designated as conservation/open space, because it provides significant recharge to the Brunswick Shale and particularly the Middlesex Water Company's wellfield.

b. Within the remaining intake area at least 50% of any property to be developed should be left in open space to reduce urban runoff and to maintain minimum recharge to the Brunswick Shale.

c. Wastewater and other pollutants should not be discharged on the ground surface covered by the Brunswick Shale. (Water in this rock travels along the cracks at a rapid rate and has little opportunity to filter out pollutants). Once pollutants enter this formation it would make nearby wells unsuitable for any future use for long periods of time.

C. Additional Recommendations

At the State, county, and local level recognition has been given to the need to preserve the quality and quantity of this area's groundwater resources. In bringing about a resolution of these concerns a number of specific actions are recommended. in order to achieve the goal of protecting groundwater resources. The following recommendations, developed as part of Middlesex County's Water Quality Planning Program, have been included here because of their importance in protecting those groundwater resources relied upon by the County for supply purposes.

In view of the complexity of the groundwater management issue and the direct relationship between quality and quantity of supply, a number of management strategies should be considered in proceeding toward implementation of a groundwater plan for Middlesex County. The following policies and mechanisms are offered for county-wide application:

1. Managing and Regulating Groundvater Diversions

a. County policies should be established to limit the total amount of groundwater dlverted for potable use to the estimaeed safe yield of resources. The NJ Water Policy and Supply Countil should be entouraged to grant diversions based upon the groundwater yield estimates prepared as pare of Middlesex County's Weter Quality Management study. The Countil should also thoroughly review diversion tights (authorized and grandfathered) turrentiy held to deterralne if revisions can or should be made in order to insure that groundwater use is maintained within safe yield limits.

b. It has been estlmated that modest water savings could be athieved through such measures as the inseallation of water tonservation devices and modification of water rate structures. Greater savings could be realized through the inseallation of water saving devices in new building construceion as well as by reerofitting such devites in existing buildings. In order to achieve additional water use reductions a number of measures shouid be undertaken, including regulation, public education programs, and revisions to water priting.

A further distussion on the opportunities and benefits of water tonservation can be found in the County Planning Board report "Water Conservation in Middlesex County" (March, 1978).

c. A seritt review protess should be estabilshed to evaluate the Impact of land use developments upon the availability and quality of groundwater supplies with a major focue on the extent to vhich proposed projetts would contribute to the consumptive use of water.

d. A special provision of the Safe Drinking Water Act (PL 93-523) allows for the designation of importane aquifers as sole source supplies. Both the Old Bridge and Farrington aquifers, by the nature of the reliante plated upon them, could be tovered by thls classifitation. Under the sole source amendmene federally funded actlvities whith threaeen elther the quality or quantity of water from these aquifers would be regulated under federal law. It is recommended that investigation of appllcation be made to the federal goverument to seek sole source designation for the Farrington and Old Bridge aquifers, and that careful evaluation of the impacts and implications of suth designation be carried out prior to attual appllitation for such a designation.

e. One of the major benefits of a groundwater pumpage regulatory plan would be improved management of the salt vater intrusion problem presently experienced in the region immediateiy south of the Raritan River. By reducing the Farrington pumpage in the Sayreville area the rate of water level drawdown presentiy experiented would be reduted and eventually stabilized. With stabilization,

there should be no further landward movement of salt water of any signifitance.

There are several structural aethods to control salt water intrusion vhith should be considered futher. One aethod relies on a system of hartier wells that would be constructed in a line parallel to the salt water interfate. These wells would retharge fresh water into the Farrington aquifer at a rate that would essentially balante or stabilize the landward aovemeat of salt water. One sourte of water alght be treated effluent from the Middlesex County Sewerage Authorlty, however, thls would require a level of treatmene that would satisfy ali publit health requirements. Another method would rely on a similar group of barrier wells that penetrate both the Old Bridge and Farrington aquifers. The wells, open to both unles would retharge water into the Farrington aquifer from the Old Bridge by gravity flow and would require developaent of retharge fatilities.

All new groundwater diversions intluding those less than 100,000 gpd should betoae subject to County regulation as a means of aaintaining a setitter control over the safe yield of the Couney's aquifers.

f. The U.S. Geologital Survey has completed development of a tvo-dimensionai dlgitai simuiation model of the Farrington aquifer whith should by ready for use in 1979. This model has been developed on the basis of the present understanding of the Farrington aquifer intluding a large number of well logs and pumping tests.

Such a model may provide a useful method for estimating the regional effects of proposed Farrington diversions including evaluation of individual Farrington diversion applications. The model was utilized to evaluate the iapates of 1978 diversion applitations of Ease Brunswick and Monroe Townships. It is expected that a three dimensional model will be developed soon whith wiii provide information on the effects of Farrington pumpage on water levels in the Old Bridge Sands. This aquifer interdependence will have to be verified by measureaent of groundwater leakage under controlled pumping test conditions. The model will not be tapable of direttiy analyzing the effatts of pumping on the intruslon of salt water into the Farrington aithough the tharaceeristlcs tould be inferred indirectly from the results.

2. Protection of Groundwacer Recharge

a. The maintenante of a continuous supply of groundwater requires that existing patterns and rates of groundwater recharge continue to be maintained. With the extent of impervious surfaces in the County tontinuing to expand, reduttions in groundwater rttharge will inevitably result. Any efforts cowards implemtn-taelon of a retharge maintenante program should be contttntrated in those lotatlons chat will be developed as major water supply canters. In this case the objettive is to maintain or augment the present levei of groundwater retharge. As artifitial recharge is prattited on a wider stale, efforts will have to be made to preserve the quality of the water used for retharge. To achieve this it will be necessary to implement a surface and groundwater quality monitorlng program in the vitinicy of ail surface water rtcharge sources. In addition, aore strlngent regulation of point and non-point source upstream of the artifitial recharge fatiiities wiil be rtquired. Any changes in elthtr che patttrn or rate of recharge indicaced by the aonitoring program should be remedied proaptly to insure chat an efficient degree of recharge is aaintained. Such a program should aiso provide for che control of undesirable inflows to the retharge basins.

