CALIBRATION STANDARD – SET

for the determination of

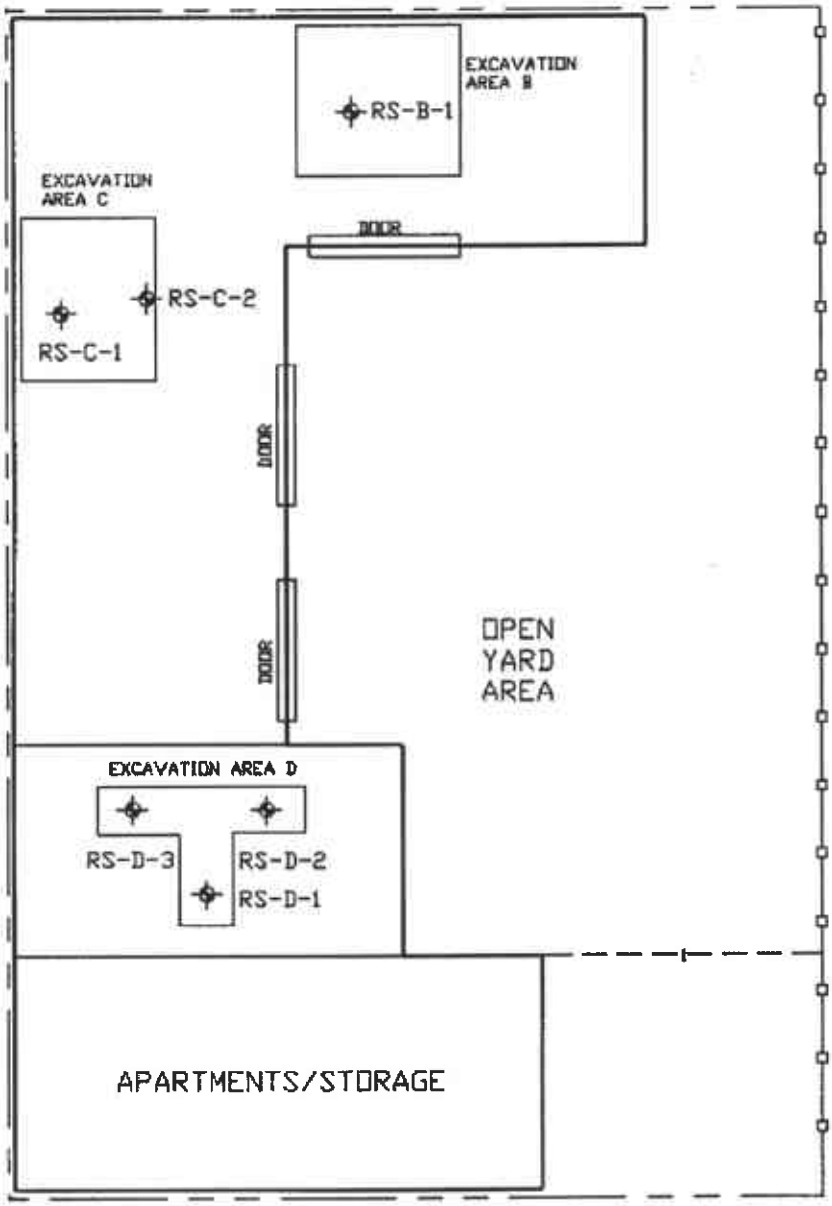
mineral oil hydrocarbons
in environmental matrices

by means of gas chromatography

BAM KS	**5002**	**Diesel Fuel**
BAM KS	**5003**	**Lubricating Oil**
BAM CRM	**5004**	**Diesel Fuel/Lubricating Oil (1:1)**

March 2000

10/23/03 email from Alan



LEGEND:

- BORING LOCATION
- WOODEN FENCE
- CHAIN-LINK GATE
- ASSUMED PROPERTY LINE

PROJECT:

762 STEWART COURT, ALAMEDA, CALIFORNIA

SHEET TITLE:

CONFIRMATION SOIL SAMPLE LOCATIONS
(THREE OF FOUR EXCAVATION AREAS)

DRAWN BY: AL	PROJ. NO. 00-90225.02
CHECKED BY: KB	FILE NO. 90225.02-2.DWG
APPROVED BY: AL	FIGURE 1
DATE: JUNE 2003	

RMT Inc. – Sunnyvale
Phone: 408-744-8505
1153 Bordeaux Drive
Suite 208
Sunnyvale, CA 94089

The calibration standard – set contains 3 samples:

