

Applied Geotechnology Inc.

August 8, 1989

15,398.001

COPY 

Stewart Meir
Narrows Marina, Inc.
9007 South 19th
Tacoma, Washington 98465

RECEIVED

AUG 19 2014

WA State Department
of Ecology (SWRO)

Dear Mr. Meir:

Final Report
Hydrocarbon Contaminated Soil Remediation
Narrows Marina, Tacoma

This letter presents the results of an on-site solid phase remediation of hydrocarbon contaminated soils associated with former underground storage tanks (USTs) at the above referenced site. Applied Geotechnology Inc. (AGI) was retained for services associated with contaminated soils discovered during the removal of underground storage tanks and the on-site remediation of contaminated soils.

BACKGROUND

The site is located at 9007 South 19th Street, Tacoma, Washington (Figure 1). Three underground storage tanks (USTs), two 3000 gallon gasoline and one 3000 gallon diesel, were removed from a single tank nest east of the marina (Figure 2).

Excavation of the tanks by Station Maintenance and Equipment (SME) revealed contamination within the tank nest, particularly against the west and south edges of the cavity. Gary Porter, Tacoma-Pierce County Health Department (TPCHD) was present and observed contamination during excavation. Six soil samples collected by TPCHD were analyzed for TPH (total petroleum hydrocarbons) and BETX (benzene, ethylbenzene, toluene, xylene) and revealed contamination along the west and south walls. Mr. Porter requested that an environmental assessment be performed, and overexcavation and remediation of the of contaminated soil be performed.

Mr. Stewart Meir
Narrows Marina, Inc.
August 8, 1989
Page 2

Applied Geotechnology Inc.

SITE WORK

During the period of June 7 through 9, 1989, AGI personnel were on-site directing the excavation of hydrocarbon contaminated soil. Soil samples were collected from the tank cavity floor and walls and screened visually and with a photoionization detector (PID) to determine the extent of contamination. Based on preliminary field screening, soil samples were selected and analyzed for TPH (total petroleum hydrocarbons) by EPA Method 8015 and BETX (benzene, ethylbenzene, toluene, xylene) by EPA Method 8020. The excavation continued until clean soil was encountered.

Satisfactory cleanup was achieved on the north, east, and west walls and floor of the tank cavity. Soils with hydrocarbon concentrations above the Washington State Department of Ecology (Ecology) cleanup guidelines remain along the southern wall, as continued excavation would have jeopardized the stability of several above-ground storage tanks. A visqueen barrier was installed along the southern wall separating the tank cavity from the contaminated soils. This contaminated soil along the south wall will require remediation whenever the remaining tanks, both above-ground and underground storage tanks, are removed.

The approximately 450 cubic yards of contaminated soil removed during excavation, was remediated on site using solid phase treatment techniques. The contaminated soil was placed on visqueen and spread out in a layer approximately 10 inches in thickness. The soil was tilled several times a week, to enhance aeration.

Four composite soil samples were collected from the solid phase treatment area and submitted for TPH and two samples for BETX analyses. Analytical results indicated that the hydrocarbon concentration in the soil was below cleanup guidelines. On June 30, 1989, the treated soil was backfilled into the cavity, and compacted.

LABORATORY ANALYTICAL RESULTS

The analytical results for the soil samples from the tank cavity and the solid phase treatment area are presented in Table 1. The results indicate that soils with hydrocarbon concentrations above Ecology's cleanup guidelines have been removed from the tank cavity with the exception of the mid south wall, where soil with higher levels of hydrocarbons remains. In addition, results of soil samples collected from the treatment area indicate that the soil has been cleaned to below Ecology's cleanup guidelines.

Mr. Stewart Meir
Narrows Marina, Inc.
August 8, 1989
Page 3

Applied Geotechnology Inc.

SUMMARY

The majority of hydrocarbon contaminated soil associated with the former USTs has been excavated and remediated. The clean soil was placed and compacted back in the tank cavity. Soil with hydrocarbon levels above Ecology cleanup guidelines remains to the south of the former UST cavity and is separated from the backfill by a visqueen barrier. This soil will require remediation whenever the adjacent storage tanks are removed.

Yours very truly,

APPLIED GEOTECHNOLOGY INC.

[Signature] for
Peter P. Barry
Hydrogeologist

[Signature]
John E. Newby, P.E.
President

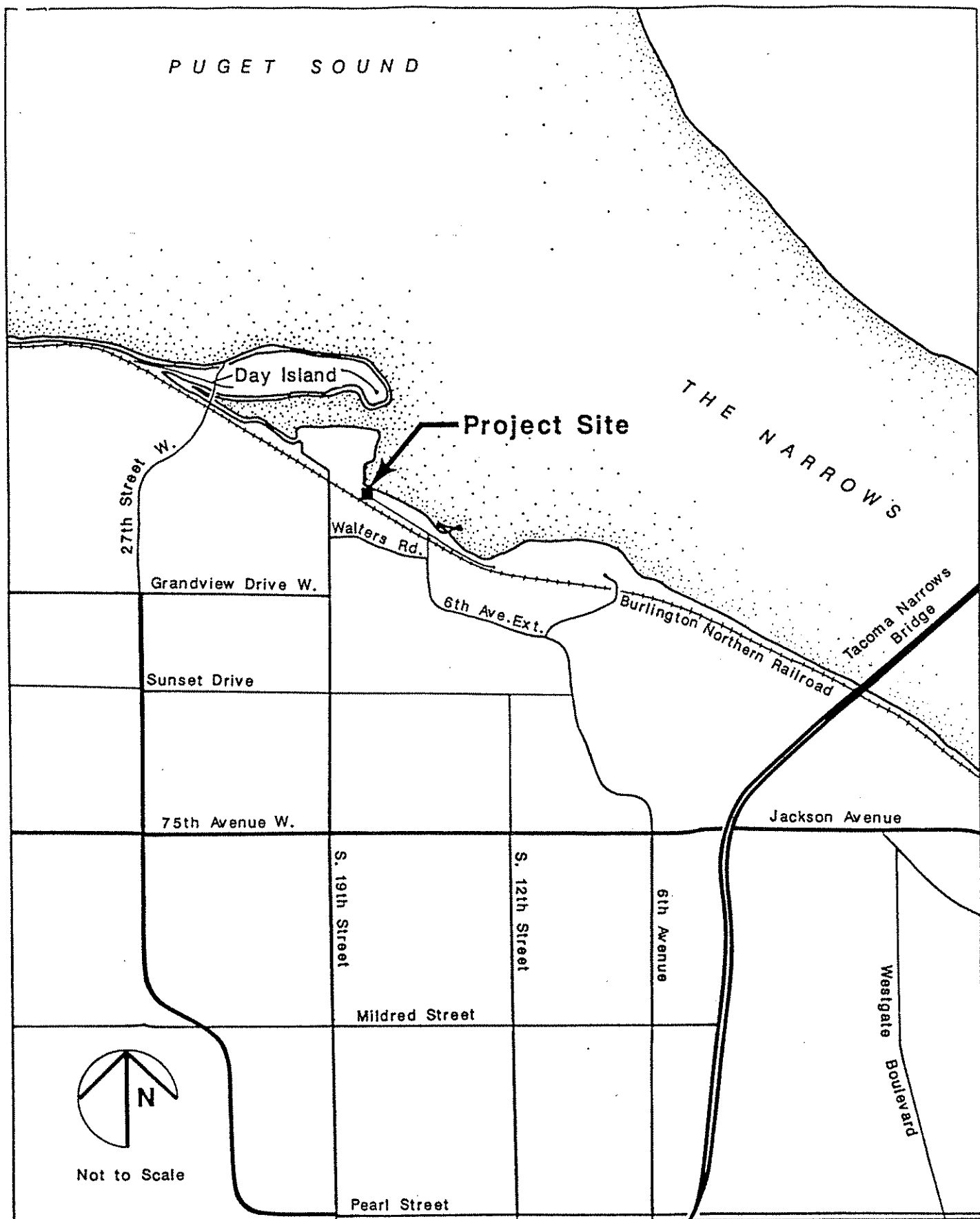


Very truly,

LIMITATIONS

This report has been prepared for the exclusive use of Narrows Marina, and their other consultants for this project only. The analyses, conclusions, and recommendations in this report are based on conditions encountered at the time of our field investigation, design information you provided, and our experience and engineering judgement. AGI cannot be responsible for the interpretation of the data contained herein by others.

