PORT OF OAKLAND

September 8, 1999

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

Subject: **Modified Work Plan for The Remediation of Two UST Sites, Pacific Dry Dock Yard II, 321 Embarcadero Road, Oakland**

Dear Mr. Chan:

Please find enclosed the modified work plan for the remediation of two UST sites located at Pacific Dry Dock Yard II (Crowley), 321 Embarcadero Road, Oakland. The Port of Oakland is prepared to implement the work plan within thirty days of you written approval.

If you have any questions regarding the enclosed document, please contact me at 510-272-1184.

Sincerely,

Douglas P. Herman
Assistant Port Environmental Scientist

Encl: Noted

Cc: Neil Werner (w/encl.)
Michele Heffes "

Yane Nordhav, Baseline (w/o encl.)

530 Water Street ■ Jack London Square ■ P.O. Box 2064 ■ Oakland, California 94604-2064
Telephone (510) 272-1100 ■ Fax (510) 272-1172 ■ TDD (510) 763-5703 ■ Cable address, PORTOFOAK, Oakland

BASELINE

ENVIRONMENTAL CONSULTING

7 September 1999
98379-09

Mr. Douglas Herman
Port of Oakland
EH & SC Department
530 Water Street, 2nd Floor
Oakland, CA 94607

Subject: Work Plan for Pacific Dry Dock Yard II, USTs GF-11 and GF-12, 321 Embarcadero, Oakland

Dear Mr. Herman:

At your request, we have prepared the following Work Plan for remediation activities at the Pacific Dry Dock Yard II site at 321 Embarcadero Oakland. It is our understanding that the Port will be submitting this proposed work plan to Mr. Barney Chan of Alameda County for review, comment, and approval. We will look forward to responding to any comments that the County may have on this work plan.

Sincerely,

Yane Nordhav
Reg. Geologist 4009
Principal

YN:km

98379-09-9/7/99

5900 Hollis Street, Suite D • Emeryville, CA 94608 • (510) 420-8686 • FAX: (510) 420-1707
Emeryville Petaluma San Francisco

TABLE OF CONTENTS

WORK PLAN FOR REMEDIATION OF UST SITES GF-11 AND GF-12
Pacific Dry Dock Yard II
321 Embarcadero, Oakland, California

INTRODUCTION

This document is a work plan for risk-based remediation of two areas impacted by underground storage tanks (UST) at the Pacific Dry Dock Yard II site at 321 Embarcadero in Oakland. This work plan replaces an 11 January 1999 work plan previously submitted by SCA Environmental on behalf of the Port of Oakland (Port) to Alameda County Health Care Services Agency, Environmental Health Services (County). The January 1999 work plan was approved by the County in a letter dated 27 July 1999.

BASELINE was requested by the Port to review and implement the January 1999 work plan approved by the County. Following review of the site history and site conditions, BASELINE recommended that the Port use a risk-based approach to site remediation. The Port subsequently met with the County on 12 August 1999 to discuss a risk-based approach to site remediation, which would supersede the approach approved by the County in July 1999. This work plan presents the Port's proposal for remediation at the two UST areas at 321 Embarcadero based on the discussions from the 12 August 1999 meeting. The remaining portion of the Pacific Dry Dock site has previously been characterized by Crowley Marine Services. It is our understanding that the County has issued a letter to Crowley Marine Services indicating that no further action is required for the remaining portions of the site to protect human health and the environment.

BACKGROUND

Two USTs were removed from the site (GF-11 and GF-12) in June 1998. A tank removal report, dated 3 September 1998, was submitted to the County and the City of Oakland on 11 September 1998 (ITSI, 1998). The tanks had capacities of about 5,000 gallons and were constructed of single-walled steel. The time of tank installations is unknown but is believed by Port staff to have been in the early 1940s, when the Navy occupied the site. At least one of the tanks (GF-11) was shown on a 1947 drawing as having an internal steam coil to heat the product to facilitate pumping (SCA, 1999).

At the time of tank removal, the tanks were inspected and did not have any holes through the walls. Piping was found to extend from the tanks to below adjacent foundation slabs. The piping between the tanks and about five feet from the slabs was removed and the remainder left in-place. The location and extent of piping below the foundation slabs are unknown.

After tank removal, two soil samples were collected from each UST excavation; one four-point composite soil sample was collected from the stockpiles of soil generated from each of the tank locations; and one soil/water sample was collected from each open excavation. Discolored soils

were present at UST GF-11 at a depth of about three feet below the ground surface and at about six feet below the ground surface at UST GF-12.[1] The excavated soils and concrete rubble were placed back into the excavations.

Discussion of Analytical Results

The soil and soil/water samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg), as diesel (TPHd), and as motor oil (TPHmo), oil and grease, benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), MTBE, cadmium, chromium, lead, nickel, and zinc.

The following compounds were not detected in any of the soils samples: BTEX, MTBE, and cadmium. The absence of BTEX and MTBE suggests that gasoline was not stored in the tanks.

TPH was quantified by the laboratory as gasoline, as diesel, and as motor oil for all soil samples. Review of the chromatograms (included in Appendix A) for the TPH analyses indicates that the petroleum contained in the soil samples is a mixture that is significantly "heavier" than gasoline, diesel, and motor oil. This would be consistent with the historic construction drawing of UST GF-11 that showed heating coils in the tank.[2] Polynuclear aromatic compounds (PAHs) were also quantified by the laboratory in all the soil samples. The relatively high concentrations of PAHs are associated with the late distillates, such as heavy fuel oils and/or Bunker C. Metals and chlorinated VOCs (up to 6.1 µg/kg of chlorobenzene) were detected in all the soil samples at relatively low concentrations.[3]

The two soil/water samples collected from the open excavation are not indicative of groundwater conditions at the site, since they contained soil particles mixed with the water. The analytical results would be significantly affected by any contaminants adhering to the soil particles and would therefore not represent dissolved concentrations in the groundwater. However, the analytical results are meaningful for those analytes that were not identified above the laboratory reporting limits. The following analytes were not reported above the laboratory reporting limit for the soil/water samples from either tank excavation: benzene and cadmium. The absence of benzene suggests that gasoline may not have been stored in the tanks during tank operations.

Site Conditions

The site is located in an area formerly part of the Oakland Estuary. It was filled at least by 1942 when the Navy operated the site as a ship repair and maintenance facility. Fill was observed in the tank excavations and extended at least seven feet below the ground surface. Along the shoreline,

---

[1] The summary tables of the analytical results are included in Appendix A to this work plan. Laboratory reports were included in the original report by ITSI (1998).

[2] Heating coils would be used to mobilize a viscous fuel, such as Bunker C, used in boilers.

[3] Chlorobenzene has been identified at the Yard II site in numerous locations and is likely unrelated to tank operations.

fill is generally underlain by fine-grained Bay Mud containing interfingering sand lenses. The Lake Merritt Channel is located about 40 feet northwest of UST GF-12 and the Oakland Inner Harbor is about 100 feet southeast of UST GF-11. Groundwater was found in the tank excavations at depths of about 6 to 7.5 feet below the ground surface at the time of tank removal (June 1998). Groundwater levels would be expected to vary with tidal fluctuations. Groundwater flow direction at the site was found to be toward the north-northwest in the spring of 1996 (Versar, 1996).

RISK-BASED REMEDIAL ACTION PLAN

This work plan proposes a risk-based remediation approach for the two UST areas. This risk-based approach considers both human health risks and ecological risks. Human health risk for both park users and construction/maintenance workers are addressed below. The Oakland Estuary Plan identifies the site as a future park. As described below, no further actions are needed for the protection of human health (future site users, construction/maintenance workers) at this site but additional data collection is proposed to evaluate whether the site could pose an ecological risk.

Human Health Risk

In addition to the U.S. EPA Region 9 Preliminary Remediation Goals (PRGs), significant work has been performed to assess human health risks from contaminated soils adjacent to the Bay in the past couple of years. This work has resulted in development of threshold values for specific site conditions and contaminants. The recently completed risk assessments applicable to the Pacific Dry Dock site include Regional Water Quality Control Board (RWQCB) orders 99-045 and 98-072.[4]

RWQCB Order No. 99-045

Order No. 99-045 pertains to risk-based remediation for the San Francisco International Airport (airport). The Order provides clean-up standards for the protection of human health and ecological receptors. The airport is generally covered by asphalt or concrete, which is underlain by fill with thicknesses varying from a few to about 35 feet in thickness; the fill is underlain by young Bay Mud; groundwater occurs at varying depths ranging from four to 16 feet, depending on the thickness of the fill. These conditions are similar to the conditions at the Pacific Dry Dock Yard II site. Since most of the airport site is covered by manmade surfaces, the human health protection standards apply to construction/maintenance workers and indoor workers. The clean-up standards are not applicable for park uses or residential uses.

The Human Health Protection Tier 1 Standards (Table 4 in Order No. 99-045) are summarized in Table 1 for those contaminants identified both at the airport and at the Pacific Dry Dock site for construction, maintenance, and indoor workers. Review of the data in the table reveals that the maximum on-site concentrations of total PAHs and TPH are below the thresholds for protection of human health for the potential receptors. It should be noted that the TPH standards at the airport are for diesel and motor oil and not heavier fuels, identified at the project site.

---

[4] The City of Oakland has also developed risk-based clean-up goals; however, those are not directly applicable to this site because of the shallow depth to groundwater (i.e., less than ten feet below the ground surface).

RWQCB Order No. 98-072

Order No. 98-072 pertains to risk-based soil and groundwater remediation at the Catellus proposed Eastshore Park property in Berkeley, Albany, and Richmond. Action levels were developed for the protection of human health and ecological receptors. Specific action levels were developed for soil and groundwater in upland and upland buffer zones. The groundwater action levels were developed for the protection of aquatic ecological receptors. Soil action levels in Order No. 98-072 apply only to soils within the top two feet of the ground surface. The order does not provide action levels for deeper soils based on the rationale that future users and terrestrial ecological receptors would only be exposed to the shallow soils. Action levels for the upland soil buffer zone were developed to protect aquatic ecological receptors, and upland soil action levels were developed for the protection of both human and terrestrial ecological receptors.

The soil contamination associated with USTs GF-11 and GF-12 were observed to begin about three and six feet below the ground surface, respectively. The soil samples were collected at seven and eight feet below the ground surface. Even though the contamination was deeper than two feet, we compared the maximum concentrations found among the samples collected from the bottom of tank excavations to the upland soil action levels listed in Order No. 98-072 for the purpose of conducting an ultra-conservative human health screening. These action levels are the lower of the human health and ecological action levels. The human health action levels were adjusted PRGs for residential use; the adjustment of the PRGs took into account less frequent use of the site by a park user compared to a resident. The ecological receptor was a mouse chosen by the Oak Ridge National Laboratory, Department of Energy (DOE mouse).

Table 1 lists the action levels for upland soils from Order No. 98-072. Comparison of the action levels with the maximum on-site concentrations found at the UST locations shows that the on-site maximum concentrations of TPHd and benzo(a)pyrene exceed the Order No. 98-072 action levels. We do not believe that the exceedance of these action levels represents a human health risk, even by using these conservative action levels, for the following reasons:

- The exposure pathway for human health effects is incomplete. The maximum concentration of benzo(a)pyrene was found in the soil of sample collected from the UST GF-12 excavation. At this location, contaminated soil was identified during tank removal, as evidenced by visual observations, at a depth of six feet below the ground surface to the depth of the groundwater surface. The sample was collected at a depth of eight feet below ground surface. Future park users would not be exposed to soil at a depth of at least six feet and, therefore, would not be exposed to the maximum concentration of benzo(a)pyrene.

- The 1,000 mg/kg action level in Order No. 98-072 is based on toxicity to aquatic receptors and not human health; it is therefore not applicable in this evaluation of human health. Human health risks from petroleum is generally assessed by indicator species in the fuel, such as PAHs and BTEX.

Preliminary Remediation Goals

For some of the chemicals of concern identified at the Pacific Dry Dock site, the RWQCB orders do not provide action levels or standards. We have therefore used the U.S. EPA Region 9 PRGs to assess the possible health risks from residual contaminants at the site (Table 1).

Table 1 lists PRGs for residential soil. Comparison of the PRGs with maximum on-site concentrations shows that none of the on-site concentrations exceed PRGs, except benzo(a)pyrene and dibenz(a,h)anthracene. We do not believe that the benzo(a)pyrene and dibenz(a,h)anthracene exceedances of the residential PRG represent a human health risk for the following reasons:

- The exposure to future park users would be less than that assumed for developing the residential PRGs.

- The residential PRGs for benzo(a)pyrene and dibenz(a,h)anthracene are 0.056 mg/kg (Table 1). That level was determined based on not exceeding an excess cancer risk of 10^{-6}. The maximum benzo(a)pyrene concentration found at the UST excavation of 1.2 mg/kg represents a 2.1×10^{-5} excess cancer risk, which is within U.S. EPA Region 9's permissible cancer risk range of 10^{-6} to 10^{-4}. The maximum dibenz(a,h)anthracene concentration was 0.41, representing an excess cancer risk of 1.3×10^{-5}, also within permissible cancer risk range.