BAM KS 5002 diesel fuel (DK 1037, Deutsche Shell AG)
BAM KS 5003 lubricating oil (HVI 50, Deutsche Shell AG)
BAM CRM 5004 diesel fuel / lubricating oil (1:1), certified on the basis of mass ratio

Characterization of diesel fuel and lubricating oil:

BAM KS 5002 Diesel Fuel

Deutsche Shell AG	**result**	**method**
Density at 15°C	840,1 kg/m³	DIN 51 757
Kinematic viscosity at 40°C	2,955 mm²/s	DIN EN ISO 3104
Sulfur	0,044 % m/m	DIN EN ISO 14596
High Friquency Reciprocating Rig (HFRR)	363 µm	CEC F-06-A-96
Cetane number	51	DIN 51773
Cloudpoint	-2° C	DIN EN 23 015
Cold Filter Plugging Point (CFPP)	-17° C	DIN EN 116
BAM I.2	**result**	**method**
Water content (Karl Fischer)	0,004 ± 0.005 %	DIN 51 777
CHN	C: 86,44 ± 0,07 % H: 13,62 ± 0,32 % N: not detectable	BAM 1.2901/6.9
PCB	0,18 mg/kg	DIN 51527
EOX	< 10 mg/kg	BAM 1.2902/6.05
Sulfur	0,383 ± 0,003 g/kg	BAM 1.2902/6.13
$\leq C_{10}$-fraction	5,90 ± 0,21 %	GC/FID

The GC/FID-chromatogram is shown in fig.1.

BAM KS 5003 Lubricating Oil (hydraulic oil) probably 1000 ppm ESL

Deutsche Shell AG	**result**	**method**
Density at 15°C	857,8 kg/m³	DIN 51 757
Kinematic viscosity at 40°C	17,33 mm²/s	DIN 51 562
Kinematic viscosity at 100°C	3,704 mm²/s	DIN 51 562
Sulfur	0,136 % m/m	DIN EN ISO 14596
BAM I.2	**result**	**method**
Water content (Karl Fischer)	0,004 ± 0.005 %	DIN 51 777
CHN	C: 86,05 ± 0,78 % H: 14,13 ± 0,19 % N: not detectable	BAM 1.2901/6.9
PCB	0,12 mg/kg	DIN 51527
EOX	< 10 mg/kg	BAM 1.2902/6.05
Sulfur	1,212 ± 0,028 g/kg	BAM 1.2902/6.13
$\geq C_{40}$-fraction	0,17 ± 0,03 %	GC/FID

The GC/FID-chromatogram is shown in fig.2.

Preparation and characterization of the diesel fuel/lubricating oil mixture:

The mineral oils were weighed in the relation 1:1 (w/w) and the mass ratio was certified.

Certified values:

Diesel fuel / lubricating oil mass ratio: **1,00003**
Uncertainty of the dieseloil/lubricating oil mass ratio: **0,00006**
Relative uncertainty: **0,006 %**

Additional informations:

$\leq C_{10}$ – fraction	2,95 ± 0,11 %	GC/FID
$\geq C_{40}$ – fraction	0,09 ± 0,02 %	GC/FID

The GC/FID-chromatogram of the mixture is shown in fig.3.

GC-conditions for fig.1-3:

Injection technique: on-column
Column: BPX-5 (5m x 0,32mm ID x 1µm); deactivated precolumn (2m x 0,53mm ID)
Carrier gas: Helium (1,5 ml/min)
Detector: Flame ionization detector (FID), 360°C
Oven program: 50°C (isotherm: 3 min) up to 360°C (isotherm: 2 min); rate: 20°C/min

The calibration standard – set was prepared by BAM and checked on homogeneity and for loss of evaporation during storage. It is to be stored in darkness at room temperature. A certificate can be received on request.

Supplier of calibration standard – sets:

Federal institute for materials research and –testing (BAM)
Devision I.2
Richard-Willstätter-Str. 11
12489 Berlin
Tel.: +49 30 8104 1120
Fax.: +49 30 8104 1127