Our work has been performed in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the area. No other warranty, express or implied, is made.



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Vicinity Map

Narrows Marina
Tacoma, Washington

FIGURE

1

JOB NUMBER
15,398.001

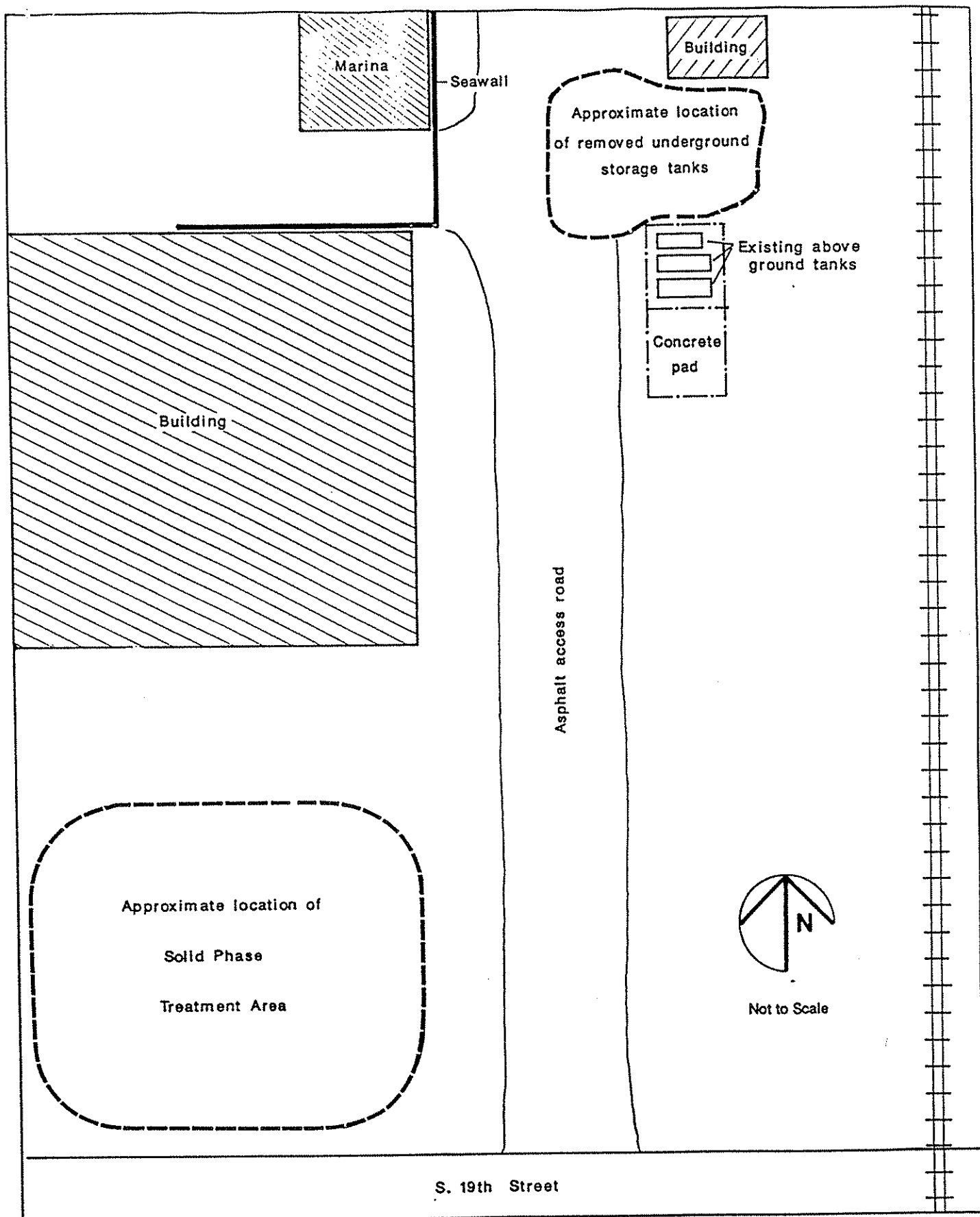
DRAWN
KLC

APPROVED
REM

DATE
7 August 89

REVISED

DATE



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Site Sketch

Narrows Marina
Tacoma, Washington

PLATE

2

JOB NUMBER
15,398.001

DRAWN
KLC

APPROVED
AEM

DATE
8 August 89

REVISED

DATE

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
NARROWS MARINA

SAMPLE SOURCE	DEPTH (FEET)	DATE	T P H 8015	BENZENE	ETHYL- BENZENE	TOLUENE	META & PARA XYLENES	ORTHO XYLENE
<u>TANK CAVITY</u>								
EAST WALL	8	6/7/89	37	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
NORTH WALL, FLOOR	11.5	6/7/89	< 5	0.04	< 0.025	< 0.025	< 0.025	< 0.025
SOUTH- SOUTHWEST WALL, FLOOR	11	6/7/89	208	1.04	5.7	3.9	28	6.4
WEST WALL, FLOOR	14	6/7/89	< 5	0.047	< 0.025	< 0.025	0.11	< 0.025
NORTH WALL	8.5	6/8/89	< 5	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
NORTH SIDE, FLOOR	13.5	6/8/89	< 5	0.038	0.095	0.034	0.21	0.043
WEST WALL	9	6/9/89	< 5	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
WEST SIDE FLOOR	12	6/9/89	7	0.18	0.073	0.033	0.19	< 0.025
SOUTH WALL, WEST END	9	6/9/89	21	< 0.025	< 0.025	< 0.025	0.11	< 0.025
MID SOUTH WALL	9	6/9/89	1,400	0.36	2.4	0.41	7.4	0.49
<u>TREATMENT AREA</u>								
QUAD 1	0.0-0.8	6/23/89	95	NA	NA	NA	NA	NA
QUAD 2	0.0-0.8	6/23/89	180	NA	NA	NA	NA	NA
QUAD 3	0.0-0.8	6/23/89	60	NA	NA	NA	NA	NA
QUAD 4	0.0-0.8	6/23/89	88	NA	NA	NA	NA	NA
EAST	0.0-0.8	7/5/89	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
WEST	0.0-0.8	7/5/89	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
ECOLOGY CLEAN-UP GUIDELINES			200	0.66	N/E	N/E	N/E	N/E

NOTES:

1. Units are mg/kg [parts per million (ppm)]
2. < indicates below detection limit.
3. N/E indicates not established.
4. N/A indicates not analyzed.

CHEMICAL ANALYSES



Analytical**Technologies**, Inc.

560 Naches Avenue, S.W., Suite 101, Renton, WA 98055. (206) 228-8335

RECEIVED

JUN 26 1989

APPLIED GEOTECHNOLOGY INC

ATI I.D. # 8906-026

June 22, 1989

Applied Geotechnology, Inc.
P.O. Box 3885
Bellevue, WA 98009

Attention : Allen Moore

Project Number : -

Project Name : Narrows Marina/Tacoma Yacht

On June 7, 1989 Analytical Technologies, Inc. received four soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney

Donna M. McKinney
Metals Chemist

FWG/hbb

Frederick W. Grothkopp

Frederick W. Grothkopp
Technical Manager

ATI I.D. # 8906-026

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8906-026-1	EAST WALL 8'	SOIL	06/07/89
8906-026-2	NORTH WALL/FLOOR 11-1/2'	SOIL	06/07/89
8906-026-3	SOUTH/SOUTHWEST WALL/FLOOR 11'	SOIL	06/07/89
8906-026-4	WEST WALL/FLOOR 14'	SOIL	06/07/89

----- TOTALS -----

MATRIX	# SAMPLES
--------	-----------

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ATI I.D. # 8906-026

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
BETX	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

ATI I.D. # 8906-026

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: -	DATE RECEIVED	: N/A
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE

93

ATI I.D. # 8906-026-1

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: EAST WALL 8'	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDSRESULTS

BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE

94

ATI I.D. # 8906-026-2

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: NORTH WALL/FLOOR 11-1/2'	DATE ANALYZED	: 06/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	0.040
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	88
--------------------	----

ATI I.D. # 8906-026-3

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: SOUTH/S.W. WALL/FLR 11'	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 10

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	1.04
ETHYLBENZENE	5.7
TOLUENE	3.9
META & PARA XYLENE	28
ORTHO XYLENE	6.4

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE

*

* Out of limits due to matrix interference.