Conclusion

There are no adverse human health risks associated with the residual contamination at the Pacific Dry Dock site because:

- Maximum concentrations of chemicals of concern are below the RWQCB Order No. 99-045 for protection of maintenance, construction, and indoor workers.

- Maximum concentrations of chemicals of concern are either below RWQCB Order No. 98-072 action levels or within acceptable US EPA Region 9's permissible cancer risk range.

Therefore, no remediation is proposed for the protection of future park users or maintenance/construction workers at the site.

ECOLOGICAL RISKS

There are currently insufficient data to determine the ecological risks associated with the former UST operations. The USTs have not been in use at the site for possibly 19 years, since Pacific Dry Dock began leasing the property. Thus, releases from the tanks are likely to have occurred between tank installation in the mid-1940s to about 1980. Equilibrium between the petroleum released and the groundwater would be expected to have been established over the past 19+ years. The only complete pathway for potential ecological receptors is for the groundwater to discharge into the Estuary of Lake Merritt channel. Therefore, ecological risk can be best assessed by evaluating the groundwater quality prior to discharge.

Monitoring Well Installation and Groundwater Sampling

We propose to install three groundwater monitoring wells downgradient of the two former UST locations. The purpose of the wells would be to test the groundwater quality in the fill (above the Bay Mud) and compare the results with applicable surface water quality criteria. If surface water quality criteria were not exceeded, then we can conclude that the former UST locations are not affecting ecological receptors.

97-045/
98-072

The proposed well locations are shown on Figure 1. A total of three wells would be installed using a hollow-stem auger drilling method after a permit has been obtained from Zone 7. The wells would extend through the artificial fill and terminate in the top of the Bay Mud. The maximum depth of the wells is not expected to be more than about ten feet below the ground surface. The wells would be constructed of two-inch PVC casings with 0.01-inch screens placed to intercept the groundwater table (to be determined in the field). The annulus between the screen and the borehole walls would be filled with clean 2/16 sand to two feet above the top of the screen, overlain by a two-foot bentonite seal, and followed by neat cementing to the ground surface. A traffic-rated Christy-box would be installed around the top of the well and a locked cap would be placed at the top of the casing. The wells would be developed until field parameters (temperature, electrical conductivity, and pH) had stabilized and the water turbidity reduced. The top of the casings would be surveyed relative to the Port datum by a licensed surveyor.

All well installation and sampling equipment would be decontaminated with steam on-site. The decontamination water and drill cuttings would be contained on-site for off-site disposal following receipt of analytical results.

The groundwater from each well would be sampled with a peristaltic pump with clean Teflon tubing without initial purging of the wells. Field measurements would be collected for electrical conductivity, pH, temperature, and turbidity. If product were present in the well(s), the thickness of the separate phase material would be measured, but the well water would not be sampled. The samples would be placed directly into the laboratory glassware, labeled, and kept in a cooled container. The samples would be analyzed for TPHd and TPHmo (EPA Method 8015M with silica gel cleanup and glass fiber filtering; duplicate samples would not be filtered); cadmium, chromium, lead, nickel, and zinc (EPA Method 7010, filtered samples in the laboratory); PAHs (EPA Method 8310); and halogenated and aromatic volatile organic compounds, including MTBE (EPA Method 8021B). The samples would be submitted to Curtis and Tompkins, Ltd., Analytical Laboratories in Berkeley on the day of sample collection for analysis.

Reporting

Four weeks following sample collection, a report would be submitted to the County. The report would document field methods and analytical results. Quarterly sampling for one year to provide data on seasonal variability may be recommended. If quarterly sampling indicates that ecological receptors were not affected, a risk management plan would be provided to manage on-site residual contamination to ensure that future users of the site would not be affected by residual contaminants

associated with the former underground tanks. Recommendations on future remediation would be provided, if the groundwater quality were to appear to potentially affect ecological receptors.

REFERENCES

ITSI, 1998, Tank Closure Report Port of Oakland Tank Numbers GF-11 and GF-12, Pacific Dry Dock (Crowley Yard II), 325 Embarcadero Street, Oakland, California, 3 September - Project No. 95-113.54.

SCA Environmental, Inc., 1999, Final Work Plan for Subsurface Investigation & Remediation, Two Underground Storage Tank Sites, Pacific Dry Dock Yard II, 321 Embarcadero, Port of Oakland, CALIFORNIA; 25 January 1999 - Project No.: F-3070.

Versar, 1996, Preliminary Investigation and Evaluation Report, Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California, prepared for Crowley Marine Services; 20 March - Project No. 2463-108.

	GW samples max ug/l	Order Cleanup levels ug/l 98-072 Catellus	99-045	Soil Airport 7/7/99
TPHg	1000		3700	629
B	ND	510	71	
T	ND		5000	
E	1.3		86	
X	0.5			
MTBE	3.8			
TPHd	(91,000)		(640)	518
O+G	(56,000)		(Site specific)	site specific
PAHs	8060	15	(15)	
naphthalene ~~PAH~~	ND		470	

eco: cleanup levels GW ?

TABLE 1

HUMAN HEALTH SCREENING

PACIFIC DRY DOCK, YARD II

Chemical of Concern at Pacific Dry Dock Yard II	Maximum Concentration Soil (mg/kg)	Soil Thresholds (mg/kg)				
		Construction Workers[1]	Maintenance Workers[1]	Park User[2]	Indoor Worker[1]	PRG[3] Industrial
TPHd	2,800	7,900	17,000	1,000	--	
TPHmo	3,100	8,500	15,000	--	--	
Chlorobenzene	6.1	--	--	--	--	54
1,4-dichlorobenzene	5.0	--	--	--	--	3.0
Acenaphthene	0.35	--	--	--	--	2,600
Fluorene	0.47	--	--	--	--	1,800
Phenanthene	3.8	--	--	8,100	--	
Anthracene	1.1	--	--	5.7	--	
Fluoranthene	6.4	--	--	27,000	--	
Pyrene	5.0	--	--	100	--	
Benzo(a)anthracene	3.1	--	--	3.9	--	
Chrysene	3.4	--	--	7.2	--	
Benzo(b,k)fluoranthene	4.9	--	--	--	--	
Benzo(a)pyrene	1.2	2.6	1.6	0.39	13	0.056
Indeno(1,2,3-cd)pyrene	0.43	--	--	3.9	--	
Dibenz(a,h)anthracene	0.41	--	--	--	--	0.056
Benzo(g,h,i)perylene	ND	--	--	20,000	--	
Total PAHs	30.56	92	92	44.8[4]	92	
Lead	52	--	--	840	--	
Cadmium	ND	--	--	33	--	
Chromium (total)	41	--	--	91.4	--	
Nickel	36	--	--	345	--	
Zinc	130	--	--	1,140	--	

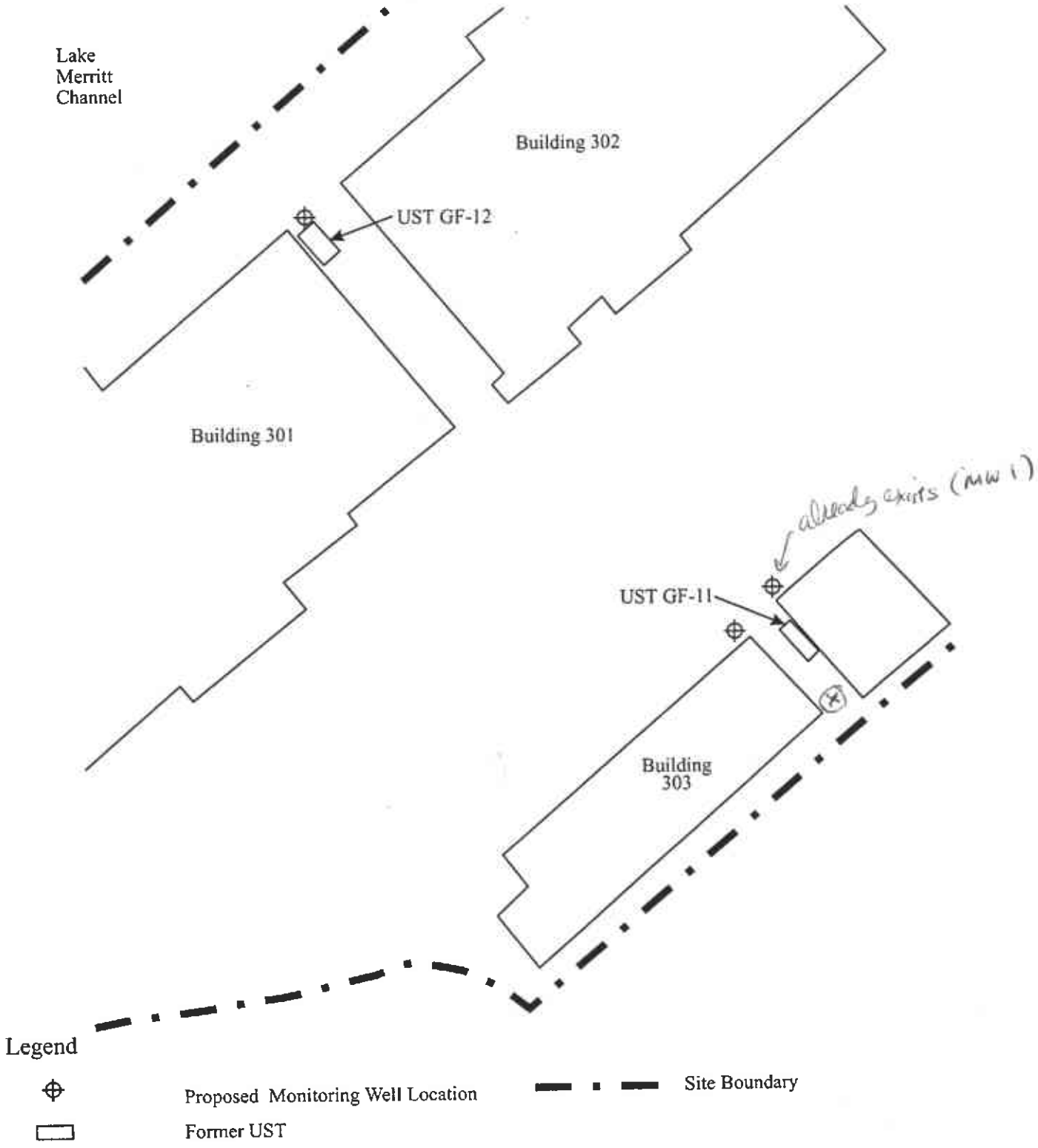
Source:

Notes: -- = No action level.
ND= Not detected.

[1] RWQCB Order No. 99-045, Tier 1, Table 4.
[2] RWQCB Order No. 98-072 for "upland soils all."
[3] PRG for residential soil; PRGs are listed only for constituents that do not have action levels in RWQCB Order No. 98-072.
[4] RWQCB Order No. 98-072 - for "upland soil buffer"; "value for upland soil all" not available.

PROPOSED MONITORING WELL LOCATIONS

Figure 1



Pacific Dry Dock Yard II
321 Embarcadero
Oakland, California

Approximate
0
50 Feet

BASELINE

D:\Graphics\98379-09\PMWL.cdr 8/25/99

APPENDIX A

SUMMARY TABLES FOR ANALYTICAL RESULTS AND CHROMATOGRAMS

Table 1

Laboratory Results for Petroleum Hydrocarbons In Soil and Groundwater
GF-11 and GF-12 Tank Removals
Pacific Dry Dock (Crowley Yard II)
325 Embarcadero Street
Oakland, California

Sample I.D.	TPHg (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	MTBE (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	O & G (mg/kg)
SOIL SAMPLES (in mg/kg)									
S-A-7'-N	8.9[1,3]	<5	<5	<5	<10	<20	2,800[1]	3,100[1,2]	650
S-A-7'-S	7.6[1,3]	<5	<5	<5	<10	<20	300[1]	590[1,2]	130
S-B-8'-N	<1	<5	<5	<5	<10	<20	270[1,3]	1,400[1,2]	230
S-B-8'-S	14[1,3]	<5	<5	<5	<10	<20	640[1]	740[1,2]	430
S-SP1-A,B,C,D	7.1[1,3]	<5	<5	<5	<10	<20	620[1,3]	1,900[1,2]	470
S-SP2-A,B,C,D	1.1[1,3]	<5	<5	<5	<10	<20	240[1]	910[1,2]	180
GROUNDWATER SAMPLES (in µg/L)									
W-TP-A	1,000[1,3]	<0.5	<0.5	1.3	0.5	3.8	91,000[1,3]	-	<5,000
W-TP-B	1,000[1,3]	<0.5	<0.5	<0.5	<0.5	<2	34,000[1]	-	56,000

[1]Heavier hydrocarbons than indicated standard.
[2]Lighter hydrocarbons than indicated standard.
[3]Sample exhibits fuel pattern which does not resemble standard.