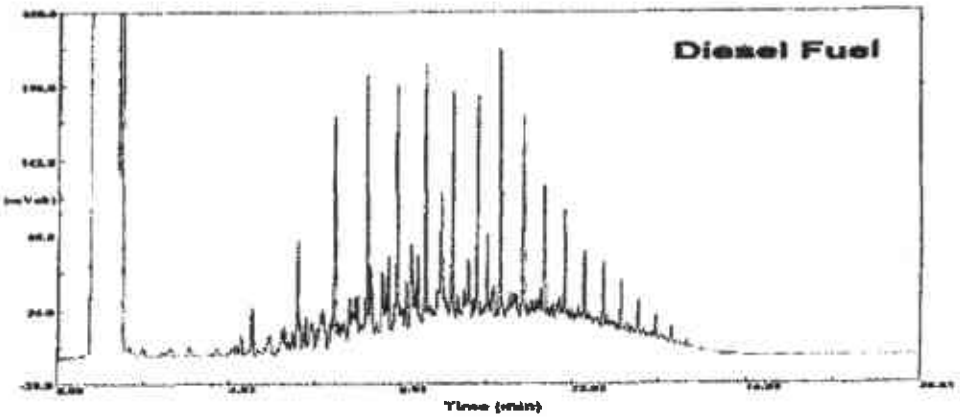


Fig.1: GC/FID-chromatogram of BAM KS 5002 Diesel Fuel

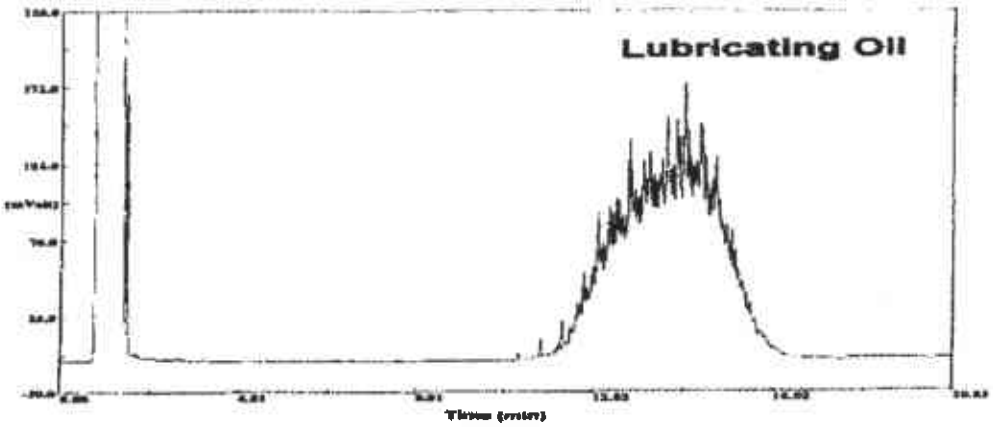


Fig.2: GC/FID-chromatogram of BAM KS 5003 Lubricating Oil

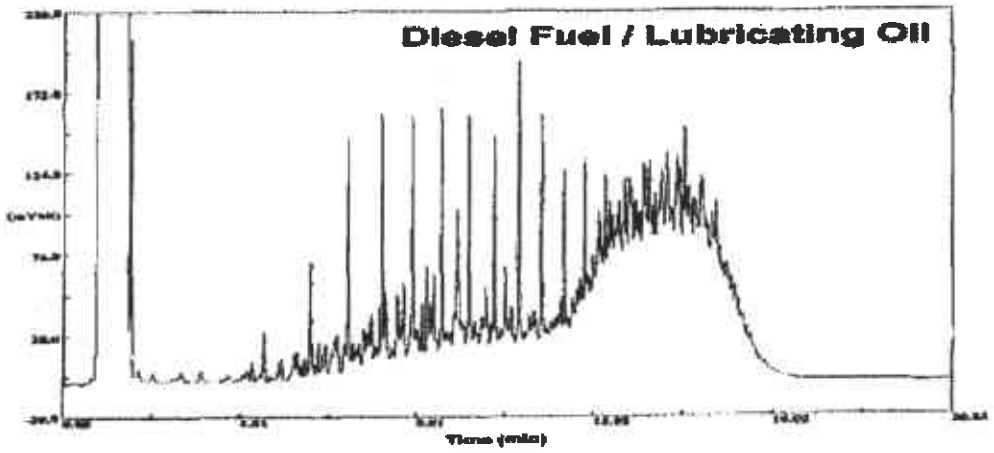


Fig.3: GC/FID-chromatogram of BAM CRM 5004 Diesel Fuel / Lubricating Oil (1:1)

Curtis & Tompkins, Ltd.
Analytical Laboratories. Since 1878

Total Extractable Hydrocarbons

Lab #:	167150	Location:	762 Steward Court
Client:	Remediation Services, Inc.	Prep:	SHAKER TABLE
Project#:	3001-01-001	Analysis:	EPA 8015B
Matrix:	Soil	Sampled:	08/25/03
Units:	mg/Kg	Received:	08/25/03
Basis:	as received	Prepared:	08/25/03
Batch#:	83288	Analyzed:	08/26/03