ATI I.D. # 8906-026-4

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: WEST WALL/FLOOR 14'	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	0.047
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	0.11
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	86
--------------------	----

ATI I.D. # 8906-026

PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. SAMPLE I.D. : SAND 6/7
 PROJECT # : - DATE ANALYZED : 06/12/89
 PROJECT NAME : NARROWS MARINA/TACOMA YACHT UNITS : mg/Kg
 EPA METHOD : 8020 (BETX) MATRIX : SOIL

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.400	0.383	96	N/A	N/A	N/A
CHLOROBENZENE	<0.025	0.400	0.437	109	N/A	N/A	N/A
TOLUENE	<0.025	0.400	0.441	110	N/A	N/A	N/A
META & PARA XYLENE	<0.025	1.10	1.19	108	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



ATI I.D. # 8906-026

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: -	DATE RECEIVED	: N/A
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-026-1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: EAST WALL 8'	DATE ANALYZED	: 06/09/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

37
C18 - C24
DIESEL

ATI I.D. # 8906-026-2

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: NORTH WALL/FLOOR 11-1/2'	DATE ANALYZED	: 06/09/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-026-3

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: SOUTH/S.W. WALL/FLR 11'	DATE ANALYZED	: 06/09/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

180
C6 - C14
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

26
C18 - C24
DIESEL

BEST ESTIMATE OF FUEL TYPE - 7 PARTS GASOLINE : 1 PART DIESEL

ATI I.D. # 8906-026-4

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/07/89
PROJECT #	: -	DATE RECEIVED	: 06/07/89
PROJECT NAME	: NARROWS MARINA/TAC. YACHT	DATE EXTRACTED	: 06/08/89
CLIENT I.D.	: WEST WALL/FLOOR 14'	DATE ANALYZED	: 06/09/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-026

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. DATE EXTRACTED : 06/08/89
PROJECT NAME : NARROWS MARINA/TACOMA YACHT DATE ANALYZED : 06/09/89
EPA METHOD : 8015 MODIFIED SAMPLE MATRIX : SOIL
SAMPLE ID : 8906-026-1 UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	491	98	496	99	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

ATI I.D. # 8906-026

GENERAL CHEMISTRY RESULTS

CLIENT : APPLIED GEOTECHNOLOGY, INC. SAMPLE MATRIX : SOIL
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

PARAMETER	UNITS	-1	-2	-3	-4
MOISTURE	%	12	13	26	11

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : APPLIED GEOTECHNOLOGY, INC. SAMPLE MATRIX : SOIL
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
MOISTURE	%	8906-026-1	12	12	0	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Chain of Custody

PAGE 1 OF 1

[illegible]

DISTRIBUTION: WHITE. CANARY - ANALYTICAL LABORATORY • PINK - ORIGINATOR



Analytical Technologies, Inc.

560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

RECEIVED

JUN 23 1989

APPLIED GEOTECHNOLOGY INC

ATI I.D. # 8906-032

June 20, 1989

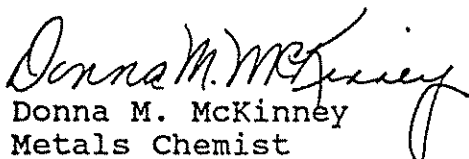
Applied Geotechnology, Inc.
P.O. Box 3885
Bellevue, WA 98009

Attention : Allen Moore

Project Number : -

Project Name : NARROWS MARINA/TACOMA YACHT

On June 8, 1989 Analytical Technologies, Inc. received two soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.


Donna M. McKinney
Metals Chemist

FWG/nah


Frederick W. Grothkopp
Technical Manager

ATI I.D. # 8906-032

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8906-032-1	NORTH WALL 8-1/2'	SOIL	06/08/89
8906-032-2	NORTH SIDE FLOOR	SOIL	06/08/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ATI I.D. # 8906-032

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
BETX	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

ATI I.D. # 8906-032

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: -	DATE RECEIVED	: N/A
PROJECT NAME	: NARROWS MARINA/TACOMA YACHT	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	100
--------------------	-----

ATI I.D. # 8906-032-1

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 06/08/89
PROJECT #	: -	DATE RECEIVED	: 06/08/89
PROJECT NAME	: NARROWS MARINA/TACOMA YACHT	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: NORTH WALL 8-1/2'	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	71
--------------------	----

ATI I.D. # 8906-032-2

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 06/08/89
PROJECT #	: -	DATE RECEIVED	: 06/08/89
PROJECT NAME	: NARROWS MARINA/TACOMA YACHT	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: NORTH SIDE FLOOR	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
-----------	---------

BENZENE	0.038
ETHYLBENZENE	0.095
TOLUENE	0.034
META & PARA XYLENE	0.21
ORTHO XYLENE	0.043

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	86
--------------------	----

Halocarbons also found

ATI I.D. # 8906-032

PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY INC. SAMPLE I.D. : 8906-032-2
PROJECT # : - DATE ANALYZED : 06/12/89
PROJECT NAME : NARROWS MARINA/TACOMA YACHT UNITS : mg/Kg
EPA METHOD : 8020 (BETX) MATRIX : SOIL

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	0.031	0.400	0.389	90	0.407	94	5
CHLOROBENZENE	<0.025	0.400	0.406	102	0.407	102	0
TOLUENE	0.028	0.400	0.402	94	0.407	95	1
META & PARA XYLENE	0.17	1.10	1.22	96	1.22	96	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: -	DATE RECEIVED	: N/A
PROJECT NAME	: NARROWS MARINA/TACOMA YACHT	DATE EXTRACTED	: 06/14/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/14/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

RESULTS

COMPOUNDS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5

-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5

-
DIESEL

ATI I.D. # 8906-032-1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 06/08/89
PROJECT #	: -	DATE RECEIVED	: 06/08/89
PROJECT NAME	: NARROWS MARINA/TACOMA YACHT	DATE EXTRACTED	: 06/14/89
CLIENT I.D.	: NORTH WALL 8-1/2'	DATE ANALYZED	: 06/15/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS
-----FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING<5
-
GASOLINEFUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING<5
-
DIESEL

ATI I.D. # 8906-032-2

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 06/08/89
PROJECT #	: -	DATE RECEIVED	: 06/08/89
PROJECT NAME	: NARROWS MARINA/TACOMA YACHT	DATE EXTRACTED	: 06/14/89
CLIENT I.D.	: NORTH SIDE FLOOR	DATE ANALYZED	: 06/14/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-032

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY INC. DATE EXTRACTED : 06/13/89
PROJECT NAME : NARROWS MARINA/TACOMA YACHT DATE ANALYZED : 06/16/89
EPA METHOD : 8015 MODIFIED SAMPLE MATRIX : SOIL
SAMPLE ID : 8906-040-5 UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	441	88	454	91	3

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

ATI I.D. # 8906-032

GENERAL CHEMISTRY RESULTS

CLIENT : APPLIED GEOTECHNOLOGY INC. SAMPLE MATRIX : SOIL
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

PARAMETER	UNITS	-1	-2
MOISTURE	%	18	19

ATI I.D. # 8906-032

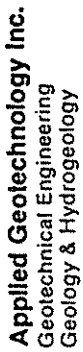
GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : APPLIED GEOTECHNOLOGY INC. SAMPLE MATRIX : SOIL
PROJECT # : -
PROJECT NAME : NARROWS MARINA/TACOMA YACHT

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
MOISTURE	%	8906-038-1	14	15	7	N/A	N/A	N/A
MOISTURE	%	8906-036-10	17	16	6	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Chain of Custody

PAGE 1 OF 1

[illegible]

DISTRIBUTION: WHITE, CANARY • ANALYTICAL LABORATORY • PINK • ORIGINATOR



Analytical Technologies, Inc.