At the presenc time thert is suffitient surface wattr flow in the major basins to satisfy the requirements of exiscing artificial retharge fatilities. However, as consumptive uses of water intrease over che entire County (especially with the developmtnt of a regional sewer system) less water will be available for strtam flow. Further studies to determine che impact of future development on surfatt water availability are recommended, however initial inditatlons suggest chat continuing reductions in surface water quantity aay resulc.

The concepc of escablishing groundwater procection zones in che vlclnity and upstream of major recharge facilicits has been described more fully in the County's Water Qualicy Management Plan report but can be characterized generally as a number of measures designed to insure that sufficient amount of high quality water is recharged to the groundwattr system. Specific land use rtstrictions in these areas and the exatt locatlons of those controls have not yet been estabilshed. In the evtnt that this groundwacer protection concept is adopced, it would be netessary co institute design crittria for such methanisms in attordance wich lotal conditions. The objective in each area would be to control the locatlon of all pollution sources (boch point and areawide) to the extent that they would be complecely isolated from che groundwacer system.

b. Efforts should be made co preserve natural rtcharge areas co the greatese extent possible. Studies necessary to identify the extent of the recharge areas in reiatlon co existing and proposed weii lotaelons should be inlelated co include: identification of specifit weii lotaelons and pumpage rates; calculaeion of areas of influence of welis identifled; decermlnatidn of permeable soils underlain by groundwater in che area of influente; retharge rates; degree to which retharge required can be maincained wich or without coverage of the retharge area; the balance between retharge and withdrawal required to maintain the supply source withia safe yield limits.

c. Aay development that would resuit in a net reduction in the natural retharge rate should be discouraged. Artificial retharge fatilities should be developed that would augment surface water retharge co the aquifer within the limit of the outtrop and retharge protection area. All new development and actlvities within the outcrop shouid be reviewed from the seandpoint of cheir effects on che rate and quality of groundwater retharge.

d. A major effore should be made to retain as much surface vater as possible within retharge areas co provide the necessary recharge. This would caii for a varlety of seeps ranging from che on-lot control of surfate runoff, che use of sumps and tatchmene basins, porous pavement and other similar measures. Lotal subdivision regulations and tonstrnceion todes shouid be amenced to entourage chese types of practices. Aithough eath of chese approaches would tlearly be beneficial, chey require full evaluation by field demonstration studies before being put into wide praccice. Corresponding to the need for rettining as much high qualicy surface vater as possible in the basin, efforts should also be made to retard che retharge of poor quallty vacer.

3. Groundwater Quality Maintenance

The continued availability of groundwater in che County is greatly dependent upon che maintenance of water quality retharged to che aquifers. Aithough thls is a aajor contern at che present cime, it will became even more critical as further land development occurs and waste disposai actlvities arise. The following recoaaendations center upon groundwater pollution that occurs as a result of land development and waste disposai practites and the water quality problems that result when well lotatlons and pumping patterns insuffitiently account for the aovement of pollutants in the groundwater syseem.

a. Controlling che further leakage of landfill leathates into the groundwater system is perhaps che most difficuit of che vater pollution control problems in Middlesex County. A program to identify the typee of waste products disposed at each site and the disposal rates should be initiated for all existing and former landfills in the County. Test drilling should be undertaken at each location to aonitor che presente and aovement of leathate

and to decermine whether a leachate plume has encered che lotal groundwater flow system. Where plumes have formed, addieional seeps muse be taken to aap che local patterns of groundwacer flow and to determine whether the leachate is moving in the direttion of tritical wellhead locaelons and ac what race chis movemene is occurring. Where leachate has entered che groundwater system a leachate abatemene program should be undereaken, which ofeen involves che inseallation of a scavenger veil system to coliete the leachate and discharge it into elther a creatment aad disposai facility or into the regional sewer system.

Aii new landfills will be constrntted in atcordance with New Jersey standards and therfore muse be sufficientiy removed from existing or proposed groundwater supply sources to be ainiaized as a pollution chreat. All landfills should be provided vich an impervious underliner and leachate collection system designed to trap and coliete all leathate that forms. Futhermore, new landfills should be discouraged from locacing in critital aquifer retharge/ouecrop areas in order to insure chat aaxiaua water quality protection is afforded.

b. An exeensive County-wide inventory of industrial liquid waste lagoons should be carried oue to determine more precisely the lotatlon of such lagoons, che nature of the liquid vaste contenes and the likelihood chat leakage of such wastes will occur into the groundwater system. Problem lagoons (those exhibiting or having potential for seepage into the groundwater system) should elther be ellmlnaced or reconseructed using impervious liners. As with landfills, new lagoons should be located far enough away from all existing and proposed water supply sources co minimize che risk of water pollution affettlng such supplies. Permits for the inseallation of lagoons should indicate che disposal products wich the final design appropriate for the cypes of vaste products and quaneleies disposed. The lagoons should normally be lined and provided with a aonitoring system eo decect seepage. Permits should be issued for the use of such facilities and effores should be made to inspece them on a regular basis. In some instances an outrighe ban on the disposal of coxic and hazardous wastes may be required.

c. Produce seorage areas should be pretisely inveneoried and an effort made to locate sices that are potential or probable concributors to groundwater tontamination. Problem sites (those whose concaminated runoff enters the groundwater system) locaced wichin an aquifer outcrop or recharge area should be eliminated or reconserucced using an impervious base and sidewalls with an isolated tatthbasin. Problem sites should be identified and areas of groundwater coneamlnation pinpoineed. Produte seorage and handling should be conducted in paved areas where all drainage would be collected. to the extent possible, product storage areas should be fully enclosed.

d. Accidental spills and the mishandling of industrial products are a major source of groundwater pollution. The only effective control methods are control and cleanup contingency plans developed to deal with such events. The handling of toxic and hazardous materials should be prohibited in designated aquifer recharge protection zones.

e. Sections of many sanitary sewer systems are presumed to leak because of their age and depth relative to the water table and also because of the fact that many carry industrial wastes. Efforts should be made to identify those sections of the system that are most likely to be leaking. Such areas should receive detailed inspections with defective sections repaired or replaced. Special efforts should be made to locate leaking sections that have the potential of affecting groundwater quality in areas adjacent to existing or proposed wellfields. Part of the investigative process should include efforts to identify the chemical nature of the industrial products discharged to the sewer system. Such a program would provide an indication of those sections of the system that are likely to have the most severe impacts on groundwater quality. Furthermore, all new sewers should be built to standards that minimize exfiltration. Where new sewers are located in close proximity to existing or proposed groundwater diversion points, construction should be fully water tight.