Field ID:	RS-D-1	Lab ID:	167150-001
Type:	SAMPLE	Diln Fac:	50.00

Analyte	Result	RL
Diesel C10-C24	17,000 H Y q	50

Surrogate	Result	Limits
Hexacosane	DO q	36-141

Field ID:	RS-D-3	Lab ID:	167150-002
Type:	SAMPLE	Diln Fac:	50.00

Analyte	Result	RL
Diesel C10-C24	3,600 H Y q	50

Surrogate	Result	Limits
Hexacosane	DO q	36-141

Field ID:	RS-D-2	Lab ID:	167150-003
Type:	SAMPLE	Diln Fac:	50.00

Analyte	Result	RL
Diesel C10-C24	9,800 H Y q	50

Surrogate	Result	Limits
Hexacosane	DO q	36-141

Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC223563	Cleanup Method:	EPA 3630C

Analyte	Result	RL
Diesel C10-C24	ND q	1.0

Surrogate	Result	Limits
Hexacosane	110 q	36-141

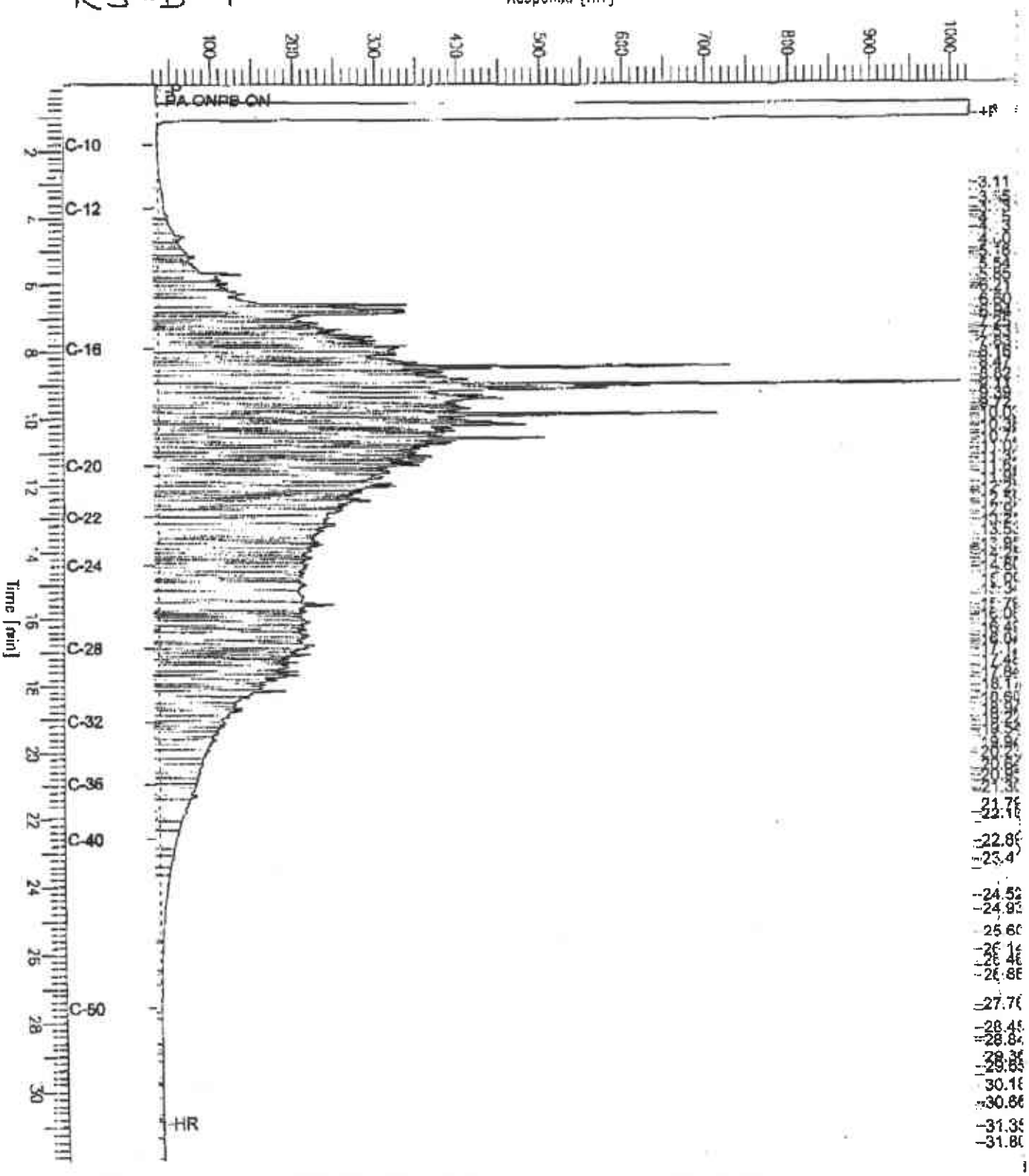
H= Heavier hydrocarbons contributed to the quantitation
Y= Sample exhibits chromatographic pattern which does not resemble standard
q= Draft result - ending CCV not yet analyzed
DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Chromatogram

