

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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December 20, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the amended results from the testing of material submitted on December 5, 2019 from the Kosmos 19499-00, F&BI 912095 project. Per request, the results were submitted as a single data package.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1219R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 5, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos 19499-00, F&BI 912095 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912095 -01	TP-5-2.5
912095 -02	TP-5-5
912095 -03	TP-5-8
912095 -04	TP-5-10
912095 -05	TP-5-12
912095 -06	TP-5-15
912095 -07	TP-5-19
912095 -08	TP-3-8
912095 -09	TP-3-12
912095 -10	TP-3-15
912095 -11	TP-3-20
912095 -12	D-2
912095 -13	U-1
912095 -14	D-1
912095 -15	SP1-1
912095 -16	SP1-3
912095 -17	SP1-4
912095 -18	SP1-2
912095 -19	SP2-1
912095 -20	SP1-5
912095 -21	SP2-2
912095 -22	SP2-5
912095 -23	SP2-4
912095 -24	SP2-3

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ENVIRONMENTAL CHEMISTS

CASE NARRATIVE (Continued)

The water samples were sent to Fremont Analytical for hexavalent chromium and trace level mercury analyses. The report will be forwarded to your office upon receipt.

A 6020B internal standard failed the acceptance criteria for several samples. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported. In addition, arsenic and selenium in the 6020B matrix spike duplicate failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

An 8270D internal standard failed the acceptance criteria for several samples. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

All other quality control requirements were acceptable.

The samples were sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D-2 912095-12	<0.0007
U-1 912095-13	<0.0007
D-1 912095-14	<0.0007
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: 12/06/19
Date Analyzed: 12/06/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
D-2 912095-12	<100	83
U-1 912095-13	<100	85
D-1 912095-14	<100	87
Method Blank 09-2912 MB	<100	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
 Date Received: 12/05/19
 Project: Kosmos 19499-00, F&BI 912095
 Date Extracted: 12/06/19
 Date Analyzed: 12/06/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**
 Results Reported on a Dry Weight Basis
 Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
SP1-1 912095-15	<0.02	<0.02	<0.02	<0.06	<5	88
SP1-3 912095-16	<0.02	<0.02	<0.02	<0.06	<5	88
SP1-4 912095-17	<0.02	<0.02	<0.02	<0.06	<5	88
SP1-2 912095-18 1/5	<0.02 j	<0.1	<0.1	<0.3	<25	89
SP2-1 912095-19	<0.02	<0.02	<0.02	<0.06	<5	85
SP1-5 912095-20	<0.02	<0.02	<0.02	<0.06	<5	89
SP2-2 912095-21	<0.02	<0.02	<0.02	<0.06	<5	89
SP2-5 912095-22	<0.02	<0.02	<0.02	<0.06	<5	89
SP2-4 912095-23	<0.02	<0.02	<0.02	<0.06	<5	88
SP2-3 912095-24	<0.02	<0.02	<0.02	<0.06	<5	84
Method Blank 09-2913 MB	<0.02	<0.02	<0.02	<0.06	<5	87

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: 12/06/19
Date Analyzed: 12/06/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-D_x
Extended to Include Motor Oil Range Compounds**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
D-2 912095-12	<250	90
U-1 912095-13	<250	101
D-1 912095-14	<250	105
Method Blank 09-2977 MB2	<250	94

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ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
 Date Received: 12/05/19
 Project: Kosmos 19499-00, F&BI 912095
 Date Extracted: 12/06/19
 Date Analyzed: 12/06/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
 Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 53-144)
SP1-1 912095-15	<50	<250	99
SP1-3 912095-16	<50	<250	100
SP1-4 912095-17	<50	<250	99
SP1-2 912095-18	83 x	600	99
SP2-1 912095-19	<50	<250	101
SP1-5 912095-20	110 x	620	105
SP2-2 912095-21	74 x	480	98
SP2-5 912095-22	<50	<250	107
SP2-4 912095-23	<50	<250	101
SP2-3 912095-24	170 x	<250	101
Method Blank 09-2985 MB	<50	<250	97

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ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: NA
Date Analyzed: 12/06/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D-2 912095-12	7.7
U-1 912095-13	8.0
D-1 912095-14	8.0