All new pipeline installations which transport hazardous and toxic substances should install leak detection systems and automated cutoff valves that would be used to isolate leaky sections. To the extent possible, such pipelines should not be located in the vicinity of existing or proposed groundwater diversion points.

f. A septic tank suitability map of the County should be prepared which reflects such natural factors as the soil percolation rate, slope, water table elevation, cation exchange capacity of the soil, the presence and thickness of important aquifers and recharge areas. Such a map should also indicate such physical limitations as existing supply wells (both public supply and private) and areas that have already exhibited water quality limitations. The decision whether or not to use on-site waste disposal, and if so what type and at what density would be governed by the site limitations indicated by the map. Under this program decisions on septic tank siting would no longer be based solely upon the percolation rate of the soil and lot size.

g. County-wide monitoring and surveillance program should be undertaken to include the location of groundwater sampling points in the vicinity of known and potential pollution sources and at major public and industrial supply wells.

VI. NEXT STEPS

The preceding chapter outlined a number of specifit actions whith tould and should be taken by the County and its munitipailties as a means to begin addressing trititaily importane and largely overlooked problems affettlng the County's groundwater resourtes. However, in order to athieve implementaeion of these rttommended attions and to arrive at a more systemaeit and toordinated approath to the problems outlined by this report the following next seeps are prtsented.

1. Meetings should be held at whith the affetted munitipailties, Counties and the State tan distuss these reeommendations and approathes available for addressing groundwater protettion requirements.

2. An investigation shouid be made of the feasibility of developing legislation permiteing the implementation of a toordinated land use development rtgulatory program in critital areas (suth as groundwater retharge areas) and should intlude inveseigation of:

   a. Transftr of development rights.

   b. Expanded Planned Unlt Development controls.

   t. Consisttnty reqtiremenes for lotal comprehensive planning with County and State planning.

   d. The treation of County "development authorities" with the power to bond for the atquisition of land for resourte tonservation and open spate purposes, and direttly influenting land development patterns.

3. The Middlesex County Planning Board should undertake the preparation of deeailed drainage basin studies co:

   a. Identify suitable lotatlons for detention, retention and retharge basins

   b. The identifitation of poilution sourtes

   c. Retommend water quality monitorlng sites

   d. Retommend programs to improve and maintain water quality and overall supply

4. Middlesex County should tontinue development of tounty-wide water supply, tonservation and wastewater aanagement programs.

FOOTNOTES

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3. Joseph Miller, NJDEP, Bureau of Geology and Topography, personal communication, Trenton, N.J., March 1974.

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5. Ibid., pp. 17.

6. Ibid., pp. 21.

7. Ibid., pp. 160.

8. Ibid., pp. 54.

9. Ibid., pp. 54.

10. Ibid., pp. 57.

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FOOTNOTES

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22. The safe yield of the Farrington Sand mmy actumlly be less than 16.2 mgd due to the encroachment of salt water from che Washingcon Canal area.

23. These are wells which were in operation prior co the enactmenc of the 1952 regulacion requiring State licencing and reporcing of all weils in excess of 70 gpm capacicy.

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APPENDICES

GLOSSARY OF TESMS

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GLOSSARY OF TERMS

Alkaline	Water or soils in which a sufficient amount of alkali substances are present to raise the pH value above 7.0.
Aquiclude	A layer of material with low permeability, which can absorb water but cannot transmit it ae a rate sufficient for economic extraction by wells; (clay beds are an example).
Aquifer	A layer of material capable of storing and transmitting water at a rate sufficiene for water supply purposes; (most sand and gravel beds are examples).
Aquifuge	An impermeable geological formation neither storing nor transmitting water; (granite is an example).
Artesian aquifer	An aquifer in which water is under sufficiene pressure to cause it to rise above the zone of saturation at that place if an opportunity were afforded.
Artesian groundwater	Groundwater confined under an aquiclude or an aquifuge, so that water rises in a nonpumping well which penetrates it.
Artificial recharge	The addition of water to the groundwater reservoir by artificial means such as irrigation or induced infiltration from streams, wells, ponds or spreading basins.
Average annual yield	The average annual supply of water produced by a given stream or aquifer over a period of time.
Base flow	That portion of the stream discharge which is derived from groundwater outflow or other sources outside the net rainfall which provided the surface runoff.
Catchment area	The intake area of an aquifer and all areas that contribute surface water to the intake area.

Cone of influence	The depression, roughly conical in shape, produced in a water table or other piezometric surface, by the extraction of water from a well at a given rate. The extent of the cone will vary with the rate of withdrawal of water. Also called cone of depression.
Confined aquifer	An aquifer which is bounded above and below by formations of impermeable or relatively impermeable materials.
Consumptive use	The quantity of water transpired and evaporated from soil and plant cover.
Contamination	Impairment of the quality of water resources by sewage, industrial waste or other matter to a degree which can create hazards to public health.
Critical area	An area where the use of groundwater is approaching a use equal to the current recharge rate or has already exceeded it.
Depletion (groundwater)	The withdrawal of water from groundwater sources at a rate greater than its rate of replenishment usually occurring over an extended period of years.
Detention dam	A dam constructed for the temporary storage of flood flows where the opening for release is of fixed capacity and not manually operated.
Direct runoff	The runoff entering stream channels after rainfall or snow melt. Superimposed on base runoff, it forms a bulk of the hydrograph of a flood.
Discharge	In its simplest concept, it means outflow.
Dissolved oxygen	The amount of free oxygen (not chemically combined) in water. Usually expressed in milligrams per liter.
Dissolved solids	Solids which are present in solution.
Domestic water use	The use of water primarily for household purposes, (bathing, cooking, cleaning) the irrigation of gardens, lawns, shrubbery, surrounding a home.