ITSI

Table 2

Laboratory Results for HVOCs and SVOCs In Soil And Groundwater
GF-11 and GF-12 Tank Removals
Pacific Dry Dock (Crowley Yard II)
325 Embarcadero Street
Oakland, California

Compound	SOIL SAMPLES						GROUNDWATER SAMPLES	
	S-A-7'-N	S-A-7'-S	S-B-8'-N	S-B-8'-S	S-SP1-A,B,C,D	S-SP2-A,B,C,D	W-TP-A	W-TP-B
HALOGENATED VOLATILE ORGANIC COMPOUNDS (HVOCs) (in µg/kg)								
Chlorobenzene	<5	6.1	<5	<5	<5	<5	32	<1
1,4-Dichlorobenzene	<5	5.0	<5	<5	<5	<5	8.9	<1
1,2-Dichlorobenzene	<5	<5	<5	<5	<5	<5	5.5	<1
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs) (in µg/kg)								
1-2 Acenaphthene	210	<330	350	<670	<670	<670	<240	<47
1-2 Fluorene	240	<330	470	<670	<670	<670	<240	<47
1-2 Phenanthrene	1,300	<330	3,800	1,000	470	<670	150	<47
1-2 Anthracene	380	<330	1,100	<670	<670	<670	130	<47
Fluoranthene	1,600	190	6,400	2,400	2,700	460	1,400	90
Pyrene	1,700	320	5,000	2,400	3,400	540	1,700	150
Benzo(a)anthracene	770	<330	3,100	1,400	1,900	<670	930	59
Chrysene	920	<330	3,400	1,600	2,300	380	880	38
Benzo(b,k)fluoranthene	1,200	290	4,900	2,600	3,700	680	1,600	<47
Benzo(a)pyrene	540	<330	1,200	900	1,200	<670	760	51
Indeno(1,2,3-cd)pyrene	<330	<330	430	<670	410	<670	250	<47
Dibenzo(a,h)anthracene	<330	<330	410	<670	<670	<670	<240	<47
Benzo(g,h,i)perylene	<330	<330	<670	<670	<670	<670	260	<47
TOTAL PAHS	8.86 -	0.8	30.56	12.3	16.08		8.06	

very high

95-113 S4/T 2-VOCs

ITSI

Table 3

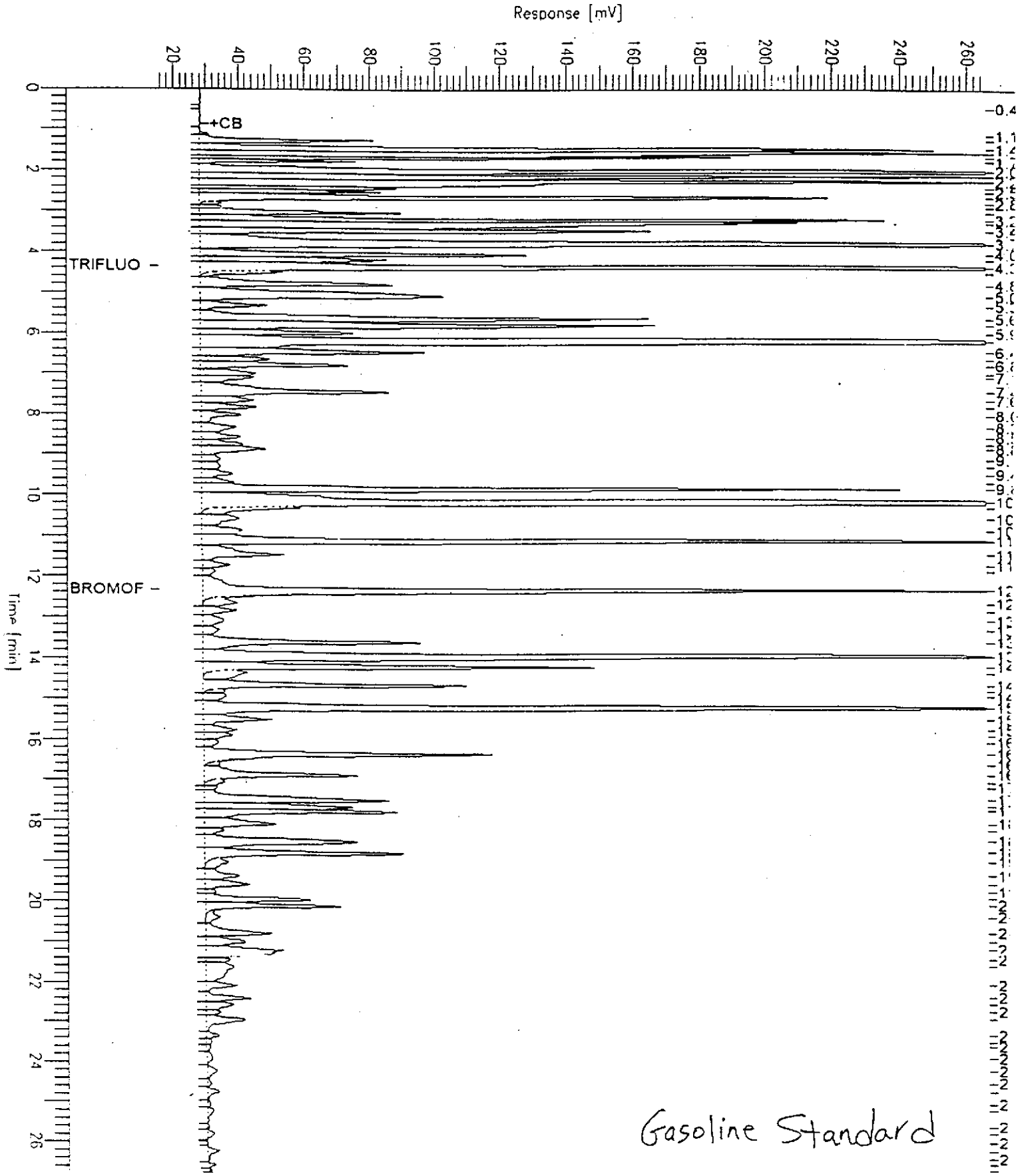
Laboratory Results for Metals In Soil and Groundwater
GF-11 and GF-12 Tank Removals
Pacific Dry Dock (Crowley Yard II)
325 Embarcadero Street
Oakland, California

Sample I.D.	Cadmium	Chromium	Lead	Nickel	Zinc
SOIL SAMPLES (in mg/kg)					
S-A-7'-N	<0.097	41	24	36	82
S-A-7'-S	<0.096	24	5.4	17	110
S-B-8'-N	<0.095	26	19	24	93
S-B-8'-S	<0.094	19	33	20	110
S-SP1-A,B,C,D	<0.099	18	11	17	89
S-SP2-A,B,C,D	<0.095	31	52	23	130
GROUNDWATER SAMPLES (in µg/L)					
W-TP-A	<5	570	350	510	2,400
W-TP-B	<5	68	140	54	420

GC19 TVH 'X' Data File (FID)

Sample Name : CCV/LCS,QC?,98WS6074,?,
FileName : C:\GC19_BAK\DATA\191X001.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: 1.0 Plot Offset: 16 mV

Sample #: GAS Page 1 of 1
Date : 7/10/98 09:38 AM
Time of Injection: 7/10/98 09:11 AM
Low Point : 15.60 mV High Point : 265.60 mV
Plot Scale: 250.0 mV

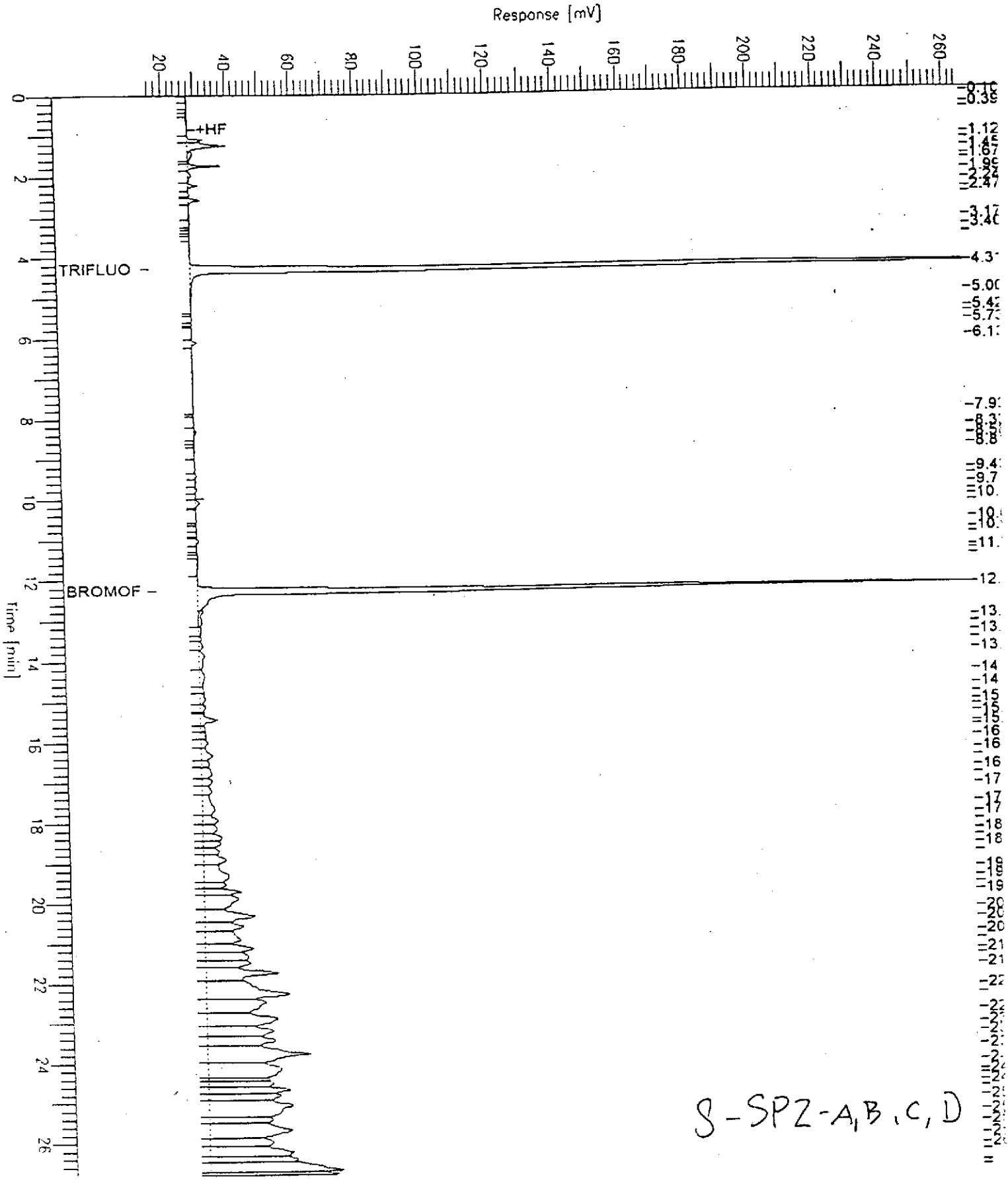


Gasoline Standard

GC19 TVH 'X' Data File (FID)

Sample Name : S.134354-007,41926
FileName : C:\GC19 BAK\DATA\191X032.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 16.60 min
Scale Factor: 1.0 Plot Offset: 15 mV

Sample #:
Date : 7/13/98 12:21 PM
Time of Injection: 7/11/98 10:30 AM
Low Point : 15.39 mV High Point : 265.39 mV
Plot Scale: 250.0 mV

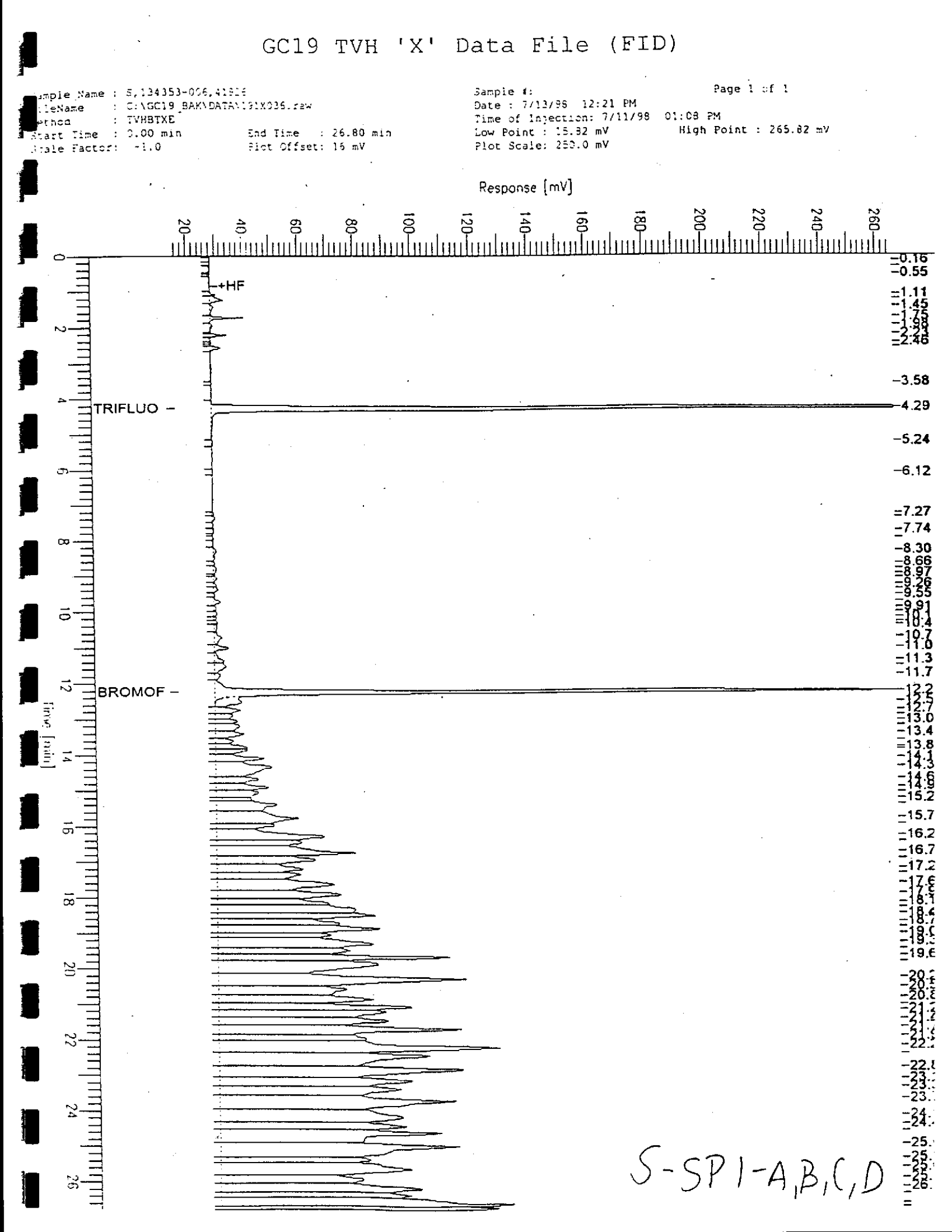


S-SPZ-A,B,C,D

GC19 TVH 'X' Data File (FID)

mple Name : S,134353-006,41816
leName : C:\GC19_BAK\DATA\191X036.raw
thod : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 16 mV