Sample Name : 167150-001,83984
FileName : G:\GC13\CHB\236B065.RAW
Method : MTEH334.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 30 mV

Sample #: 83984 Page 1 of 1
Date : 8/26/03 04:45 PM
Time of Injection: 8/26/03 04:07 PM
Low Point : 29.56 mV High Point : 1024.00 mV
Plot Scale: 994.4 mV

RS-D-1

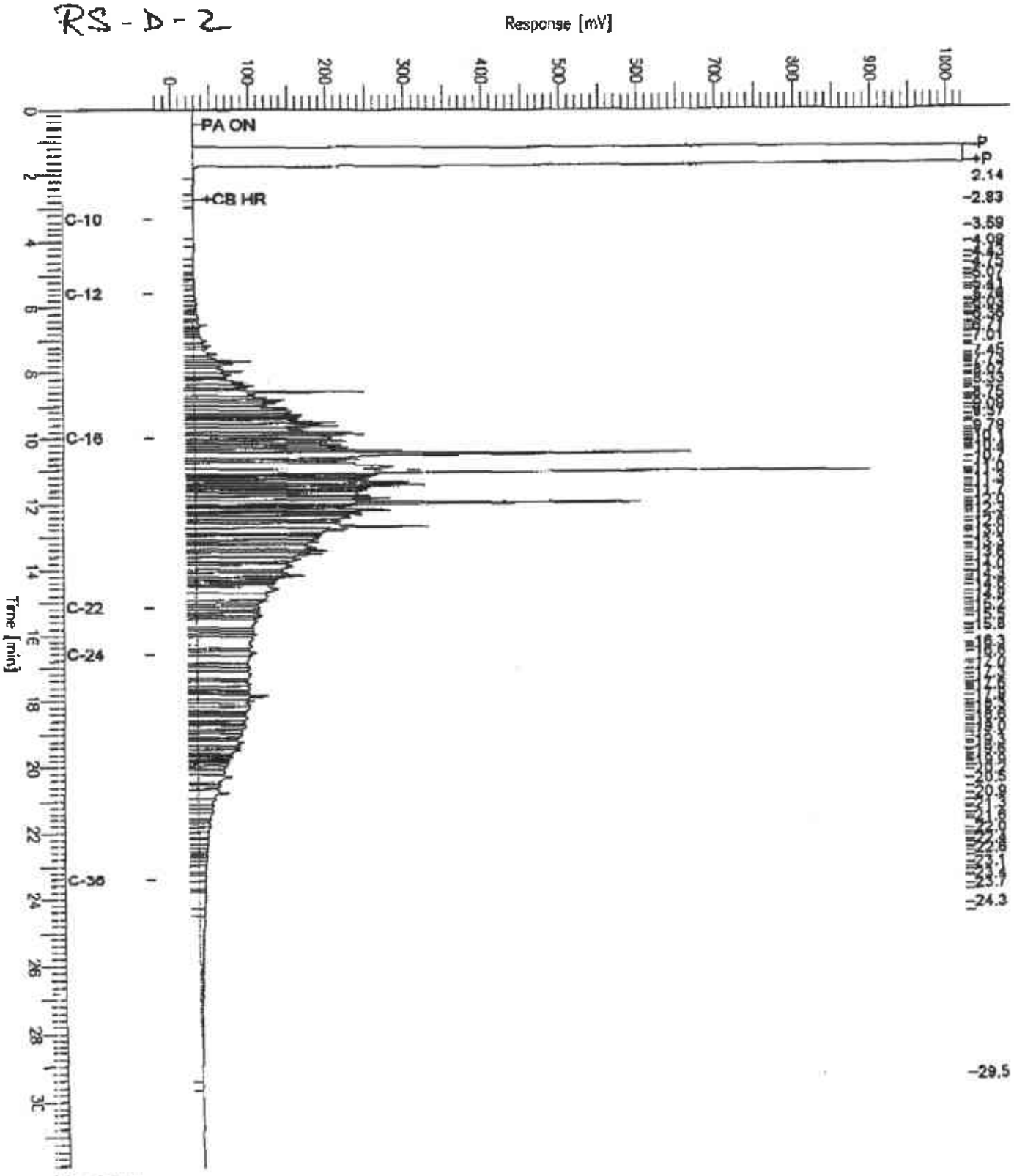


Chromatogram

Sample Name : 167150-003,83984
FileName : G:\GC17\CBA\237A026.RAW
Method : AIGH234.MTH
Start Time : 0.00 min End Time : 31.90 min
Scale Factor: 0.0 Plot Offset: -23 mV