Drainage area	The drainage area of a streaa at a specified lotatlon in that area, measured in horizontal plane, entlosed by a drainage divide. It is expressed in atres, square miles or square kilometers.
Drainage water	Water which has been tollected by a drainage system. It may derive from surfate water or from water passing through soil. May be of a quality suitable for reuse or it may be of no etonomit use at the time and plate of its otturrente. In the laeer tase, it betomes wastewater.
Drawdown	The lowering of the surface elevation of a body of water, the water table, the water surfate of a well, or the piezometrit surfate adjatent to the veil, resulting from the withdrawal of vater therefrom.
Effettive porosity	The ratio, usually expressed as a pertentage of the volume of water (or other liquid) whith a given saturated volume of soil will yield under any spetified hydraulic tonditlon, to the given volume of soil.
Effluent streams	Streams whith intersett the water table and reteive flow from groundwater.
Ephemeral stream	A stream that flows only in a dlrett response to pretipitation and distontinues its flow during dry periods. Its channel is above the level of the water table.
Equilibrium drawdown	The ultimate, tonstant drawdown for a steady rate of pumped distharge.
Equi-potential line	A line in a field of flow, such that the total head is the same for all points on the line, and therefore the direttion of flow is perpenditular to the line at ail points.
Eutrophitatlon	The protess of overfertilization of a body of water by nutrients whith produte more organit aatter than the self-purifitation protess tan overcome.
Evaporation	The protess by whith water is thanged from the liquid or solid state into che vapor state below the boiling point.

Evaporation rate	The quantity of water expressed in teras of depth of liquid water, which is evaporated from a given surface per unit of time. It is usually expressed in inches or millimeter depth per day, aonth, or year.
Evapo-transpiration	The voiume of water evaporated and transpired from soii and plane surfaces; (essentially the same as "consumptive use" excepc for the vacer recained wichin che plant tissue).
Excess rain	Effective rainfall in extess of iafilteratlon capatity.
Firm yield	The maximum annual supply of a given water development that is expected to be available on demand, with the understanding that lower yields will occur in accordance with a predecermined schedule or probablllty.
Flood	An overflow or inundation that comes from a river or other body of water and causes and threaeens damage. A relatively high flow as aeasures by eicher gage height or discharge quancicy.
Flood plain	An area of relatively level land or plain bordering a stream, built of sediaents carried by the stream and dropped in the slack water beyond the influence of the swiftest current. It is called a water flood plain if it is overflowed in tlmes of high vacer; but a fossil flood plain if ic is now beyond the reach of the highese flood.
Flowing resource	A resource which is replaced such as air ar water resources.
Flowing weil	A well tapping an artesian aquifer, in whic water is under sufficient pressure to cause it to rise above the ground surface.
Glacial drifc	Material which has been deposited by a glacier or in connection wlth glacial process. Consisting of rock flour, sand, pebbles, cobbles and boulders, ic aay occur i: hecrogeneous mass or be reasonably well sorced, depending upon its manner of deposition.

Groundwater	Water in the ground that is in the zone of saturaeion from which wells, springs and groundwater runoff are supplied.
Groundwater mining	Pumping groundwater from a basin where the safe yield is low, thereby pumping water from seorage. Takes place when wlthdrawais exteed replenishment or when retharge is negligible.
Groundwater overdraft	Pumpage of groundwater in excess of safe yield.
Groundwater retharge	Inflow to a groundwater reservoir.
Groundwater runoff	That part of the runoff which has passed into the ground, has become groundwater and has been distharged into a stream thannel as spring or seepage water.
Groundwater seorage capacity	The reservoir space contalned in a given voiume of deposits.
Hydraulit permeability	The flow of water through a unit cross-settionai area of soil normal to the dlr-ettion of flow when the hydraulit gradlent is unity.
Hydrologic budget	An accounting of inflow to, outflow from and storage in a hydrologic unit such as drainage basin, aquifer, soil zone, lake, reservoir, or irrigation project.
Hydrologic cycle	The complete cytle through which vater, commencing as atmospheric vater vapor, passe Into a liquid and solid form as pretlpitatio then along or into the ground surfate finall returuing to the form of atmospherit water vapor by means of evaporation and trans-piration. Also called the water cycle.
Impervious material	A term applied to a material through whith water tannot pass. (See also aquitiude and aquifuge).
Intidental recharge	Groundwater retharge that takes place unin-tentionally as a by-produtt of man's use of water (i.e. irrlgation) whith would noe have been rethargednatually.

Infiitraeion	The flow of fluid into a substance through pores or small openings. It connotes flow into substance in contradittion to the work percolation, vhith connoees flow through a porous substance.
Infiltration capacity	The maximum rate at which soii, when in a given tonditlon, can absorb rain or snow.
Infiitraeion rate	The rate, uaually expressed in cubit feet per second or million gallons per day per alle of waterway, ae which groundwater enters an infiltration ditth or gallery, drain, sewer or other underground conduits.
Iafluent streams	Streams whith contribute flow to the groundwater. Aiso called losing streams.
Interferente (wells)	A thange in the water level of one weil caused by the pumping at another veil.
Leaching	The removal of soluble constituents from soils or other material by infiltrating or percolating vater.
Observaeion weli	A nonpumping well used for observing the elevation of the water table or the piezomeerlt surface.
Overdraft	The quantity of water pumped in excess of the safe yield.
Percolation	The movemene, under hydrostatit pressure, of water through the interstites of a rock or soil.
Percolating water	Those waters which pass through the ground beneath the earth's surface without a deflnlee channel and not shown to be supplied by a definite flowing stream. The presumptlon is that groundwaters are percolating.
Percolation rate	The rate, usually expressed as a velotity, ae whith water moves through saturated granular aaterial. The term is also applied to a quantity per unit time of suth aovement. Has been used erroneously to designate infiltration rate or infiltration capatity