560 Naches Avenue, S.W., Suite 101, Renton, WA 98055. (206) 228-8335

RECEIVED
JUL 10 1989
APPLIED GEOTECHNOLOGY INC

ATI I.D. # 8906-103

July 7, 1989

Applied Geotechnology, Inc.
300 120th Avenue N.E.
Building 4, Suite 215
Bellevue, WA 98009

Attention : Peter Barry

Project Number : 15398.001

Project Name : -

On June 23, 1989 Analytical Technologies, Inc. received four soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
Mary C. Silva
GC Chemist

FWG/hbb

Frederick W. Grothkopp
Frederick W. Grothkopp
Technical Manager

ATI I.D. # 8906-103

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 15398.001
PROJECT NAME : -

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8906-103-1	TREATMENT AREA, QUAD #1	SOIL	06/23/89
8906-103-2	TREATMENT AREA, QUAD #2	SOIL	06/23/89
8906-103-3	TREATMENT AREA, QUAD #3	SOIL	06/23/89
8906-103-4	TREATMENT AREA, QUAD #4	SOIL	06/23/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	4

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ATI I.D. # 8906-103

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 15398.001
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED

ATI I.D. # 8906-103

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15398.001	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 06/26/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/29/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-103

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15398.001	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 06/27/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/29/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-103-1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15398.001	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 06/27/89
CLIENT I.D.	: TREATMENT AREA, QUAD #1	DATE ANALYZED	: 06/29/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

95
C10 - C28
DIESEL

ATI I.D. # 8906-103-2

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15398.001	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 06/26/89
CLIENT I.D.	: TREATMENT AREA, QUAD #2	DATE ANALYZED	: 06/26/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS
-----FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING<5
-
GASOLINEFUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING180
C10 - C28
DIESEL

ATI I.D. # 8906-103-3

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15398.001	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 06/26/89
CLIENT I.D.	: TREATMENT AREA, QUAD #3	DATE ANALYZED	: 06/26/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS
-----FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING<5
-
GASOLINEFUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING60
C10 - C28
DIESEL

ATI I.D. # 8906-103-4

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15398.001	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 06/27/89
CLIENT I.D.	: TREATMENT AREA, QUAD #4	DATE ANALYZED	: 06/29/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS
-----FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING<5
-
GASOLINEFUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING88
C10 - C28
DIESEL

ATI I.D. # 8906-103

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. DATE EXTRACTED : 06/22/89
PROJECT NAME : - DATE ANALYZED : 06/25/89
EPA METHOD : 8015 MODIFIED SAMPLE MATRIX : SOIL
SAMPLE ID : 8906-085-5 UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	11	500	414	81	419	82	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

ATI I.D. # 8906-103

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. DATE EXTRACTED : 06/27/89
PROJECT NAME : - DATE ANALYZED : 06/29/89
EPA METHOD : 8015 MODIFIED SAMPLE MATRIX : SOIL
SAMPLE ID : 8906-103-4 UNITS : mg/Kg

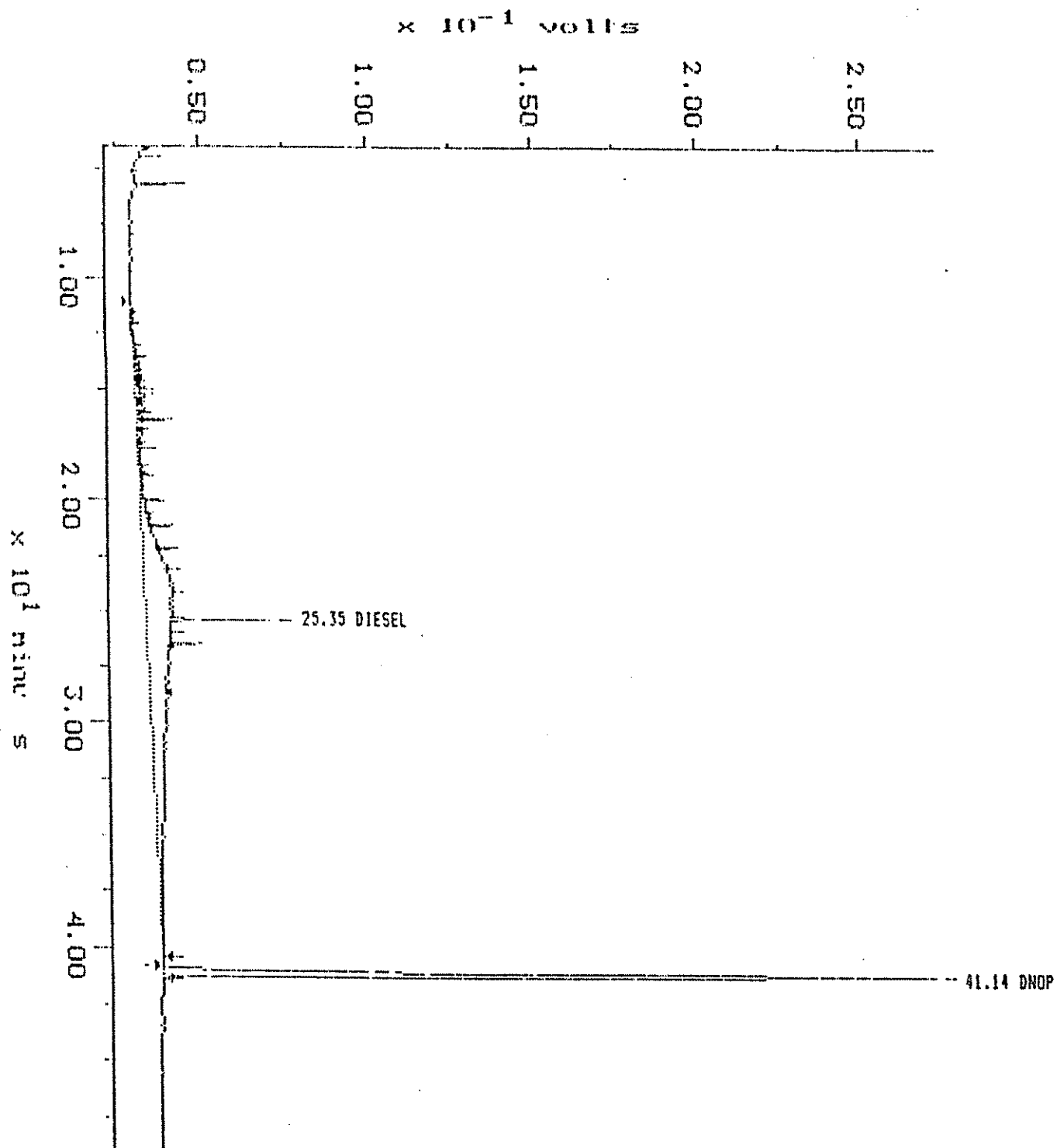
COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	88	500	436	70	431	69	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