Sample #: 83984 Page 1 of 1
Date : 8/26/03 01:25 PM
Time of Injection: 8/26/03 12:51 PM
Low Point : -22.99 mV High Point : 1024.00 mV
Plot Scale: 1047.0 mV

RS-A-2

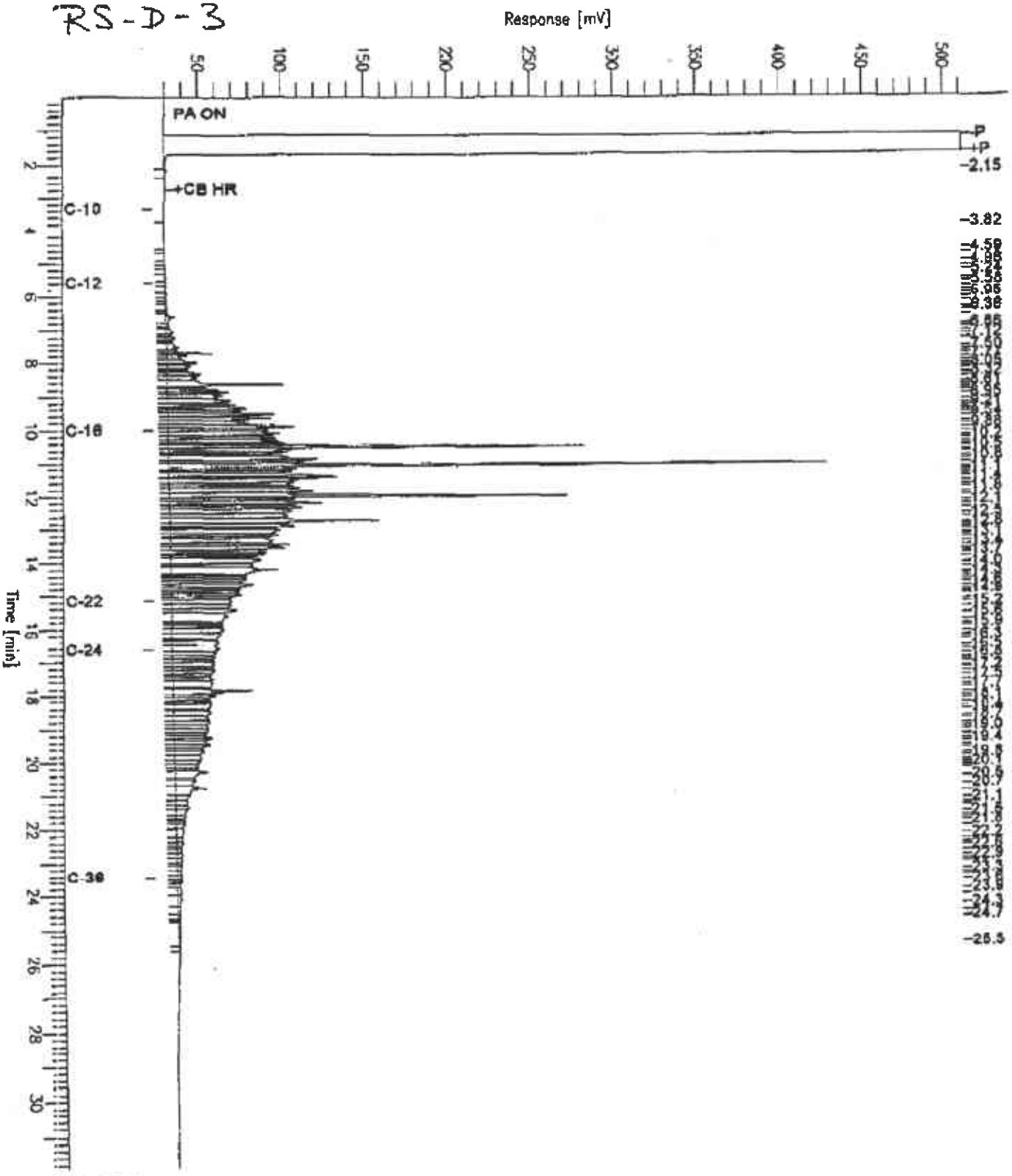


Chromatogram

Sample Name : 167150-002,83984
FileName : G:\GC17\CHA\237A025.RAW
Method : ATEH234.MTH
Start Time : 0.01 min End Time : 33.91 min
Scale Factor: 0.0 Plot Offset: 23 mV