Sample #:
Date : 7/13/98 12:21 PM
Time of Injection: 7/11/98 01:08 PM
Low Point : 15.82 mV High Point : 265.82 mV
Plot Scale: 250.0 mV

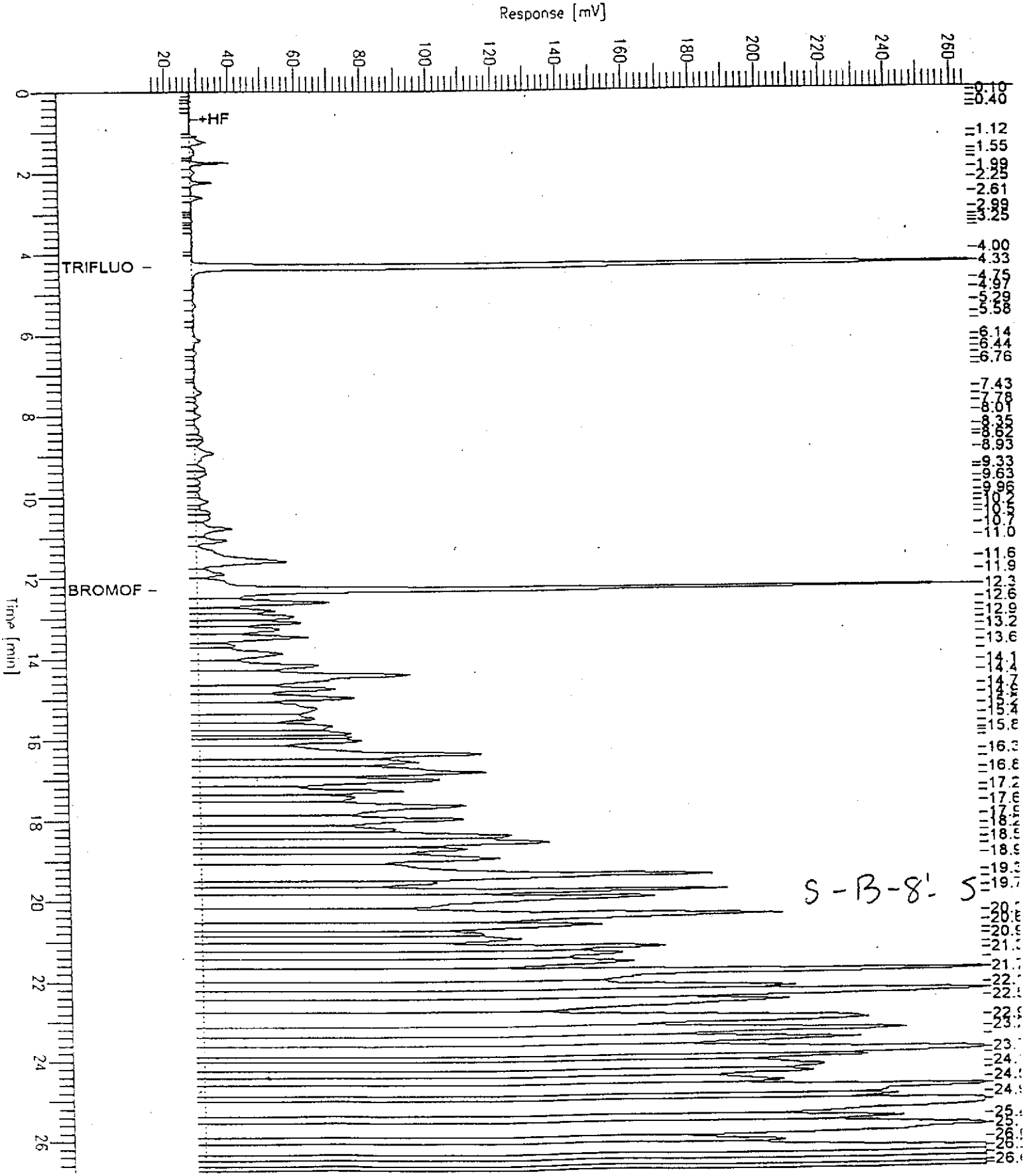


S-SP1-A,B,C,D

GC19 TVH 'X' Data File (FID)

mple Name : 3,134353-004,41926
leName : C:\GC19_BAK\DATA\191X026.raw
ethod : TVHBTXE
tart Time : 0.00 min End Time : 26.80 min
cale Factor: -1.0 Plot Offset: 15 mV

Sample #:
Date : 7/13/98 12:21 PM
Time of Injection: 7/11/98 06:33 AM
Low Point : 14.97 mV High Point : 264.97 mV
Plot Scale: 250.0 mV

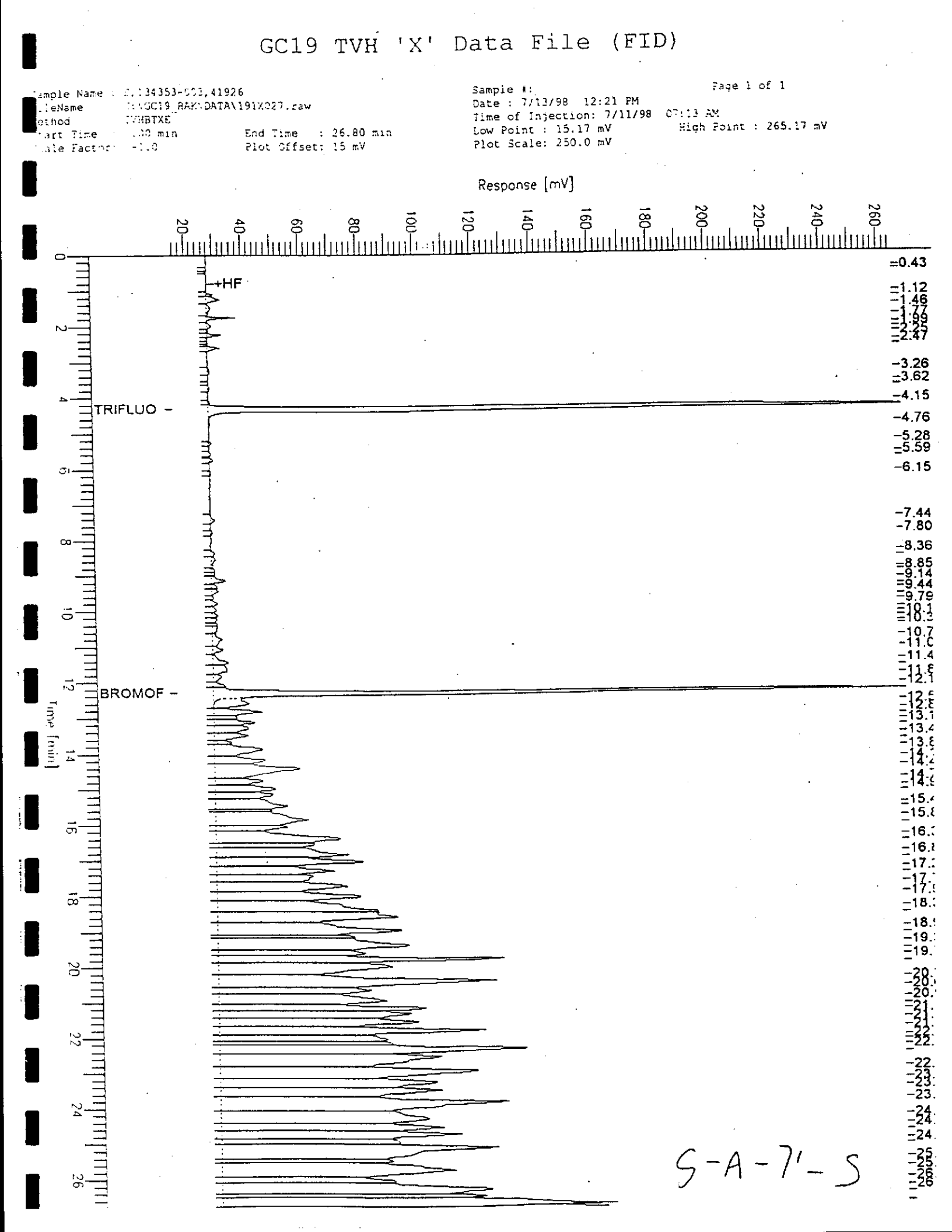


S-B-8' 5

GC19 TVH 'X' Data File (FID)

Sample Name : 2,134353-003,41926
FileName : I:\GC19_BAK\DATA\191X027.raw
Method : TVHBTXE
Start Time : .00 min End Time : 26.80 min
Scale Factor : -1.0 Plot Offset: 15 mV

Sample #:
Date : 7/13/98 12:21 PM
Time of Injection: 7/11/98 07:13 AM
Low Point : 15.17 mV High Point : 265.17 mV
Plot Scale: 250.0 mV

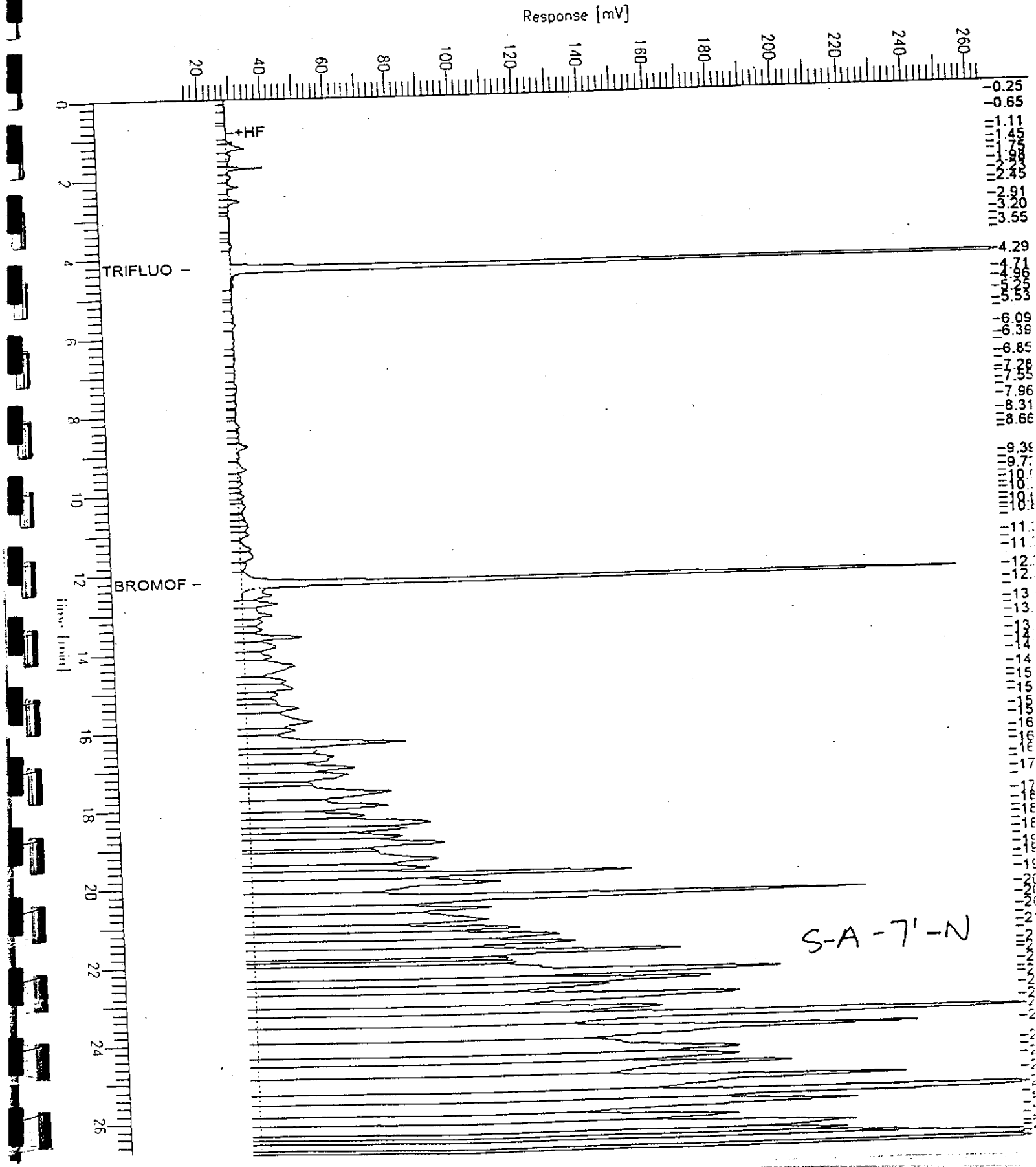


S-A-7'-S

GC19 TVH 'X' Data File (FID)