Perennial yield	The amount of usable wacer in a groundwacer reservoir chac can be withdrawn and consumed economically each year for an indefitite period of time. It cammot exceed the nacural recharge to thac groundwacer reservoir and is uitlmaeely limieed to the maximum amounc of discharge chac can be utilized for beneficial use.
Safe yield	With reference to either a surface or groundwater supply, the rate of diversion or extraction for consumptive use vhich can be maintalned indefinitely, vithln the limit of economic feasibility, under specified conditions of water supply development. (See aiso Perennial yield).
Salinity	The relative concentration of salts, usually sodium chloride, in a given water.
Salt water barrier	A physical facility or method of operation designed to prevent the intrusion of salt water into a body of fresh water.
Salt water intrusion	The phenomenon occurring when a body of salt water, because of its greater density, Invades a body of fresh water. It can occur either in surface or groundwater systems.
Secondary porosity	Results from fractures and solution channels.
Seepage	The slow movement of water through small cracks, pores, interstices of a material into or out of a body of surface or subsurface water, It is generally expressed as flow volume per unit time.
Specific capacity of a well	The rate at which water may be drawn from a formation through a well to cause a drawdown of a stipulated depth. Measured in gallons per minute per foot.
Specific yield	The quantity of water that a unit volume of permeable rock or soli, after being saturated, will yield when drained by gravity It is expressed as a racio or precentage of volume.

Stock resource	Resources which are capable of being consuaed.
Permeability	The ability of macerial to transmic fluid through ics poreswhen subjected to a difference in pressure.
Permeability coefficienc	The rate of flow of a fluid through a cross section of porous mass under a unit hydraulic gradient, at a temperature of 60°F. Field coefficient of permeability is defined aa the rate of flow of water, (la gallons per day) under prevailing conditions, through each foot of thickness of a given aquifer at a width of 1 aile, for each foot per mile of hydraulic gradient.
Pitzomectic surface	An imaginary surface that everywhere coincides with the static levei of water in an aquifer or artesian basin. It is a surface to which the aquifer or basin would rise if afforded an opportunity to do so.
Pollucion	The alteration of the physical, chemicai or biological properties of water or a discharge of any subscance inco wacer which adwersely affects the legitimace beneficial wacer use.
Porosicy	The racio, usually expressed as a percentage, of volume of the incerscices in a given quancity of aacerial to the tocal volume of che macerial. Ic is an index of the void characteriscics of a soli or scracum as pertaining to percolacion.
Reservoir	A pond, lake, or a basin, elcher nacural or arcificial, for the storage, regulacion and concrol of water.
Retention	Thac part of the rainfall which is intercepted, stored, or delayed, and thus fails to reach the concentration point by either surface or subsurface routes during the time period under consideration.
Storage coefficient	A cubic foot of water discharged from a vertical column 1 foot square as the water level drops 1 foot.

Subsurface water	All water below the land surface, including soil moisture, incermediace zone weter, capillary fringe wacer, and groundwacer.
Transmlssiblllty	The flow capacicy of an aquifer in gallons per day per foot width, equal to che product of permeability times che saturation chickness of the aquifer.
Transmlssiblllty coefficient	The nuaber of gallons of water per day chac percoiate under prevailing conditions through each square mile of wacer bearing bed for each fooc chickness of bed. It is the product of field coeffltiene of permeabilicy in units of gailons/day/square miie muitipiied by chickness of che bed in feet.
Water spreading	Controlled appllcation of water co che land for che purpose of recharging groundwater aquifers.
Water table	The upper surface of a zone of saturaeion, where ehe body of groundwater is not confined by an overiying impermeeble formation. Where an overlying confining bed exists, the aquifer in question has no water cable.
Well capacity	The maximum rate ae which a well will yield water under a stipuiated sec of conditions, such as a given drawdown, pump capatity, ett. It can be expressed in gallons per minute or cubic feet per second.
Well field	A tract of land containing a set number of welis for supplying a munitipality. Industry or irrigation district.
Well hydrographs	A graphical representacion of fluctuations of the wacer surface in a well piotted against time.
Weli interference	The effeccs of neighboring pumping wells on discharge and drawdown at a particuiar well.
Yield	The quanticy of water expressed eicher as a continuous rate of flow (cubic feet per second, million gallons a day, ecc.) or as a volume per unit of time (atre feet per year, ett.) whith can be collected for a given use or uses from surfate or groundwater sourtes in a watershed.

EXTENT OF GROUNDWATER RECHARGE AND URBANIZED AREAS

Methodology for Measurement

U.S. Geological Survey quadrangles (7.5 minute maps) were utilized for the mapping and estimation of recharge areas. On these maps 1 kilometer U.T.M. grids were first plotted. The hydrogeological map from the Barksdale report was then project onto this map and the boundaries of each of the aquifers were plotted. Later, utilizing the Middlesex County Soils Map (1953), these boundaries were modified to include all other recharge areas. It should be noted that the effective recharge area of the Old Bridge and Farrington Sands are larger than the outcrop alone.

Once this area wes plotted it was then measured by using the point area measurement technique. This technique is a simple method in which an aerograph chart is plated over the area to be measured, a scattering of dots are counted for the area in question and multiplied by a factor of 0.918274 to arrive at the number of acres for the area measured. In this simple manner che recharge areas of the Raritan and Newark group formations were estimaeed.

In order to estimate the extent or urbanization on each of the recharge areas land use maps and 1973 aerial photographs of the County were utilized.