Sample #: 83984 Page 1 of 1
Date : 8/26/03 12:45 PM
Time of Injection: 8/26/03 12:11 PM
Low Point : 22.58 mV High Point : 512.02 mV
Plot Scale: 489.4 mV

RS-D-3

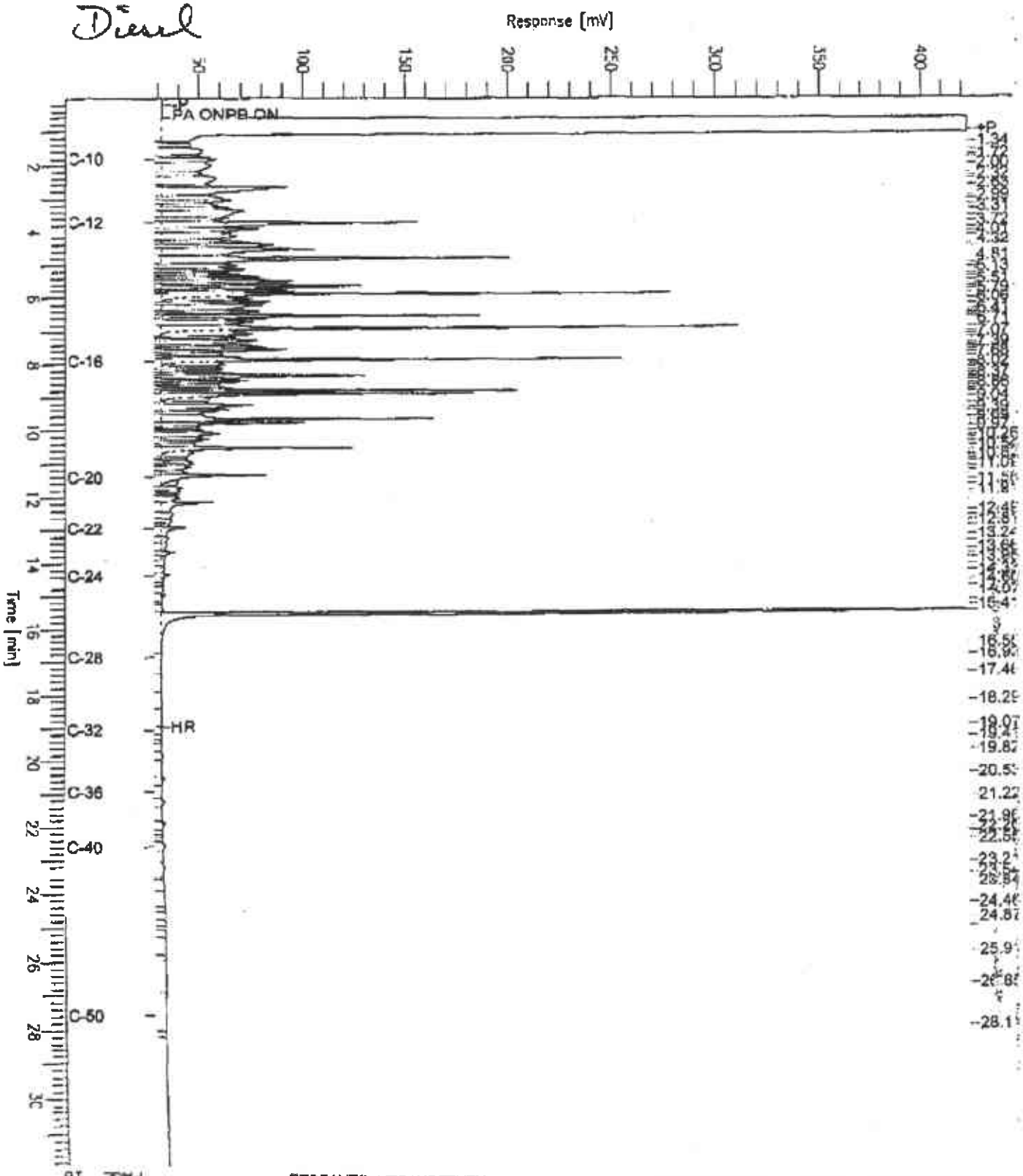


Chromatogram

Sample Name : ccv,03ws1153,da1
FileName : G:\GC13\CHB\2368002.RAW
Method :
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 29 mV