Sample Name : S,134353-002,41926
FileName : C:\GC19_BAK\DATA\191X034.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 16 mV

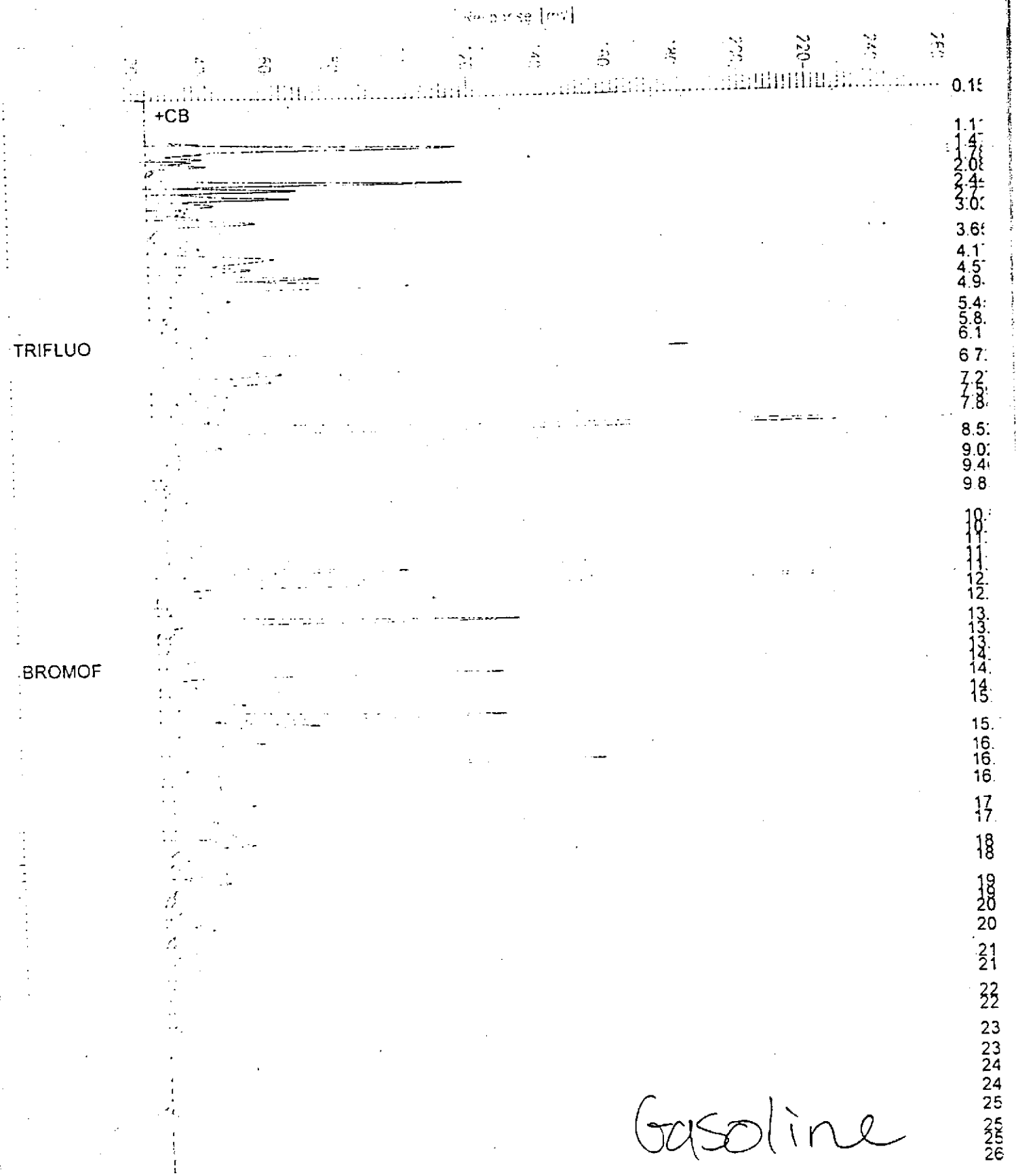
Sample #:
Date : 7/13/98 12:21 PM
Time of Injection: 7/13/98 11:49 AM
Low Point : 15.92 mV High Point : 265.92 mV
Plot Scale: 250.0 mV



GC05 'H' File TVH

Sample Name : CCV/LCS,QC74341,98WS5958,41871,
FileName : G:\GC05\DATA\189G001.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 11 mV

Sample #: GAS
Date : 7/8/98 09:35 AM
Time of Injection: 7/8/98 09:08 AM
Low Point : 11.21 mV High Point : 261.21 mV
Plot Scale: 250.0 mV

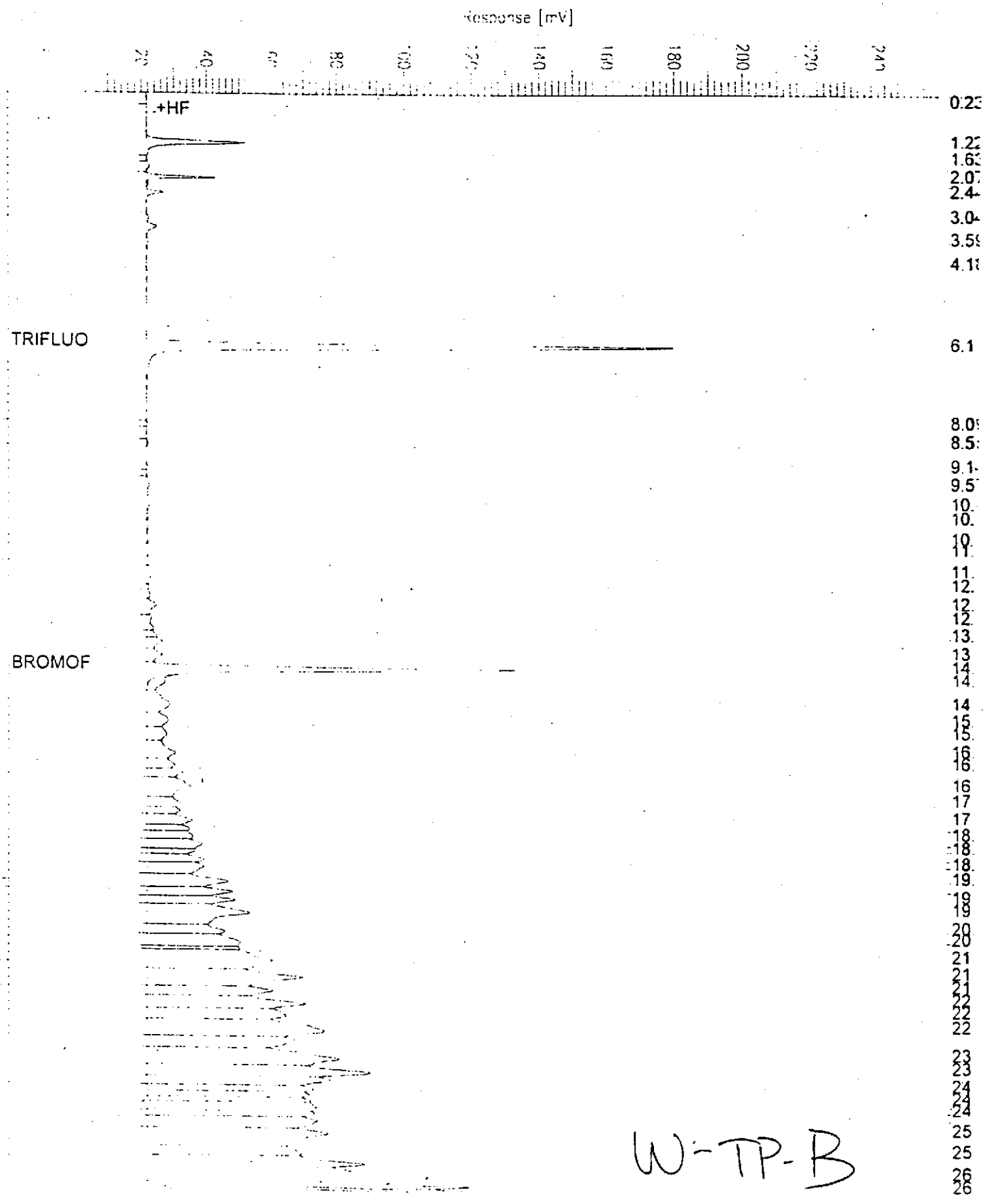


Gasoline

GC05 'H' File TVH

Sample Name : S,134353-009,41871,
FileName : G:\GC05\DATA\189G032.RAW
Method :
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 9 mV

Sample #:
Date : 7/9/98 01:30 PM
Time of Injection: 7/9/98 04:32 AM
Low Point : 8.98 mV High Point : 258.98 mV
Plot Scale: 250.0 mV

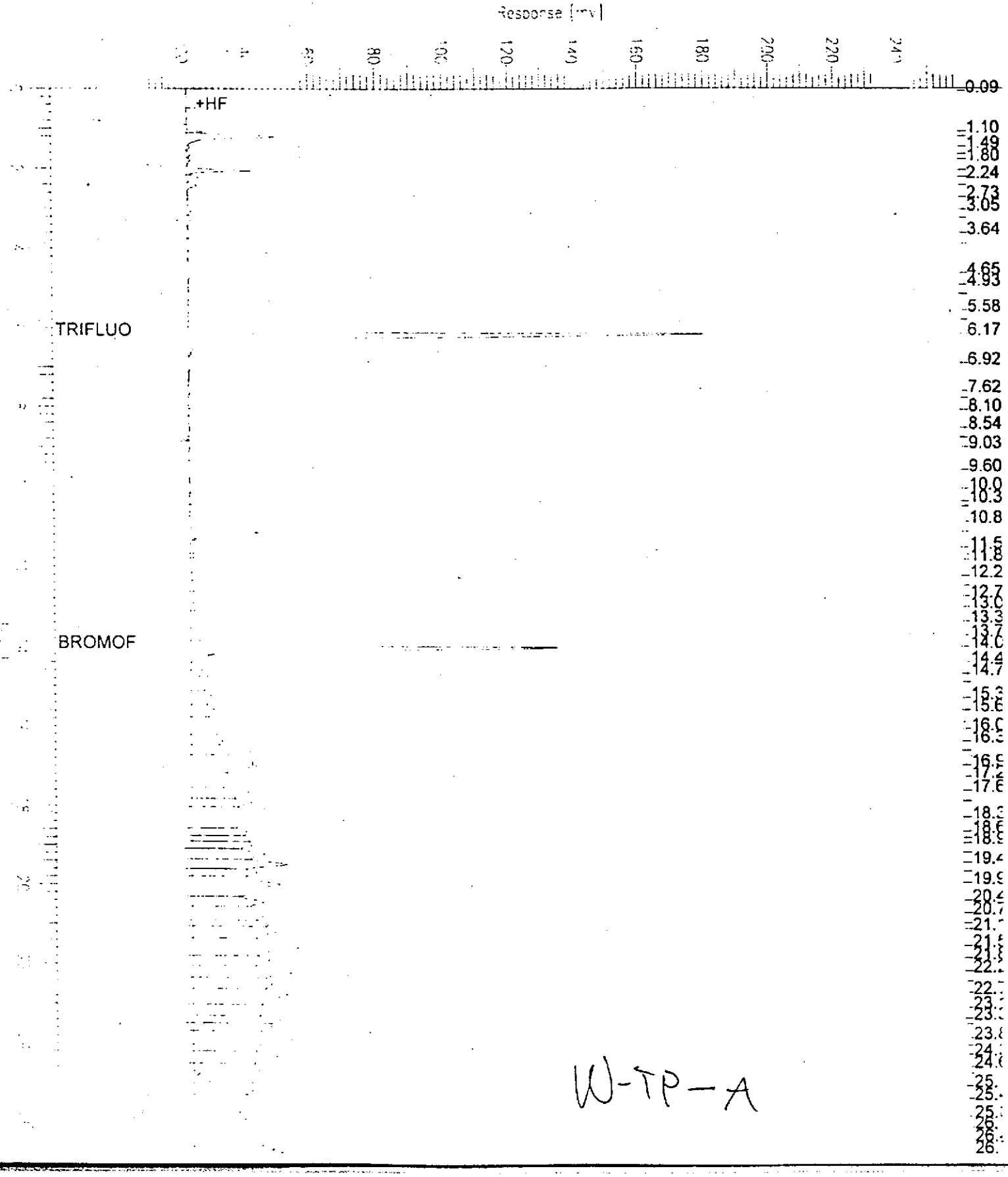


W-TP-B

GC05 'H' File TVH

Sample Name : 5,134353-008.41871,
FileName : G:\GC05\DATA\189G031.RAW
Method :
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 9 mV