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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-15
Date Analyzed:	12/06/19	Data File:	912095-15.114
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.45
Barium	65.8
Cadmium	<1
Chromium	13.3 J
Lead	6.70
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-15 x5
Date Analyzed:	12/09/19	Data File:	912095-15 x5.041
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	18.1
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-3	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-16
Date Analyzed:	12/06/19	Data File:	912095-16.117
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.22
Barium	51.5
Cadmium	<1
Chromium	10.3 J
Lead	2.51
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-3	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-16 x5
Date Analyzed:	12/09/19	Data File:	912095-16 x5.044
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	14.0
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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-17
Date Analyzed:	12/06/19	Data File:	912095-17.118
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.49
Barium	61.3
Cadmium	<1
Chromium	10.5 J
Lead	2.62
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-17 x5
Date Analyzed:	12/09/19	Data File:	912095-17 x5.045
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	14.7
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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-18
Date Analyzed:	12/06/19	Data File:	912095-18.124
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.57
Barium	48.6
Cadmium	<1
Chromium	9.37 J
Lead	13.1
Mercury	<1
Selenium	<1
Silver	<1

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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-18 x5
Date Analyzed:	12/09/19	Data File:	912095-18 x5.048
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	12.4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-19
Date Analyzed:	12/06/19	Data File:	912095-19.125
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.12
Barium	61.7
Cadmium	<1
Chromium	11.4 J
Lead	2.49
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-19 x5
Date Analyzed:	12/09/19	Data File:	912095-19 x5.049
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	15.4
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-20
Date Analyzed:	12/06/19	Data File:	912095-20.126
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.38
Barium	71.9
Cadmium	<1
Chromium	13.5 J
Lead	3.29
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP1-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-20 x5
Date Analyzed:	12/09/19	Data File:	912095-20 x5.050
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	19.1
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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-21
Date Analyzed:	12/06/19	Data File:	912095-21.127
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.44
Barium	60.7
Cadmium	<1
Chromium	10.9 J
Lead	16.9
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-21 x5
Date Analyzed:	12/09/19	Data File:	912095-21 x5.051
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	14.7
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-22
Date Analyzed:	12/06/19	Data File:	912095-22.128
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.91
Barium	60.6
Cadmium	<1
Chromium	13.0 J
Lead	3.52
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-22 x5
Date Analyzed:	12/09/19	Data File:	912095-22 x5.052
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	18.5
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-23
Date Analyzed:	12/06/19	Data File:	912095-23.129
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	67.0
Cadmium	<1
Chromium	11.4 J
Lead	2.56
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-23 x5
Date Analyzed:	12/09/19	Data File:	912095-23 x5.053
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	15.9
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-3	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-24
Date Analyzed:	12/06/19	Data File:	912095-24.130
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.31
Barium	58.7
Cadmium	<1
Chromium	13.3 J
Lead	2.44
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-3	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-24 x5
Date Analyzed:	12/09/19	Data File:	912095-24 x5.054
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	18.6
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	I9-773 mb
Date Analyzed:	12/06/19	Data File:	I9-773 mb.109
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-12 x10
Date Analyzed:	12/06/19	Data File:	912095-12 x10.071
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	12.3
Magnesium	3.07
Hardness (as CaCO3)	43.4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	U-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-13 x10
Date Analyzed:	12/06/19	Data File:	912095-13 x10.074
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	12.8
Magnesium	3.07
Hardness (as CaCO ₃)	44.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-14 x10
Date Analyzed:	12/06/19	Data File:	912095-14 x10.075
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	12.6
Magnesium	3.11
Hardness (as CaCO3)	44.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	I9-772 mb
Date Analyzed:	12/06/19	Data File:	I9-772 mb.069
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO3)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-12
Date Analyzed:	12/06/19	Data File:	912095-12.121
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.571
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	U-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-13
Date Analyzed:	12/06/19	Data File:	912095-13.122
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.527
Zinc	22.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-14
Date Analyzed:	12/06/19	Data File:	912095-14.123