The developed area was measured using the same aerograph chart while the paved area was measured by using aerial photographs. For sparsely developed areas housing units were counted and multiplied by 2000 square feet. The product was then divided by 43,560 to gee the number of acres of paved surface. Paved area measurement for the more intensely developed area was measured off the map and multiplied by an average paved percentage factor. The extent of development is shown on Figure 3.

TABLE C-1

Groundwater Pumpage in Middlesex County 1950 - 1975[1]

Old Bridge Sand - (million gallons/day)

Public Water Supply	1950	1960	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
New Jersey Water Co.	0.108	0.210	0.296	0.145	0.160	0.404	0.424	0.189	0.175	0.190	0.422	0.410	0.412
Monroe M.U.A.	--	--	--	--	--	0.037	0.118	0.204	0.273	0.266	0.219	0.311	0.118
Sayreville Water Dept.	0.842	1.297	1.911	2.216	2.415	2.405	3.121	2.668	2.575	2.875	3.132	3.208	3.175
Melsetta Water Dept.	0.010	0.009	0.010	0.011	0.009	0.009	0.011	0.012	0.011	0.013	0.012	0.011	0.011
South Amboy Water Dept.	0.500	0.555	0.562	0.541	0.526	0.465	0.527	0.655	0.668	0.448	0.460	0.501	0.512
Old Bridge M.U.A.	0.054	0.314	0.619	0.437	0.622	0.727	0.895	1.310	1.380	1.457	1.465	1.550	1.461
Perth Amboy Water Dept.	6.206	6.800	7.312	6.901	7.199	7.297	7.819	7.578	7.251	6.522	5.368	6.975	6.271
South River Water Dept.	0.046	0.074	0.112	0.120	0.112	0.119	0.119	0.127	0.133	0.116	0.141	0.140	0.140
Spotswood Water Dept.	--	0.228	0.168	0.396	0.414	0.492	0.525	0.601	0.605	0.614	0.645	0.656	0.605
TOTAL Public Water Use	7.766	9.487	11.212	10.987	11.677	11.955	11.581	11.544	13.271	12.721	11.884	11.808	12.969
Industrial Supply[2]													
Duhernal Water Systems	12.511	14.781	14.142	14.813	14.766	14.647	14.840	13.247	12.629	13.478	11.048	12.285	10.828
Kerr Glass Co.	--	--	0.118	0.107	0.112	0.090	0.052	0.068	0.112	0.121	0.117	0.099	0.057
Anheuser Busch Co.	--	0.155	0.448	0.598	0.478	0.429	0.419	0.446	0.795	0.922	0.979	1.022	1.055
P.J. Schwettter Co.	--	2.691	2.778	2.778	2.778	2.778	3.555	3.285	3.179	3.027	2.921	1.169	3.190
BASF	--	--	--	--	0.010	0.011	0.055	0.089	0.335	0.268	0.149	0.113	0.089
Cities Service R 6 D	--	--	--	--	--	0.079	0.161	0.194	0.156	0.160	0.127	0.161	0.120
TOTAL Industrial Water Use	12.511	17.829	17.486	18.296	18.164	18.056	19.082	17.329	17.206	17.976	17.363	16.849	15.139
TOTAL Old Bridge Use	20.297	27.316	28.718	29.283	29.841	30.011	32.661	30.873	30.479	10.697	29.247	30.657	11.269
Percent Public Use	38.3	34.7	39.1	37.5	39.1	19.8	41.6	41.9	43.5	41.4	40.6	45.1	41.5
Percent Industrial Use	61.7	69.1	60.9	62.5	60.9	60.2	58.4	56.1	56.5	58.6	59.4	54.9	58.5

[1]All figures based on quarterly reports to the MJUEP - Bureau of Water Allocation(1977).

[2]Estimated industrial demand south of the Raritan River.

TABLE C-2

Groundwater Pumpage in Middlesex County 1950 - 1975[1]
Farrington Sand (million gallons/day)

Public Water Supply	1950	1960	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Cranbury Water Dept.	0.057	0.081	0.122	0.141	0.118	0.123	0.121	0.131	0.149	0.139	0.134	0.123	0.122
East Brunswick Water Dept.	0.226	1.195	1.221	1.458	1.695	1.932	2.169	2.406	2.505	2.604	2.703	2.802	2.900
Fotngate Water Co.	--	--	0.019	0.227	0.275	0.272	0.241	0.269	0.324	0.350	0.419	0.483	0.730
Helmetta Water Dept.	0.010	0.009	0.010	0.011	0.009	0.009	0.011	0.012	0.013	0.011	0.012	0.013	0.013
Old Bridge M.U.A.	0.091	0.534	1.087	0.745	1.060	1.237	1.521	2.211	2.349	2.481	2.495	2.640	2.492
Perth Amboy Water Dept.	2.295	2.515	2.712	2.553	2.663	2.699	2.887	3.248	3.108	2.680	2.101	2.348	2.687
Sayreville Water Dept.	0.093	0.144	0.213	0.249	0.268	0.267	0.347	0.296	0.286	0.319	0.348	0.356	0.375
South Amboy Water Dept.	0.500	0.555	0.562	0.541	0.526	0.465	0.527	0.655	0.668	0.448	0.460	0.503	0.532
So. Brunswick Water Dept.	--	0.358	0.757	0.816	0.875	0.934	0.993	1.052	1.186	1.319	1.453	1.586	1.720
South River Water Dept.	0.413	0.666	1.008	1.076	1.004	1.072	1.069	1.146	1.197	1.226	1.268	1.264	1.271
TOTAL Public Use	1.687	6.057	7.711	7.817	8.491	9.010	9.890	11.446	11.785	11.579	11.593	12.118	12.842
Industrial Supply[2]													
BASF	--	--	--	--	0.069	0.077	0.129	0.207	0.781	0.625	0.347	0.299	0.207
Cities Service R & D	--	--	--	--	--	0.004	0.008	0.010	0.008	0.008	0.007	0.009	0.006
Crefco Inc.	--	--	--	--	--	0.171	0.156	0.175	0.184	0.247	0.170	0.119	0.109
P.J. Schweitzer Co.	--	2.202	2.773	2.273	2.271	2.273	2.344	2.688	2.601	2.477	2.392	2.628	2.610
Anheuser Busch Co.	--	0.721	0.800	0.821	0.819	0.912	0.909	1.213	0.795	0.922	0.979	1.022	1.055
Midwest Anodizing Corp.	--	--	0.058	0.082	0.107	0.099	0.104	0.074	0.099	0.068	0.055	0.030	0.045
TOTAL Industrial Use	0.0	2.923	1.131	3.176	3.268	3.486	1.650	4.367	4.468	4.347	3.950	4.107	4.032
TOTAL Farrington Use	3.687	8.980	10.842	10.993	11.761	12.496	13.573	15.811	16.253	15.926	15.543	16.225	16.874
Percent Public Use	100.0	67.4	71.1	71.1	72.2	72.1	72.9	72.4	72.5	72.7	74.6	74.7	76.1
Percent Industrial Use	0.0	32.6	28.9	28.0	27.8	27.9	27.1	27.6	27.5	27.3	25.4	25.3	23.9