Sample #: Page 1 of 1
Date : 7/9/98 01:28 PM
Time of Injection: 7/9/98 03:55 AM
Low Point : 8.91 mV High Point : 258.91 mV
Plot Scale: 250.0 mV

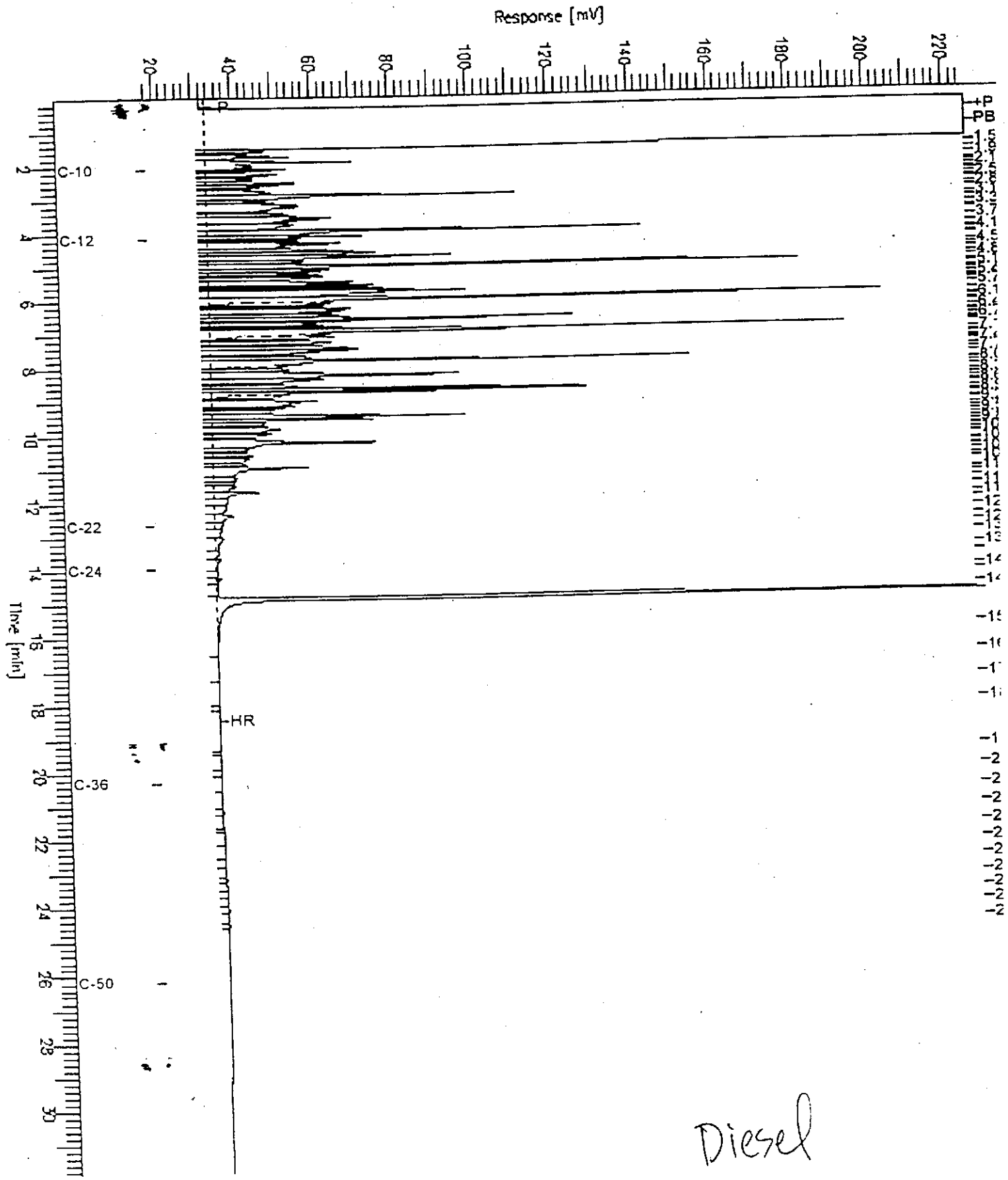


W-TP-A

GC15 Channel B TEH

Sample Name : CCV,98WS5988,DS
FileName : C:\GC15\CHB\189B028.RAW
Method : B180TEH.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 18 mV

Sample f: 500MG/L
Date : 7/9/98 03:27 PM
Time of Injection: 7/9/98 12:26 PM
Low Point : 17.83 mV High Point : 225.66 mV
Plot Scale: 207.8 mV

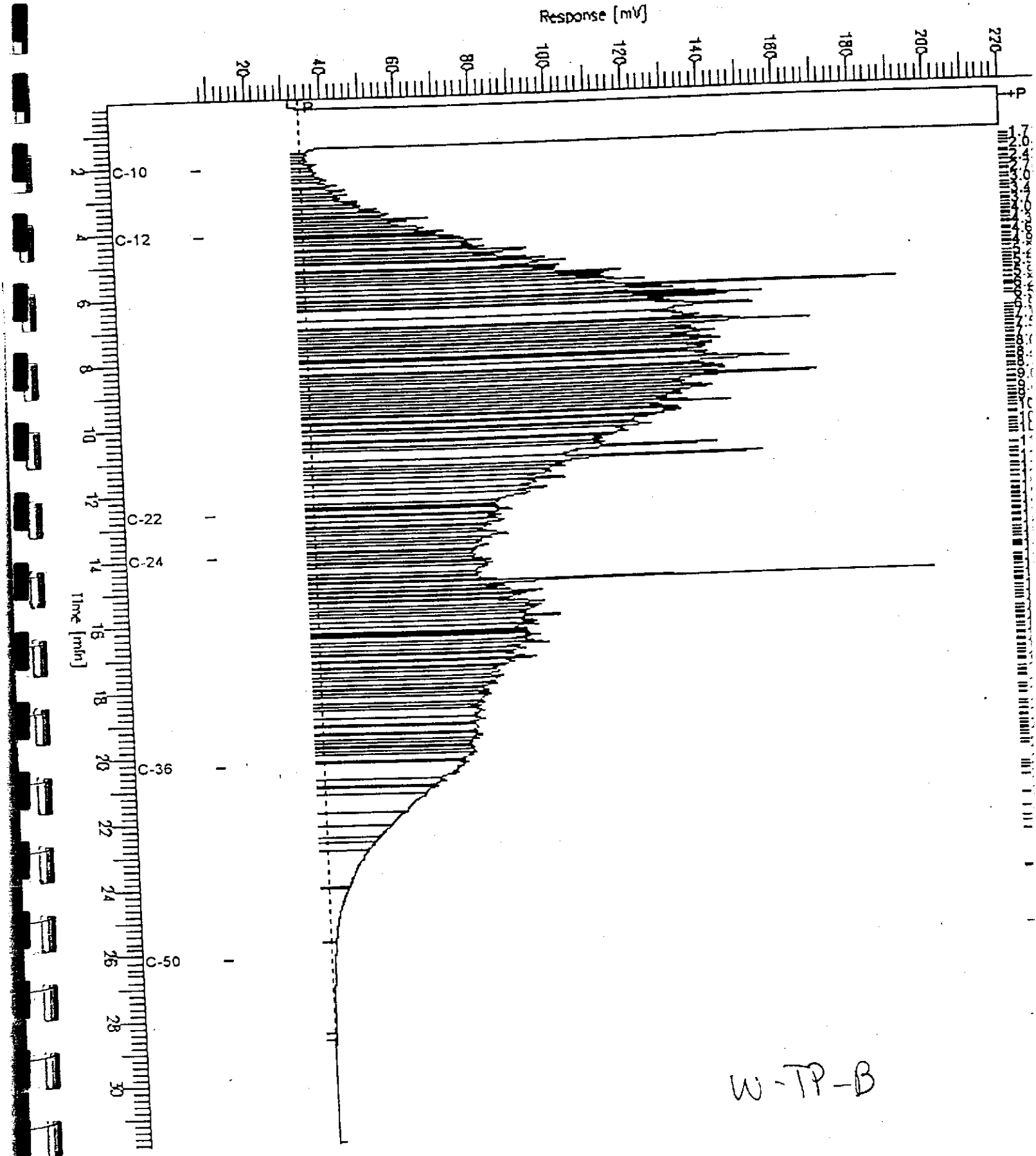


Diesel

GC15 Channel B TEH

Sample Name : 134353-009,41865
FileName : C:\GC15\CHB\169B066.RAW
Method : B180TEH.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 8 mV

Sample #: 41865
Date : 7/13/98 10:47 AM
Time of Injection: 7/10/98 07:54 PM
Low Point : 7.52 mV High Point : 220.25 mV
Plot Scale: 212.7 mV



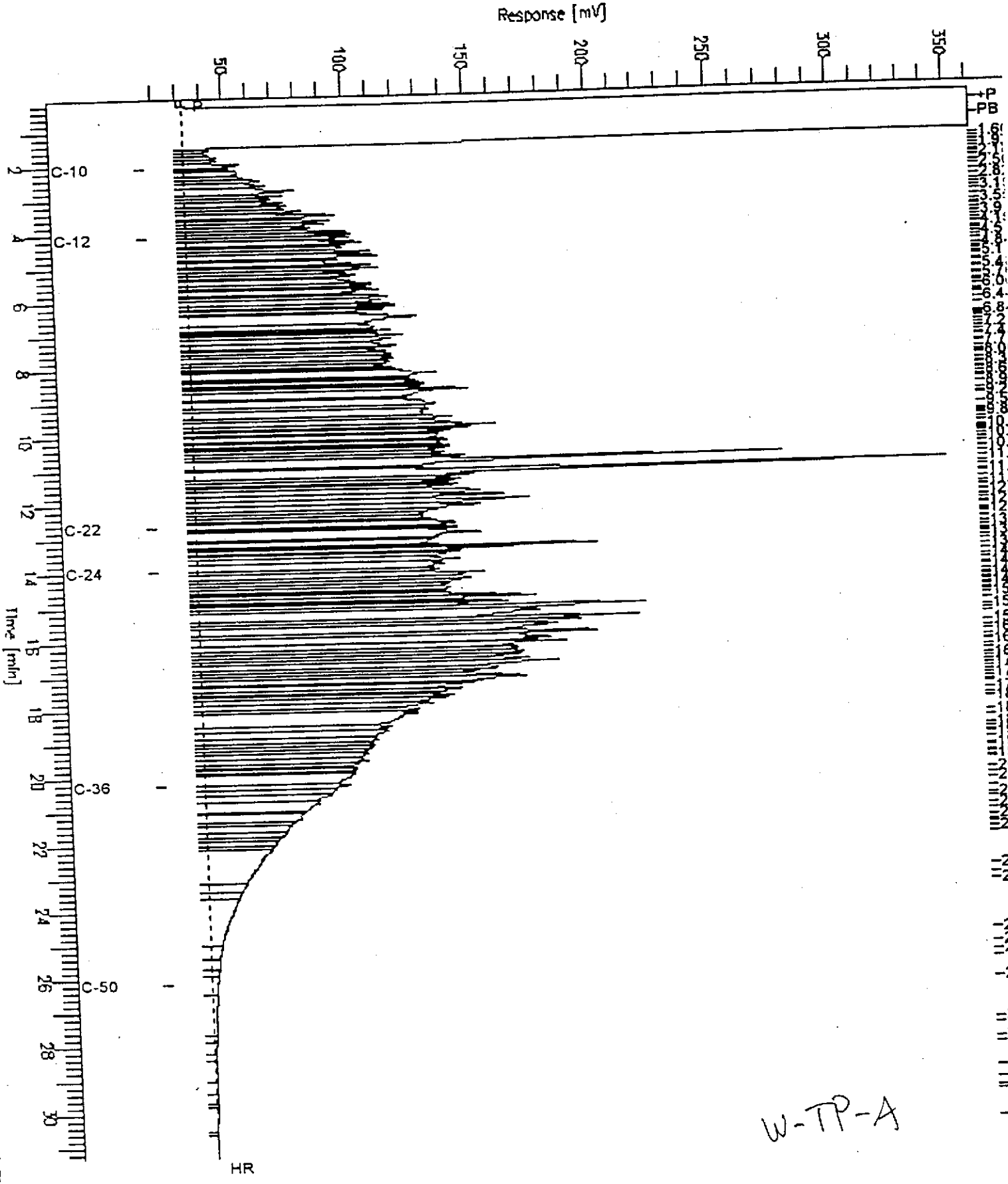
W-TP-B

GC15 Channel B TEH

mple Name : 134353-008,41865
leName : C:\GC15\CHB\189B065.RAW
Method : B180TEH.MTH
Start Time : 0.07 min
ale Factor: 0.0