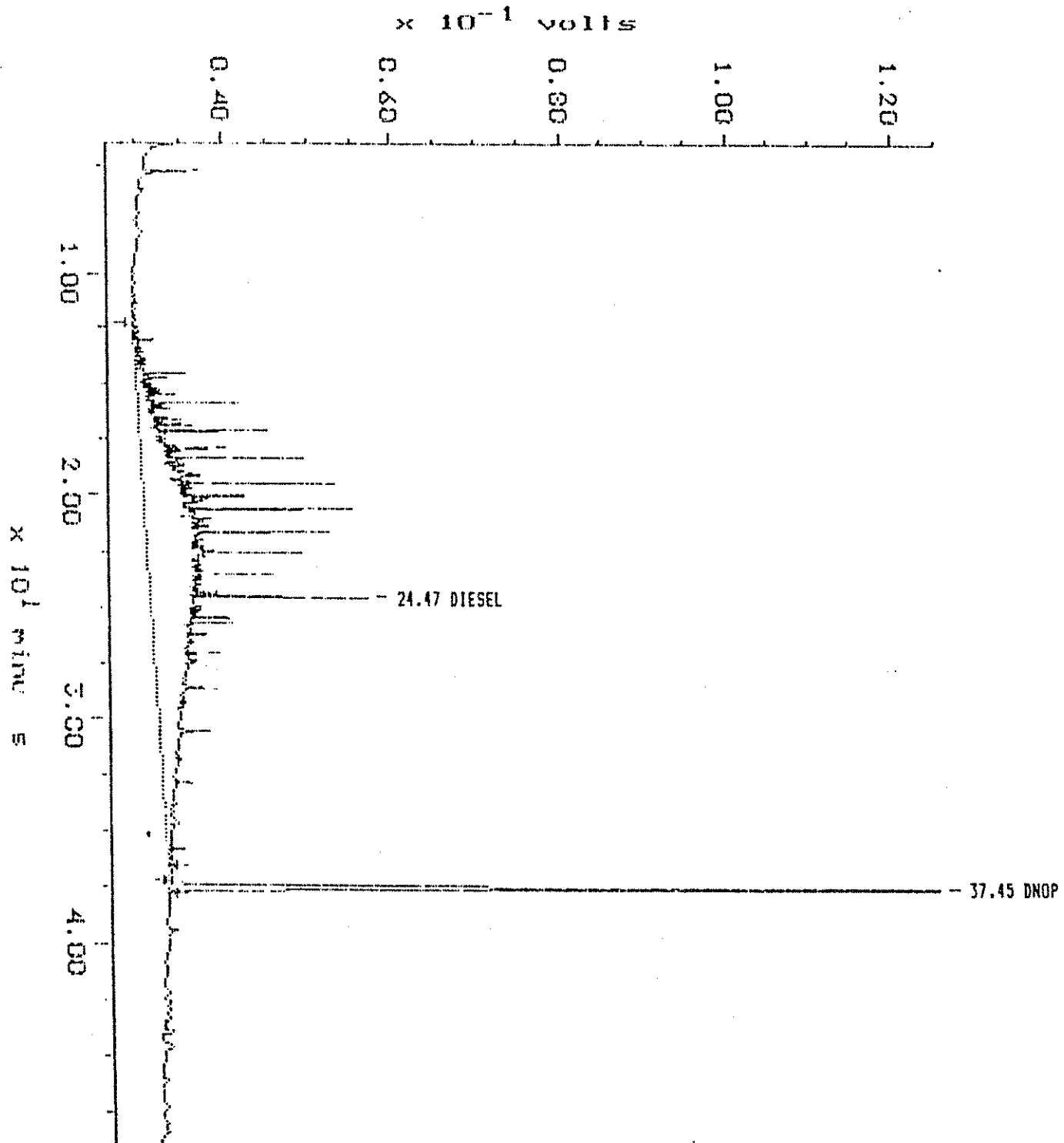
Sample: S8906-103-1 Channel: EID FRONT-A
Acquired: 29-JUN-89 0:54 Method: C:\MAX\DATA1\FAQBTX
Comments: DIESEL AND BTX PROGRAM FOR DIESEL/BTX STDs, MS, MSD, FPB, FPBN

Filename: 7EE00108
Operator: CDH



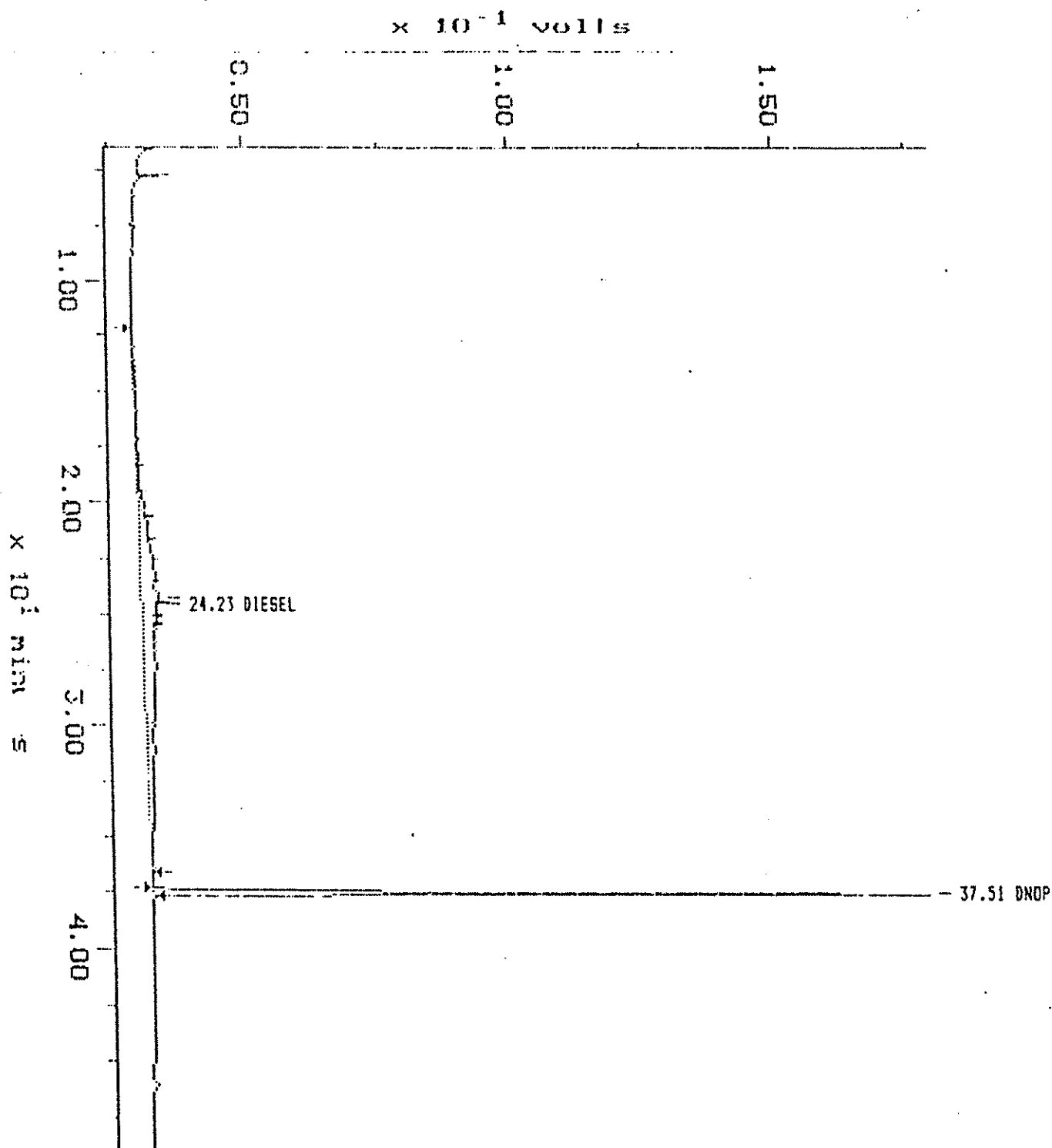
Sample: 58906-103-2 Channel: FID FRONT-A
Acquired: 26-JUN-89 14:17 Method: C:\MAX\DATA\AQ8TX10
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDs, MS, MSD, FFB, FPRN