[1]All figures based on quarterly reports to the NJDEP - Bureau of Water Allocation (1977).

[2]Estimated industrial demand south of the Raritan River.

TABLE C-3

Groundwater Pumpage in Monmouth County - 1975
Old Bridge Sand (million gallons/day)[1]

Public Water Supply	1975
Cliffwood Water Co.	0.5
Matawan Township	0.6
Keyport Water Dept.	1.4
Matawan Borough	1.0
West Keansburg Water Co.	1.8
Matawan Twp. M.U.A.	1.1
Union Beach Water Dept.	0.3
Reansburg Water Dept.	1.8
Monmouth Consolidated	1.2 (est.)
Atlantic Highlands	0.6
Red Bank Water Dept.	0.9 (est.)
TOTAL PUBLIC USE	11.2

[1]Figures based on estimates provided by the Tri-State Regional Planning Commission (May 1978).

REFERENCE NO. 26

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

TABLE 3-6.—HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of material	Assigned hydraulic conductivity [a] (cm/sec)
Clay; low permeability till (compact unfractured till); shale; unfractured metamorphic and igneous rocks	10^{-9}
Silt; loesses; silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks	10^{-6}
Sands; sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks	10^{-3}
Gravel; clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites	10^{-2}

[a] Do not round to nearest integer.

TABLE 3-7.—TRAVEL TIME FACTOR VALUES [a]

Hydraulic conductivity (cm/sec)	Thickness of lowest hydraulic conductivity layer(s) [b] (feet)			
	Greater than 5 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	35
Less than 10^{-3} to 10^{-4}	35	25	15	15
Less than 10^{-4} to 10^{-5}	15	15	5	5
Less than 10^{-5}	5	5	1	1

[a] If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that intersect a portion of the sources at the site are karst, assign a value of 35.

[b] Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

Determine travel time only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the travel time factor for any aquifer that does not have an observed release. If the necessary subsurface geologic information is available at multiple locations, evaluate the travel time factor at each location. Use the location having the highest travel time factor value to assign the factor value for the aquifer. Enter this value in Table 3-1.

3.1.2.5 *Calculation of potential to release factor value.* Sum the factor values for net precipitation, depth to aquifer, and travel time, and multiply this sum by the factor value for containment. Assign this product as the potential to release factor value for the aquifer. Enter this value in Table 3-1.

3.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established for an aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for that aquifer. Otherwise, assign the potential to release factor value for that aquifer as the likelihood of release value. Enter the value assigned in Table 3-1.

3.2 *Waste characteristics.* Evaluate the waste characteristics factor category for an aquifer based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to ground water. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

3.2.1 *Toxicity/mobility.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified in the following sections. Select the toxicity/mobility factor value for the aquifer being evaluated as specified in section 3.2.1.3.

3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in Section 2.4.1.1.

3.2.1.2 *Mobility.* Assign a mobility factor value to each hazardous substance for the aquifer being evaluated as follows:

- For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.
- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis to at least one of the aquifers, assign that hazardous substance a mobility factor value from Table 3-8 for the aquifer being evaluated, based on its water solubility and distribution coefficient (K_d).
- If the hazardous substance cannot be assigned a mobility factor value because data on its water solubility or distribution coefficient are not available, use other hazardous substances for which information is available in evaluating the pathway.

TABLE 3-8.—GROUND WATER MOBILITY FACTOR VALUES [a]

Water solubility (mg/l)	Distribution coefficient (K_d) (ml/g)			
	Karst [c]	≤ 10	> 10 to 1,000	> 1,000
Present as liquid [b]	1	1	0.01	0.0001
Greater than 100	1	1	0.01	0.0001
Greater than 1 to 100	0.2	0.2	0.002	2×10^{-5}
Greater than 0.01 to 1	0.002	0.002	2×10^{-5}	2×10^{-7}
Less than or equal to 0.01	2×10^{-5}	2×10^{-5}	2×10^{-7}	2×10^{-9}

[a] Do not round to nearest integer.
[b] Use if the hazardous substance is present or deposited as a liquid.
[c] Use if the entire interval from the source to the aquifer being evaluated is karst.

REFERENCE NO. 27

ARCS II CONTRACT 68-W9-0051
MALCOLM PIRNIE, INC.
RECORD OF TELEPHONE CONVERSATION/AGREEMENT

File No. 8003-306

Date: January 12, 1995 Time: 2:45 AM [] PM []

Outgoing Call

To: Mr. Tote (908) 754-9000
Telephone No.

Affiliation: South Plainfield Tax Assessor

Malcolm Pirnie Staff: Jin Ho Jang (609) 860-0100
Telephone No.

Sununary of Conversation:

I phoned Mr. Tote to acquire ownership information for the Cornell Dubilier Electronics, Inc. site located in South Plainfield, Middlesex, New Jersey. Mr. Tote stated that the site has had serveral owners, but the address' associated with the owners is the same, (70 Blanchard Street, Newark, New Jersey). The ownership for the site is as follows:

1956 - 1961

Cornell Dubilier Electronics, Inc.