End Time : 31.91 min
Plot Offset: 16 mV

Sample #: 41865
Date : 7/13/98 10:37 AM
Time of Injection: 7/10/98 07:11 PM
Low Point : 16.43 mV
High Point : 361.70 mV
Plot Scale: 345.3 mV

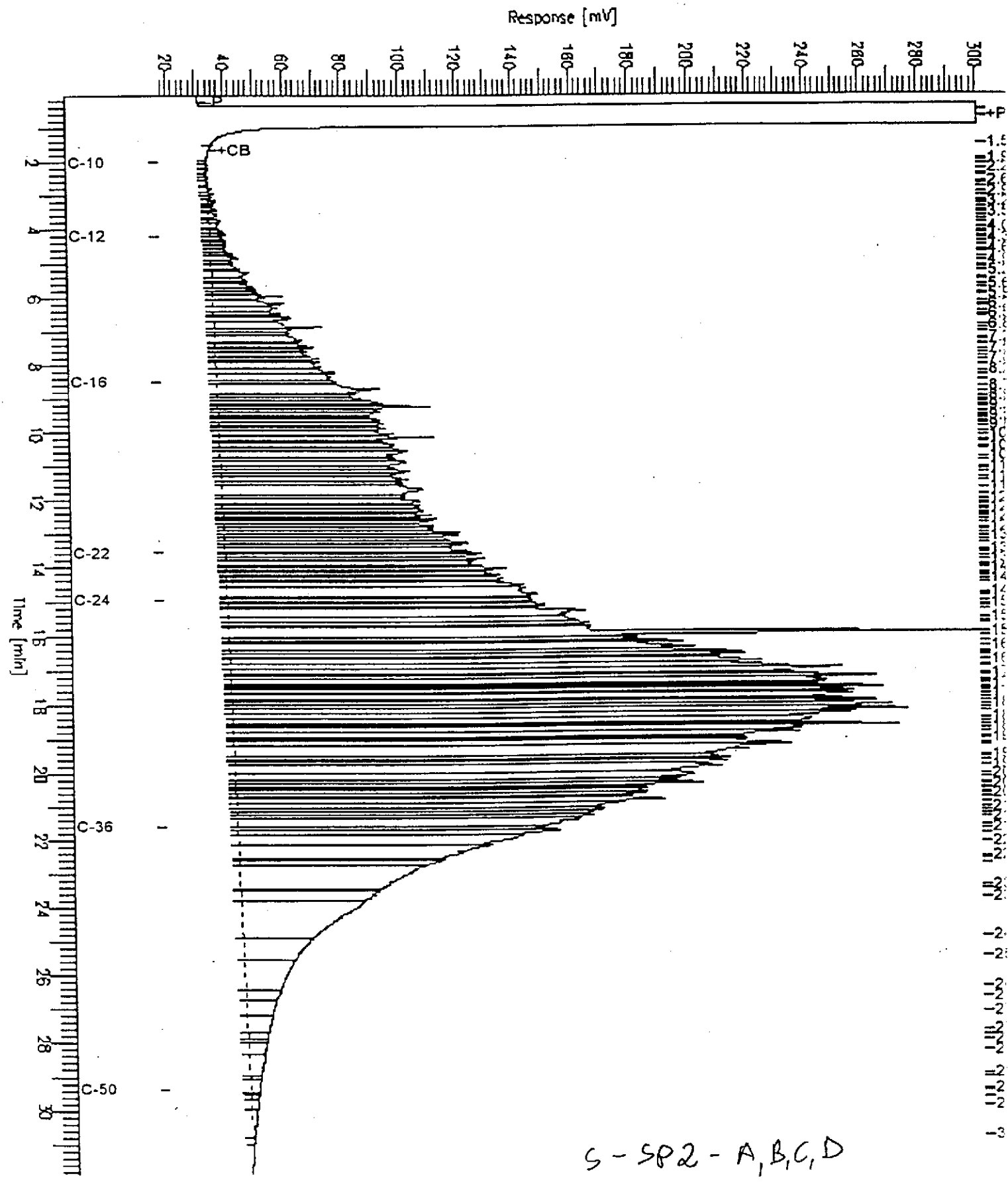


W-TP-A

Chromatogram

Sample Name : 134353-007,41975
FileName : D:\GC11\CHA\195A074.RAW
Method : ATEH180.MTH
Start Time : 0.07 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 17 mV

Sample #: 41975
Date : 7/17/98 12:30 PM
Time of Injection: 7/16/98 11:33 PM
Low Point : 16.91 mV High Point : 300.64 mV
Plot Scale: 283.7 mV



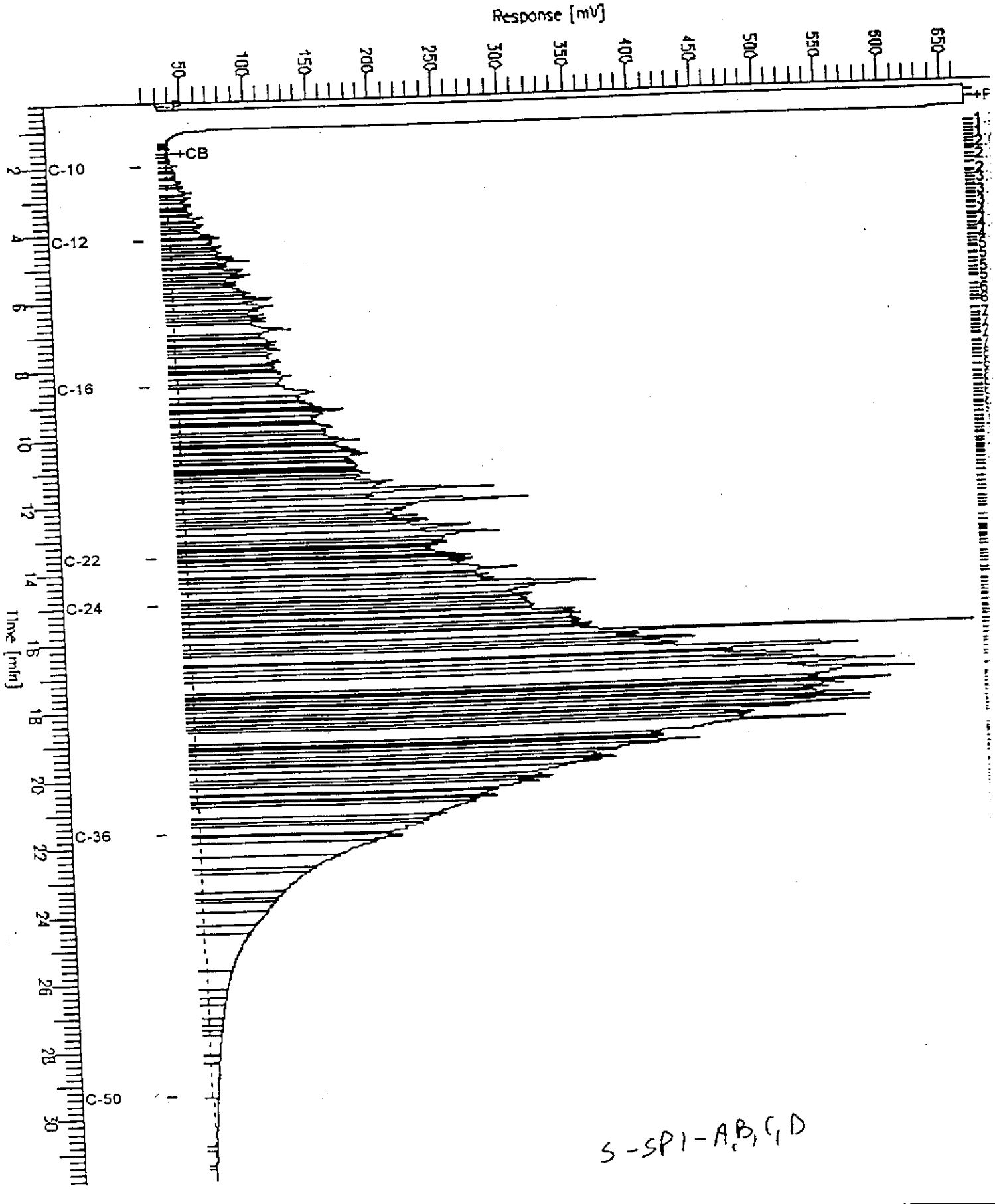
S - SP2 - A, B, C, D

Chromatogram

Sample Name : 134353-006,41975
FileName : D:\GC11\CHA\195A073.RAW
Method : ATEH180.MTH
Start Time : 0.17 min
Scale Factor: 0.0

End Time : 31.91 min
Plot Offset: 17 mV

Sample #: 41975
Date : 7/17/98 12:29 PM
Time of Injection: 7/16/98 10:52 PM
Low Point : 16.76 mV
High Point : 669.26 mV
Plot Scale: 652.5 mV

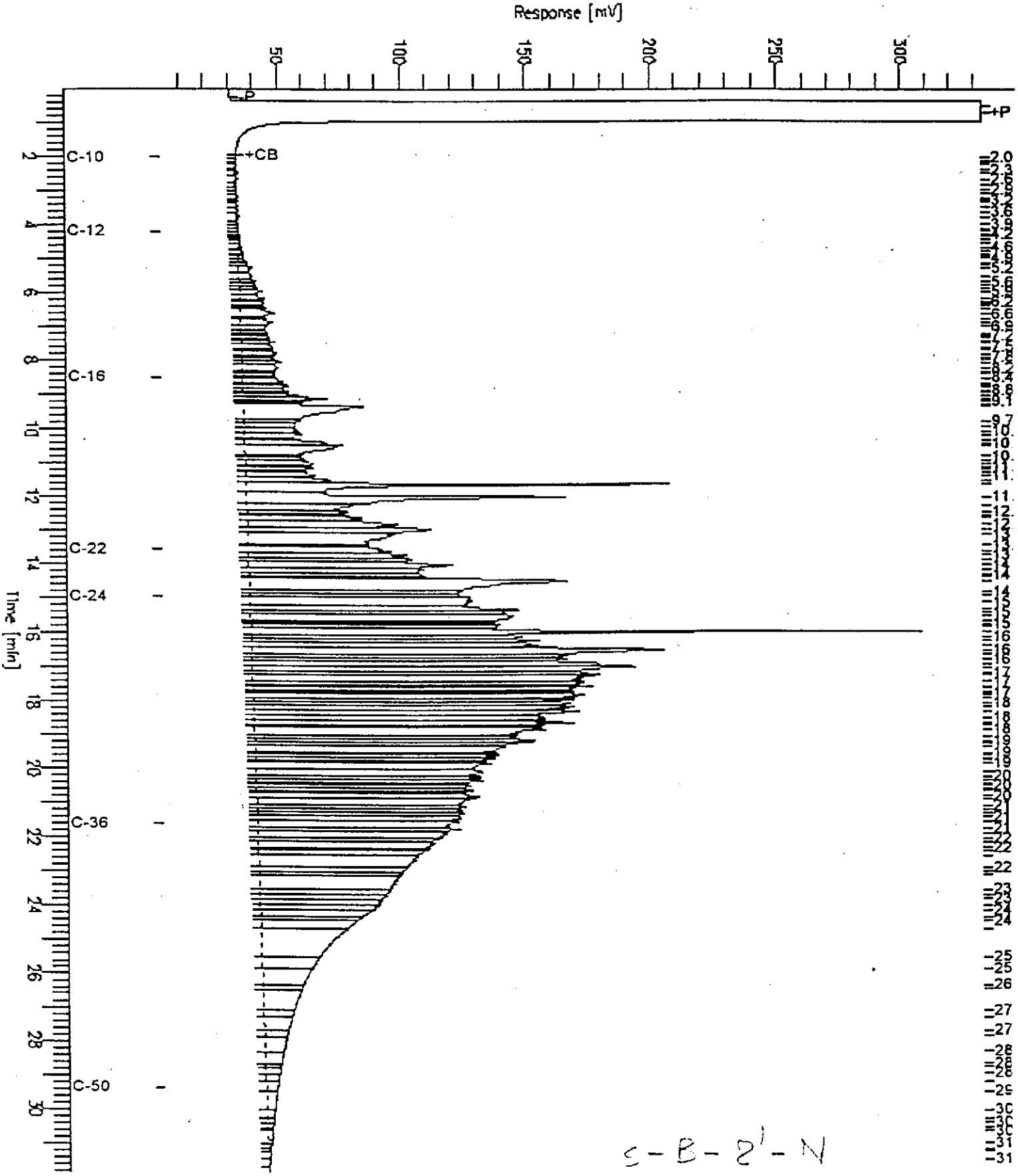


S-SP1-A,B,C,D

Chromatogram

Sample Name : 134353-005,41975
FileName : D:\GC11\CHA\195A072.RAW
Method : ATEH180.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 3 mV