Filename: 9FP01532
Operator: COM



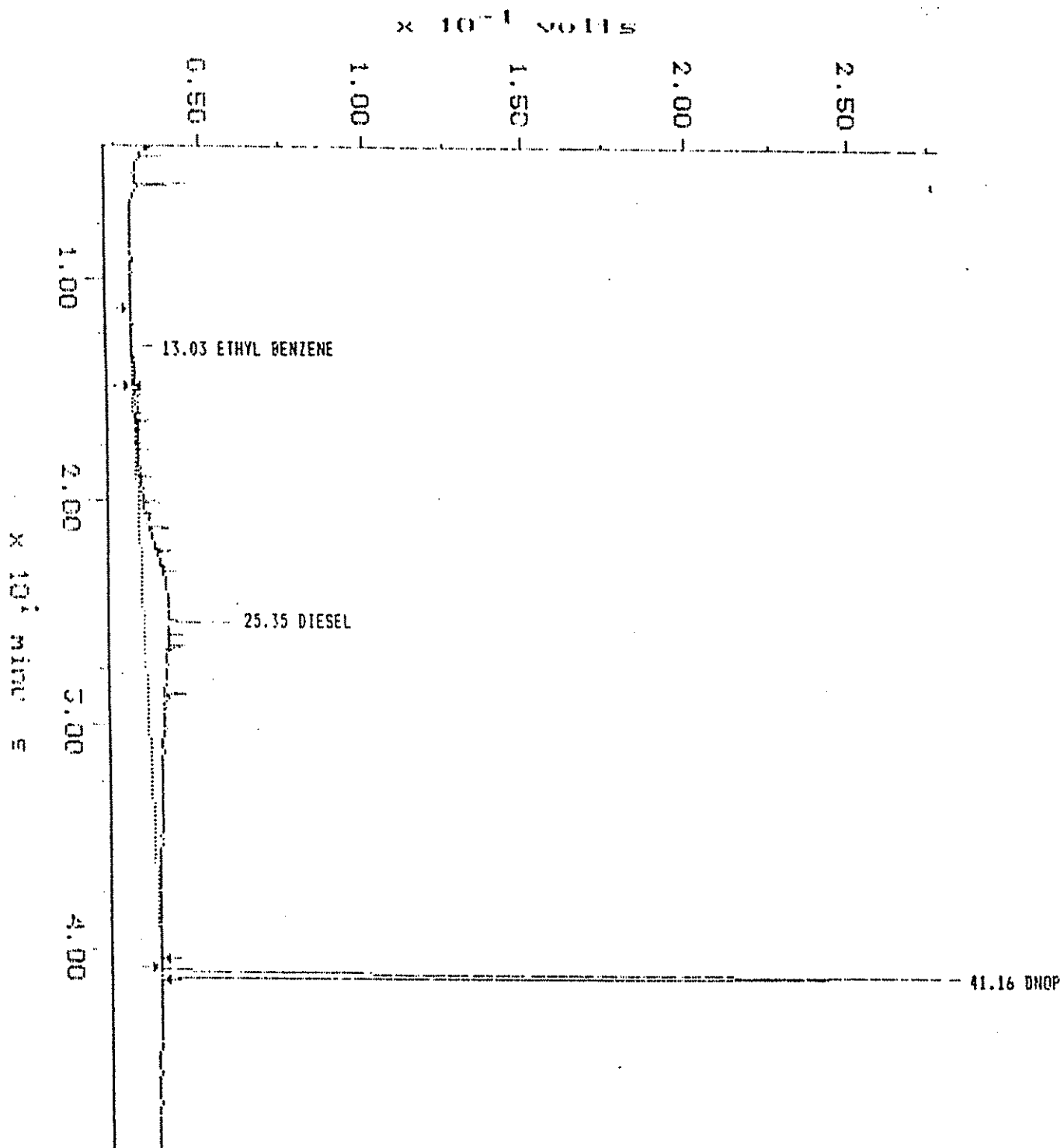
Sample: 58905-103-3 Channel: FID FRONT-A
Acquired: 25-JUN-89 15:18 Method: C:\MAX\DATA1\AQBTX10
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDs, MS, MSD, FFB, FFBM

Filename: 9FP01533
Operator: CDM



Sample: S8906-103-4 Channel: FID FRONT-A
Acquired: 29-JUN-89 1:55 Method: C:\MAIN\DATA\FA08TX
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDS, MS, MSD, FFB, FPN

Filename: 9FF00109
Operator: CDM





Analytical Technologies, Inc.
San Diego • Phoenix • Seattle

Chain of Custody

DATE 6/23/89 PAGE 1 OF 1

PROJ. MGR. <u>Robert Barry</u>				ANALYSIS REQUEST																									
COMPANY <u>Applied Technology</u>																													
ADDRESS <u>300 1500 "A" Ave NE</u>																													
<u>Seattle, WA 98102</u>																													
SAMPLERS (SIGNATURE) <u>B. Barry</u>				(PHONE NO.)																									
SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.	BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418	PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLIC/STLC	EP TOX METALS (8)	SWDA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE	NUMBER OF CONTAINERS									
1	6/23/89	1440	Soil	-1																1									
2	6/23/89	1445	Soil	-2																1									
3	6/23/89	1450	Soil	-3																1									
4	6/23/89	1455	Soil	-4																1									
PROJECT INFORMATION					SAMPLE RECEIPT					INVOICE TO:										RELINQUISHED BY					RELINQUISHED BY				
PROJECT: <u>15398.001</u>					TOTAL NO. OF CONTAINERS <u>4</u>															(Signature) <u>Robert Barry</u>					(Signature) <u>Robert Barry</u>				
PO NO.					CHAIN OF CUSTODY SEALS <u>1</u>															(Time) <u>16:50</u>					(Time) <u>16:50</u>				
SHIPPING ID. NO.					REC'D GOOD CONDITION/COLD <u>Y</u>															(Date) <u>6/23/89</u>					(Date) <u>6/23/89</u>				
VIA <u>Hand Carried</u>					LAB NO. <u>14915-103</u>															(Company) <u>Applied Technology</u>					(Company) <u>Applied Technology</u>				
SPECIAL INSTRUCTIONS/COMMENTS: <u>Anal #2 & #3: 24-hour RUSH</u> <u>Hold #1 & #4 until results of</u> <u>42-43 have been confirmed.</u> <u>11:00 AM EDT. 6/23/89</u>																													



Analytical Technologies, Inc.

560 Naches Avenue, S.W., Suite 101, Renton, WA 98055. (206) 228-8335

RECEIVED

JUN 26 1989

APPLIED GEOTECHNOLOGY INC

ATI I.D. # 8906-034

June 22, 1989

Applied Geotechnology, Inc.
300 120th Avenue N.E.
Building 4, Suite 215
Bellevue, WA 98009

Attention : Gary Laakso

Project Number : -

Project Name : Narrows Marina

On June 9, 1989 Analytical Technologies, Inc. received four soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney

Donna M. McKinney
Metals Chemist

FWG/tpj

Frederick W. Grothkopp

Frederick W. Grothkopp
Technical Manager



ATI I.D. # 8906-034

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8906-034-1	9' WEST WALL	SOIL	06/09/89
8906-034-2	12' WESTSIDE FLOOR	SOIL	06/09/89
8906-034-3	9' SOUTH WALL/WEST END	SOIL	06/09/89
8906-034-4	9' MID SOUTH WALL	SOIL	06/09/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	4

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ATI I.D. # 8906-034

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
BETX	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

ATI I.D. # 8906-034

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: -	DATE RECEIVED	: N/A
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	100
--------------------	-----

ATI I.D. # 8906-034-1

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: 9' WEST WALL	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	69
--------------------	----

ATI I.D. # 8906-034-2

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: 12' WEST SIDE FLOOR	DATE ANALYZED	: 06/12/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	0.16
ETHYLBENZENE	0.073
TOLUENE	0.033
META & PARA XYLENE	0.19
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	74
--------------------	----

NOTE: Halocarbons also found.

ATI I.D. # 8906-034-3

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: 9' SOUTH WALL/WEST END	DATE ANALYZED	: 06/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	80
--------------------	----

NOTE: Halocarbons also found.

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/12/89
CLIENT I.D.	: 9' MID SOUTH WALL	DATE ANALYZED	: 06/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 10

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	0.36
ETHYLBENZENE	2.4
TOLUENE	0.41
META & PARA XYLENE	7.4
ORTHO XYLENE	0.49

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE

*

* Out of limits due to matrix interference.