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	I9-771 mb
Date Analyzed:	12/06/19	Data File:	I9-771 mb.105
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-15 1/25
Date Analyzed:	12/07/19	Data File:	120637.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	166 d	31	163
Benzo(a)anthracene-d12	129 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05 J
Benzo(b)fluoranthene	<0.05 J
Benzo(k)fluoranthene	<0.05 J
Indeno(1,2,3-cd)pyrene	<0.05 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	<0.05 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-15 1/250
Date Analyzed:	12/09/19	Data File:	120910.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	234 d	31	163
Benzo(a)anthracene-d12	139 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-3	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-16 1/5
Date Analyzed:	12/06/19	Data File:	120624.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	105	31	163
Benzo(a)anthracene-d12	120	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-17 1/5
Date Analyzed:	12/06/19	Data File:	120622.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	163
Benzo(a)anthracene-d12	111	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-18 1/25
Date Analyzed:	12/07/19	Data File:	120638.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	140 d	31	163
Benzo(a)anthracene-d12	116 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	0.10
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05 J
Benzo(b)fluoranthene	<0.05 J
Benzo(k)fluoranthene	<0.05 J
Indeno(1,2,3-cd)pyrene	<0.05 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	<0.05 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-18 1/250
Date Analyzed:	12/09/19	Data File:	120928.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	298 d	31	163
Benzo(a)anthracene-d12	133 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-1	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-19 1/25
Date Analyzed:	12/06/19	Data File:	120630.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	160 d	31	163
Benzo(a)anthracene-d12	140 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	0.052
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	0.054
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-20 1/25
Date Analyzed:	12/07/19	Data File:	120632.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery	Lower Limit:	Upper Limit:
Anthracene-d10	154 d	31	163
Benzo(a)anthracene-d12	122 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05 J
Benzo(b)fluoranthene	<0.05 J
Benzo(k)fluoranthene	<0.05 J
Indeno(1,2,3-cd)pyrene	<0.05 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	<0.05 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP1-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-20 1/250
Date Analyzed:	12/09/19	Data File:	120929.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	318 d	31	163
Benzo(a)anthracene-d12	116 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-21 1/25
Date Analyzed:	12/07/19	Data File:	120639.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	144 d	31	163
Benzo(a)anthracene-d12	125 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	0.080
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	0.24
Benz(a)anthracene	<0.05
Chrysene	0.13
Benzo(a)pyrene	0.055 J
Benzo(b)fluoranthene	<0.05 J
Benzo(k)fluoranthene	<0.05 J
Indeno(1,2,3-cd)pyrene	<0.05 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	<0.05 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-2	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-21 1/250
Date Analyzed:	12/09/19	Data File:	120930.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	345 d	31	163
Benzo(a)anthracene-d12	112 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-22 1/25
Date Analyzed:	12/07/19	Data File:	120636.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	167 d	31	163
Benzo(a)anthracene-d12	139 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05 J
Benzo(b)fluoranthene	<0.05 J
Benzo(k)fluoranthene	<0.05 J
Indeno(1,2,3-cd)pyrene	<0.05 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	<0.05 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-5	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-22 1/250
Date Analyzed:	12/09/19	Data File:	120909.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	263 d	31	163
Benzo(a)anthracene-d12	116 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-23 1/5
Date Analyzed:	12/06/19	Data File:	120625.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	96	31	163
Benzo(a)anthracene-d12	108	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01 J
Benzo(b)fluoranthene	<0.01 J
Benzo(k)fluoranthene	<0.01 J
Indeno(1,2,3-cd)pyrene	<0.01 J
Dibenz(a,h)anthracene	<0.01 J
Benzo(g,h,i)perylene	<0.01 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-4	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-23 1/25
Date Analyzed:	12/09/19	Data File:	120931.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	145 d	31	163
Benzo(a)anthracene-d12	114 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-3	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	912095-24 1/25
Date Analyzed:	12/07/19	Data File:	120633.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	161 d	31	163
Benzo(a)anthracene-d12	146 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	0.072
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	0.072
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/06/19	Lab ID:	09-2984 mb 1/5
Date Analyzed:	12/06/19	Data File:	120621.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	106	31	163
Benzo(a)anthracene-d12	121	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912133-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0014	102	103	71-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	111	78-125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx**