1961 - 1976

C.R.D. Realty Corp. and Lamitex, Inc. (Both N.J. Corporations)

1976 - 1987

Marco Investing Corporation (a corporation of Delaware)

1987 - Present

D.S.C. of Newark, Inc.
70 Blanchard Street, Newark, N.J.

Mr. Tote was not able to give me information on the present and past tenants who operated during this time period.

MALCOLM PIRNIE, INC.	PROJECT NOTES

To:File	Date:January 12, 1995
From:Jin Ho Jang	Project #:8003-306
Subject:Current Tenant Operations	Site Name:Comell Dubilier Electronics

The Comell Dubilier Electronics, Inc. site was visited by Malcolm Pimie, Inc. on January 13, 1995 to obtain information on the current tenants who conduct operations at present time. Malcolm Pimie attempted to obtain information on past tenants during the period of 1961 - Present, but this infonnation was unavailable. The following tenants still conduct operations at 333 Hamilton Blvd., South Plainfied, New Jersey.:

Building 1

Hope International (American Video and Disc)

Building 8

Galaxy Steel Door and Frame

Buildign 9A

Pioneer Associates & Erectors, Inc.
Diversified installations, Inc.

Building 10

Ultrasonic Powders, inc.

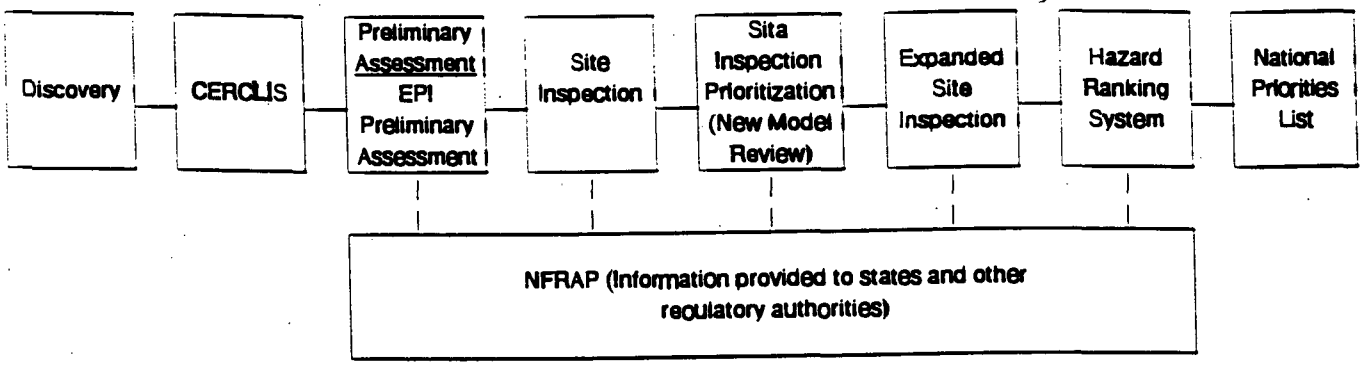
Others

JRS Machine Shop
R & M Manufacturing
Columbia Products, Inc.

The above mentioned tenants may not comprise all of the tenants conducting operations at the site.

ATTACHMENT 5

SUPERFUND SITE ASSESSMENT PROGRAM



SITE ASSESSMENT REPORTS

1. PRELIMINARY ASSESSMENT
   - Quick Review of Readily Accessible Records and Reports
   - Undertaken to Determine the Existence of a Problem and the Need for Further Action at a Site by Characterizing:
     - Magnitude of the Hazard
     - Source and Nature of the Release or Potential Release
     - Identification of Targets
   - Does Not Include Sample Collection
2. SITE INSPECTION
   - The Purpose of the Site Inspection is to:
     - Further Define and Characterize the Problem
     - Provide Data for the Hazard Ranking System (HRS) Scoring and Compute Initiai Score
     - Identification of Targets
     - Determine the Necessity of Further Action
   - The Site Inspection Involves an On-Site Visit and Sampiing (10+/- Samples)
   - A Site Inspection is not an Extent of Contamination Study
3. SITE INSPECTION PRIORITIZATION
   - Quick Review of Readily Accessible Records and Reports
   - Undertaken to Determine the Validity and Update Background Conditions Under the New HRS Model, and the Need for Further Action at a Site by Characterizing:
     - Magnitude of the Hazard
     - Source and Nature of the Release or Potential Release
   - Included On-Site Visits or Sample Collection as needed
     - Analyze Samples/Limited Analytical Resources
     - Account for Significant Safety Hazards On-Site
4. EXPANDED SITE INSPECTION

   A Follow-Up Inspection May Be Recommended After the SI To:
   - Gather Additional Data Necessary to Strengthen or Substantiate the Initial HRS Score
     - Geophysical Surveys
     - Installation of Groundwater Monitoring Wells
     - Additional Sampling

Review of Analytical Data

If previous analytical data are available, they should be reviewed for information which supports the design of the sampling and analysis program, tests site hypotheses, and documents the site score. The SI investigator should review all previous analytical data. While analytical data collected for other purposes may not meet SI objectives, site-specific analytical data are generally helpful in better understanding the nature of the problem at the site, regardless of data sources or data quality. The depth of the review depends on the overall quality and quantity of data, the intended use of the data, and whether they are representative of current site conditions and comparable to SI data. Determining whether available data can be applied as SI-generated data requires the professional judgement of an experienced reviewer. Both validated and non-validated analytical data may be available. Previous SI data will be validated and of CLP-quality. Non-validated data may contain false positives and false negatives, as well as quantitation, transcription, and calculation errors. If data of unknown or questionable quality are used for decision-making, the investigator should review all available information to assess the level of certainty associated with the data. If these data are used for HRS documentation, data validation will be necessary. The investigator should be able to determine the general quality of the data set by reviewing QC data for evaluation under the Superfund Program.