Sample #: 500mg/L Page 1 of 1
Date : 8/27/03 01:43 PM
Time of Injection: 8/24/03 05:51 PM
Low Point : 28.90 mV High Point : 422.92 mV
Plot Scale: 394.4 mV

Diesel



REMEDIATION SERVICES
4154687645
10/20/2003 13:48

Chromatogram

Sample Name : ccv,03ws1223,ws
Filename : G:\GC11\CHA\236A003.RAW
Method :
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 26 mV

Sample #: 500mg/L Page 1 of 1
Date : 9/29/03 11:03 AM
Time of Injection: 9/24/03 04:49 PM
Low Point : 26.25 mV High Point : 202.49 mV
Plot Scale: 176.2 mV

Motor Oil

Response [mV]

40 60 80 100 120 140 160 180 200

C-10 C-12 C-16 C-22 C-24 C-36 C-50

M M

Time [min]

-1.81 -6.28 -20.0 -20.5 -22.0 -22.8 -23.6 -24.3 -25.1

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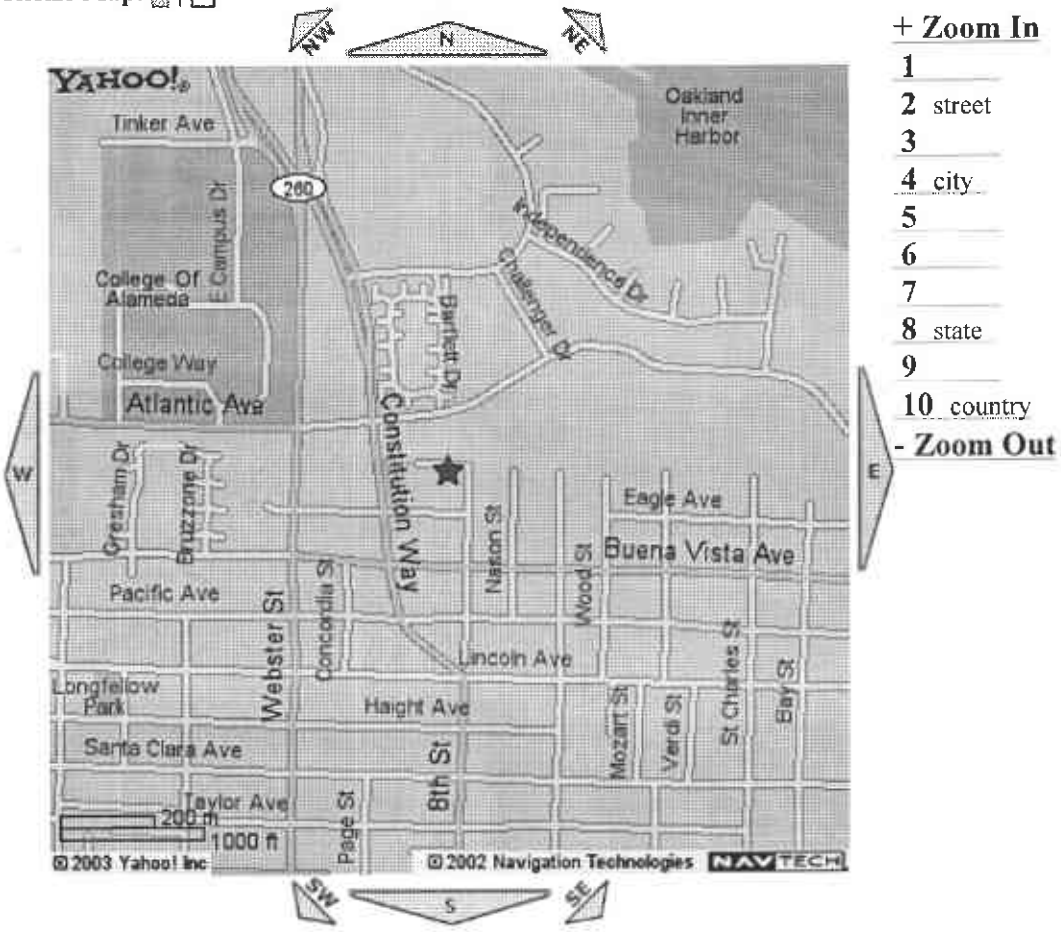

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