ATI I.D. # 8906-034

PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. SAMPLE I.D. : 8906-032-2
 PROJECT # : - DATE ANALYZED : 06/12/89
 PROJECT NAME : NARROWS MARINA UNITS : mg/Kg
 EPA METHOD : 8020 (BETX) MATRIX : SOIL

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	0.031	0.400	0.389	90	0.407	94	5
CHLOROBENZENE	<0.025	0.400	0.406	102	0.407	102	0
TOLUENE	0.028	0.400	0.402	94	0.407	95	1
META & PARA XYLENE	0.17	1.10	1.22	96	1.22	96	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

ATI I.D. # 8906-034

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: -	DATE RECEIVED	: N/A
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/13/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-034-1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/13/89
CLIENT I.D.	: 9' WEST WALL	DATE ANALYZED	: 06/15/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

ATI I.D. # 8906-034-2

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/13/89
CLIENT I.D.	: 12' WEST SIDE FLOOR	DATE ANALYZED	: 06/15/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

7
C6 - C14
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-034-3

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/13/89
CLIENT I.D.	: 9' SOUTH WALL/WEST END	DATE ANALYZED	: 06/15/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

21
C10 - C14
GASOLINE

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

<5
-
DIESEL

ATI I.D. # 8906-034-4

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 06/09/89
PROJECT #	: -	DATE RECEIVED	: 06/09/89
PROJECT NAME	: NARROWS MARINA	DATE EXTRACTED	: 06/13/89
CLIENT I.D.	: 9' MID SOUTH WALL	DATE ANALYZED	: 06/15/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 10

COMPOUNDSRESULTS
-----FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING1,400
C6 - C16
GASOLINEFUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING<50
-
DIESEL

ATI I.D. # 8906-034

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. DATE EXTRACTED : 06/12/89
PROJECT NAME : NARROWS MARINA DATE ANALYZED : 06/12/89
EPA METHOD : 8015 MODIFIED SAMPLE MATRIX : SOIL
SAMPLE ID : 8906-038-1 UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	423	85	431	86	2

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

ATI I.D. # 8906-034

GENERAL CHEMISTRY RESULTS

CLIENT : APPLIED GEOTECHNOLOGY, INC. SAMPLE MATRIX : SOIL
PROJECT # : -
PROJECT NAME : NARROWS MARINA

PARAMETER	UNITS	-1	-2	-3	-4
MOISTURE	%	20	20	12	11

ATI I.D. # 8906-034

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : -
PROJECT NAME : NARROWS MARINA

SAMPLE MATRIX : SOIL

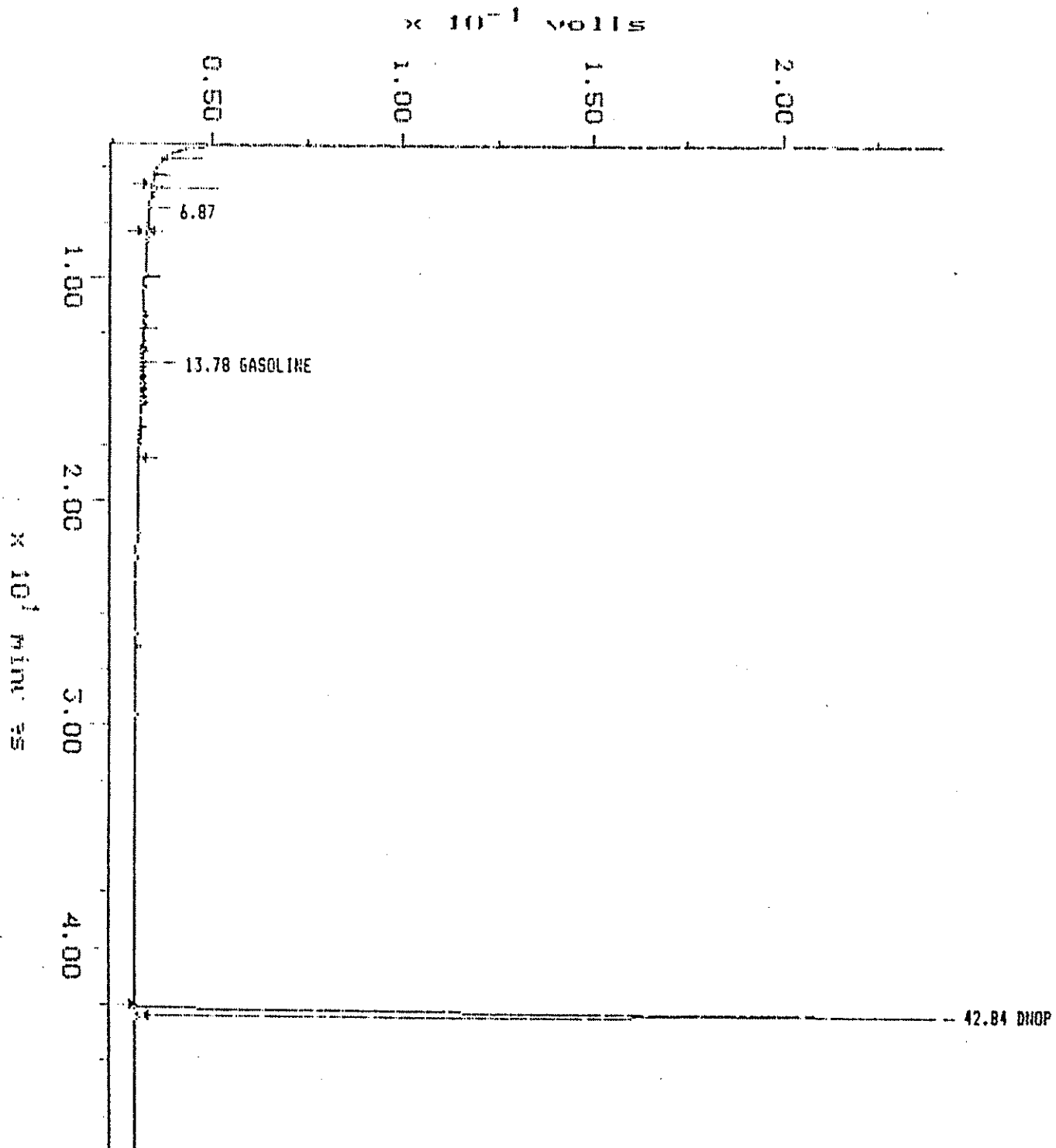
PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
MOISTURE	%	8906-038-1	14	15	7	N/A	N/A	N/A
MOISTURE	%	8906-036-10	17	16	6	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