Sample #: 41975 Page 1 of 1
Date : 7/17/98 12:28 PM
Time of Injection: 7/16/98 10:12 PM
Low Point : 2.51 mV High Point : 333.59 mV
Plot Scale: 331.1 mV



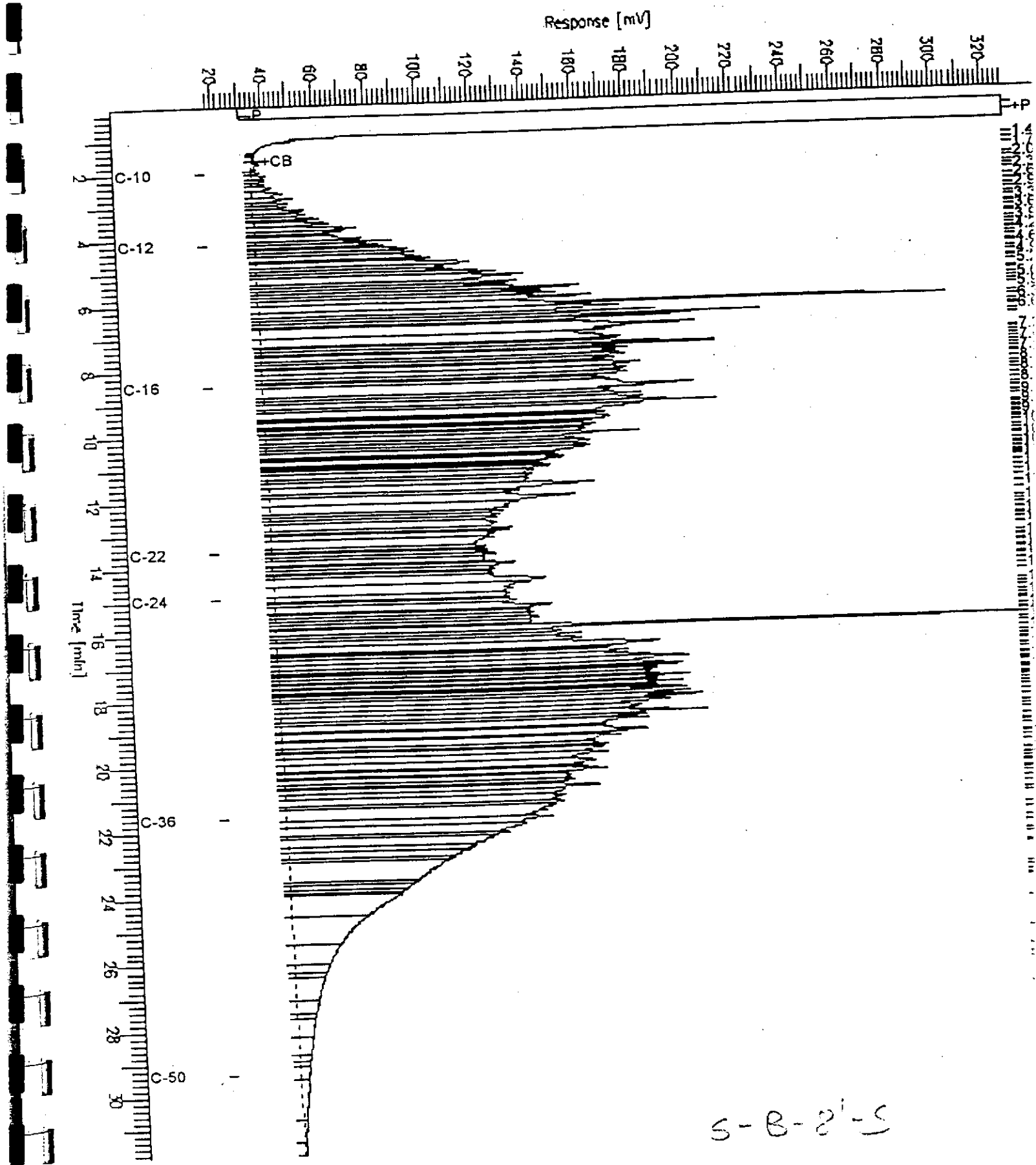
C-B-2'-N

Chromatogram

Sample Name : 134353-004,41975
FileName : D:\GC11\CHA\195A071.RAW
Method : ATEH180.MTH
Start Time : 0.01 min
Scale Factor: 0.0

End Time : 31.91 min
Plot Offset: 16 mV

Sample #: 41975
Date : 7/17/98 12:26 PM
Time of Injection: 7/16/98 09:31 PM
Low Point : 16.40 mV
High Point : 328.54 mV
Plot Scale: 312.1 mV



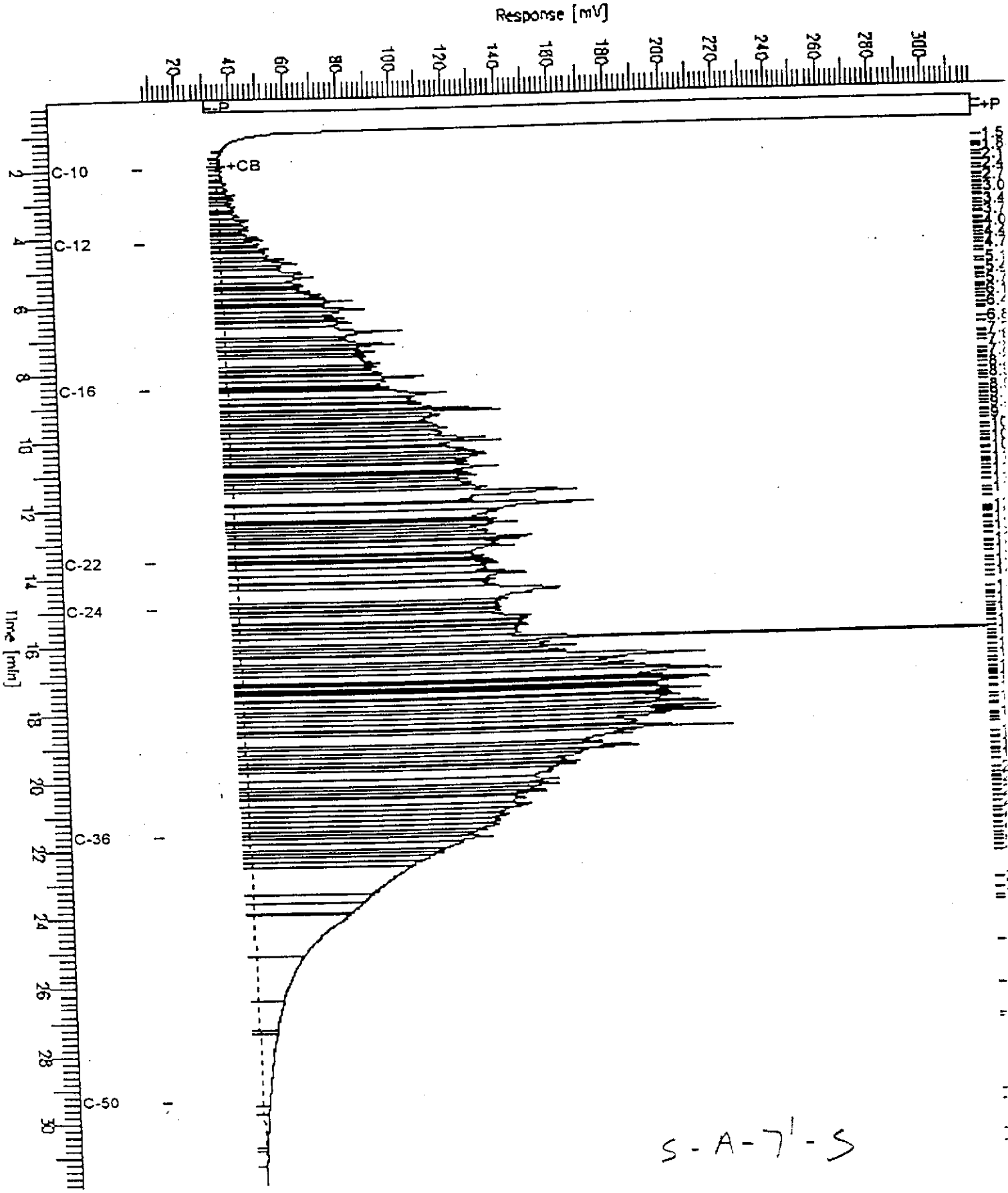
S-B-2'-5

Chromatogram

Sample Name : 134353-003,41975
FileName : D:\GC11\CHA\195A070.RAW
Method : ATEH180.MTH
Start Time : 0.01 min
Scale Factor: 0.0

End Time : 31.91 min
Plot Offset: 7 mV

Sample #: 41975
Date : 7/17/98 12:24 PM
Time of Injection: 7/16/98 08:51 PM
Low Point : 6.62 mV
High Point : 318.92 mV
Plot Scale: 312.3 mV

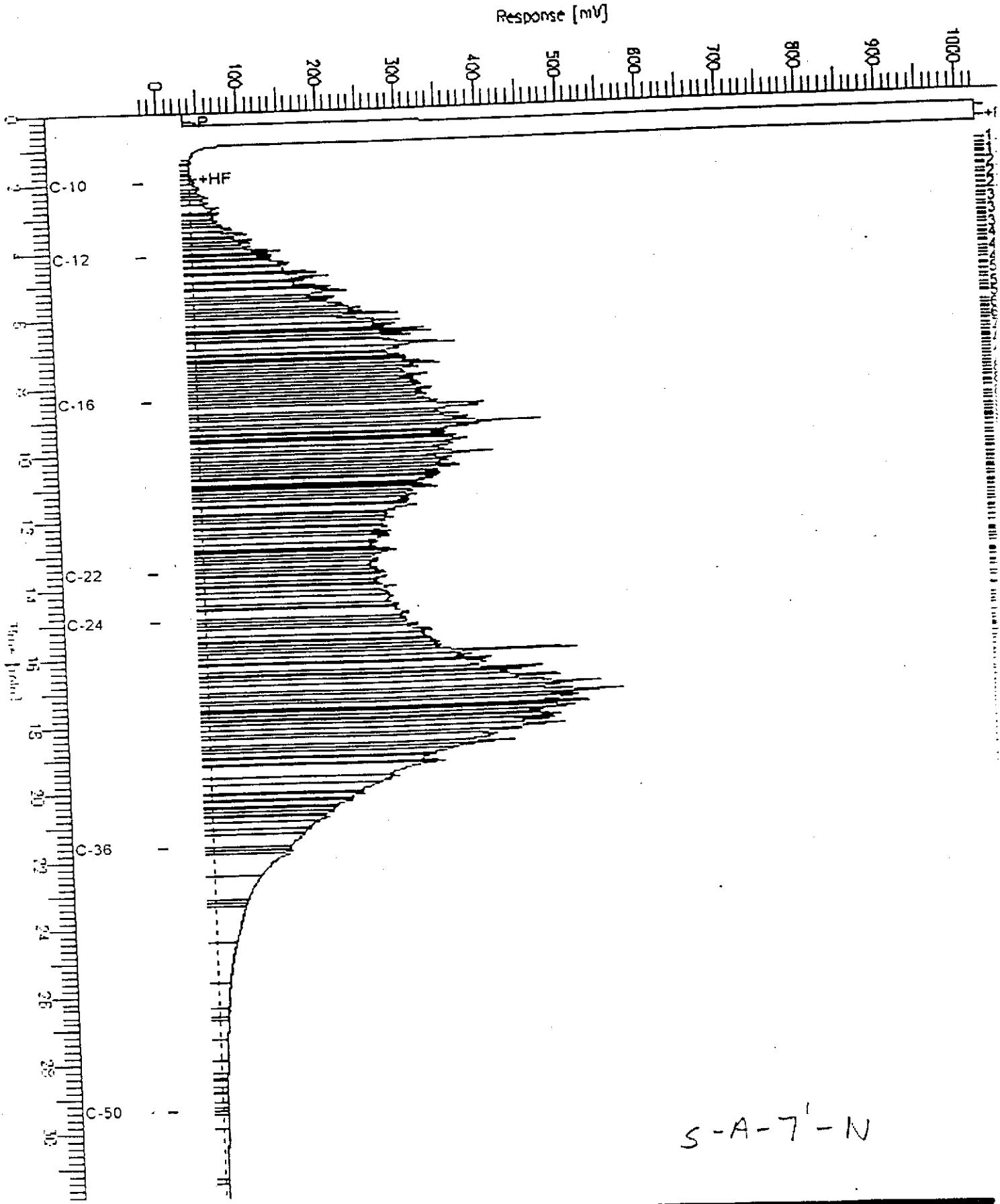


S-A-7'-5

Chromatogram

: 131353-002,41975
: J:\GC11\CHA\198A038.RAW
: ATEH180.MTH
: 0.00 min End Time : 31.90 min
: 0.0 Plot Offset: -20 mV

Sample #: 41975
Date : 7/20/98 02:16 PM
Time of Injection: 7/18/98 06:43 PM
Low Point : -20.05 mV High Point : 1024.00 mV
Plot Scale: 1044.0 mV



S-A-7'-N