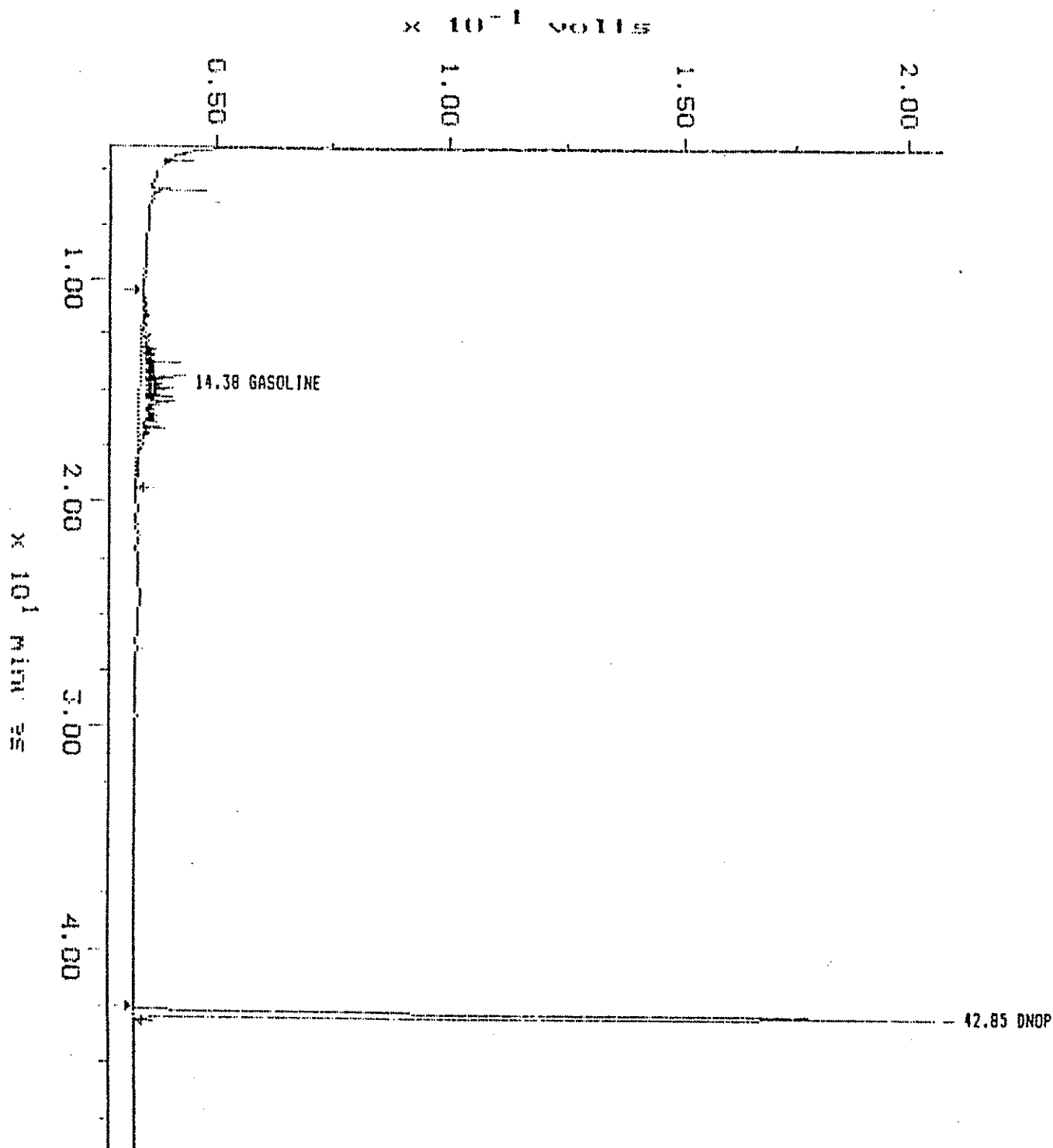
Sample: S8906-034-2 Channel: FID REAR-B
Acquired: 15-JUN-89 21:09 Method: C:\MAX\DATA1\A08T18
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDS, MS, MSD, FPB, FFBH

Filename: 9FP01347
Operator: AMC

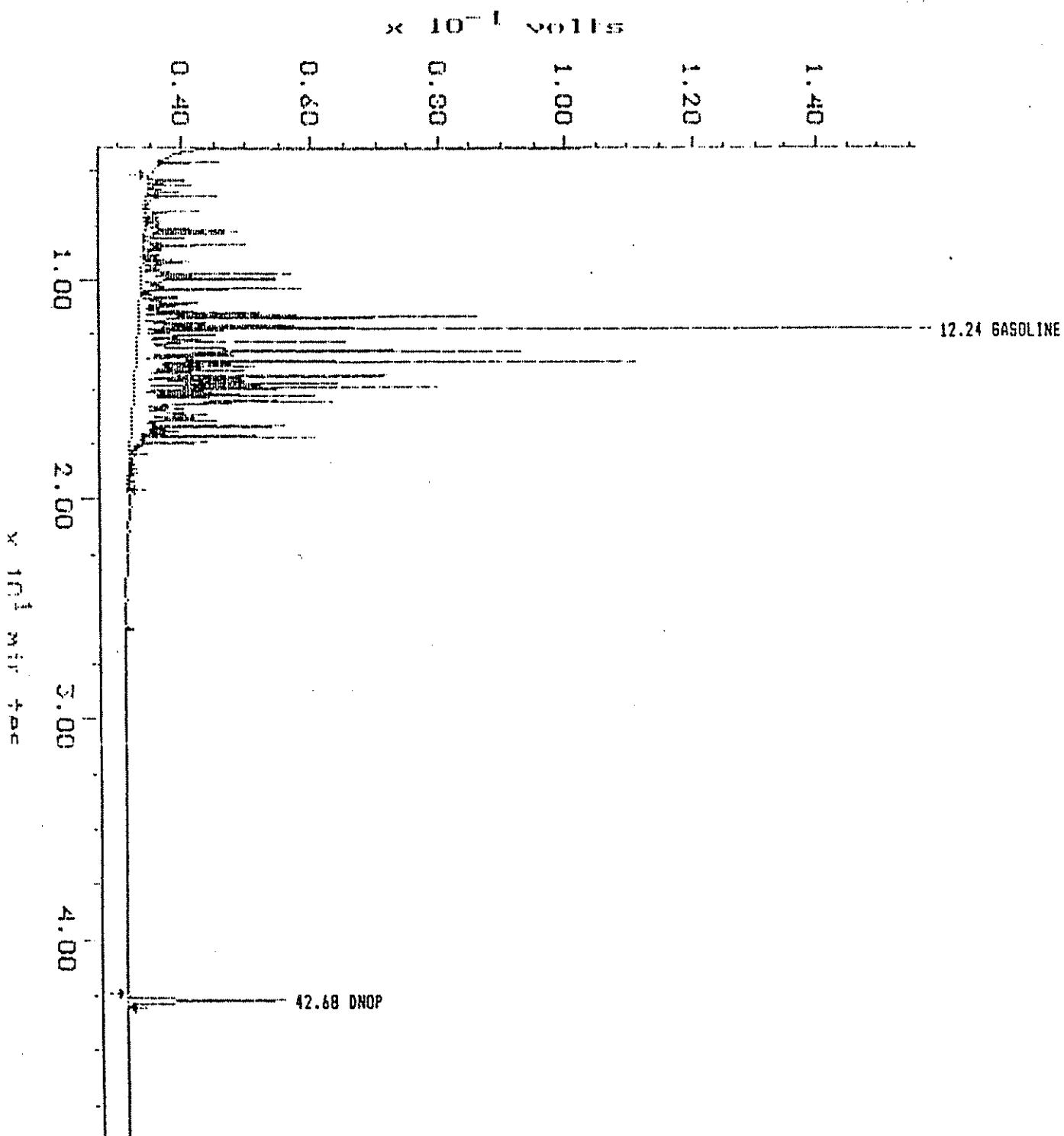


Sample: 58905-034-3 Channel: FID REAR-B
Acquired: 15-JUN-89 7:47 Method: C:\MAX\DATA1\AO8TX8
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDS, MS, MSD, FFB, FFBN

Filename: 9FP01335
Operator: AMC



Sample: S8906-034-480.1 Channel: FID REAK-B File: 9FF01342
Acquired: 15-JUN-89 16:07 Method: C:\MAX\DATA1\AOBTX8 Operator: AMC
Dilution: 1 : 10.000
Comments: DIESEL AND BTX PROGRAM FOR DIESEL/BTX STDs, MS, MSD, FFB, FPN





Chain of Custody

PAGE 1 OF 1

[illegible]



SPECTRA Laboratories, Inc.

5013 Pacific Hwy. E. #A-12 • Tacoma, WA 98424 • (206) 922-5120

July 6, 1989

SME
2302 A street
Tacoma, WA 98402
Customer #81711

RECEIVED

JUL 26 1989

APPLIED GEOTECHNOLOGY INC

Sample Source: Narrows Marine
Desc: Soil

Sample ID: East side of parking lot
Spectra #23806

BTX, ppm

Benzene	<0.01
Toluene	<0.01
Ethyl Benzene	<0.01
Para Xylene	<0.01
Meta Xylene	<0.01
Ortho Xylene	<0.01

Sample ID: West side of parking lot
Spectra #23807

BTX, ppm

Benzene	<0.01
Toluene	<0.01
Ethyl Benzene	<0.01
Para Xylene	<0.01
Meta Xylene	<0.01
Ortho Xylene	<0.01

BTX testing performed by EPA Method 8020

SPECTRA LABORATORIES, INC.


Steven G. Hibbs, Chemist

DISTRIBUTION

2 Copies

Narrows Marina, Inc.
9007 S. 19th Street
Tacoma, Washington 98465

Attention: Mr. Stewart Meir

1 Copy

Tacoma-Pierce County Health Department
3629 South D Street
Tacoma, Washington 98408

Attention: Mr. Gary Porter

PPB/AEM/cgl