Laboratory Code: 912081-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	100	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912095-15 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	88	69-120
Toluene	mg/kg (ppm)	0.5	84	70-117
Ethylbenzene	mg/kg (ppm)	0.5	82	65-123
Xylenes	mg/kg (ppm)	1.5	87	66-120
Gasoline	mg/kg (ppm)	20	85	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	88	92	61-133	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: 912108-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	110	114	64-133	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	108	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912095-14 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	8.0	8.0	0	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912095-15 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	78	74 vo	75-125	5
Barium	mg/kg (ppm)	50	51.1	114	122	75-125	7
Cadmium	mg/kg (ppm)	10	<5	105	103	75-125	2
Chromium	mg/kg (ppm)	50	13.0	86	87	75-125	1
Lead	mg/kg (ppm)	50	5.84	107	110	75-125	3
Mercury	mg/kg (ppm)	5	<5	107	91	75-125	16
Selenium	mg/kg (ppm)	5	<5	80	73 vo	75-125	9
Silver	mg/kg (ppm)	10	<5	105	104	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	91	80-120
Barium	mg/kg (ppm)	50	102	80-120
Cadmium	mg/kg (ppm)	10	100	80-120
Chromium	mg/kg (ppm)	50	100	80-120
Lead	mg/kg (ppm)	50	104	80-120
Mercury	mg/kg (ppm)	5	103	80-120
Selenium	mg/kg (ppm)	5	99	80-120
Silver	mg/kg (ppm)	10	103	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912095-12 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	12.3	136 b	141 b	70-130	4 b
Magnesium	mg/L (ppm)	1.0	3.07	117	121	70-130	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	111	85-115
Magnesium	mg/L (ppm)	1.0	111	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912081-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	95	95	70-130	0
Cadmium	ug/L (ppb)	5	<0.25	97	96	70-130	1
Chromium	ug/L (ppb)	20	<1	101	98	70-130	3
Copper	ug/L (ppb)	20	11.1	96	94	70-130	2
Lead	ug/L (ppb)	10	<0.5	90	90	70-130	0
Nickel	ug/L (ppb)	20	3.08	96	95	70-130	1
Zinc	ug/L (ppb)	50	85.0	99	95	70-130	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	94	85-115
Cadmium	ug/L (ppb)	5	96	85-115
Chromium	ug/L (ppb)	20	97	85-115
Copper	ug/L (ppb)	20	98	85-115
Lead	ug/L (ppb)	10	96	85-115
Nickel	ug/L (ppb)	20	97	85-115
Zinc	ug/L (ppb)	50	98	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912095-17 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	80	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	89	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	81	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	87	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	79	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	81	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	85	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	85	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	81	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	75	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	67	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	67	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	67	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	48	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	49	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	47	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	84	82	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	95	92	54-121	3
Acenaphthene	mg/kg (ppm)	0.17	87	85	54-123	2
Fluorene	mg/kg (ppm)	0.17	97	93	56-127	4
Phenanthrene	mg/kg (ppm)	0.17	86	84	55-122	2
Anthracene	mg/kg (ppm)	0.17	87	85	50-120	2
Fluoranthene	mg/kg (ppm)	0.17	99	93	54-129	6
Pyrene	mg/kg (ppm)	0.17	91	90	53-127	1
Benz(a)anthracene	mg/kg (ppm)	0.17	95	93	51-115	2
Chrysene	mg/kg (ppm)	0.17	89	89	55-129	0
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	82	82	56-123	0
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	82	82	54-131	0
Benzo(a)pyrene	mg/kg (ppm)	0.17	81	81	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	83	77	49-148	7
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	79	75	50-141	5
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	75	69	52-131	8

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

912095

SAMPLE CHAIN OF CUSTODY

ME 12-05-19 Page # 1 of 2 US4

Report To Angie Goodwin
 Company Hart Crouser
 Address 3131 Elliot Ave
 City, State, ZIP Seattle, WA
 Phone (206) 954-2549 Email angie.goodwin@hartcrouser.com

SAMPLERS (signature) Julie Higgins
 PROJECT NAME KOSMOS PO # 19499-00
 REMARKS _____ INVOICE TO _____
 Project specific RLs? - Yes / No _____

TURNAROUND TIME VWS
 Standard turnaround COY
 RUSH
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	RURAB				
TP-5-2.5	01A-E	12/5/19	1000	Soil	5												Hold Soil for Analysis - contact Angie
TP-5-5	02		1005		1	(X)											
TP-5-8	03		1010		1	(X)	(X)			(X)				(X)			
TP-5-10	04		1015		1	(X)	(X)			(X)	(X)	(X)	(X)				
TP-5-12	05		1020		1	(X)											
TP-5-15	06		1030		1	(X)											
TP-5-19	07	✓	1035	✓	✓	(X)	(X)			(X)	(X)	(X)					FRS-RES 12/5/19
TP-3-8	08		1115		1	(X)	(X)			(X)				(X)			(X) Added on 12/19/19 by AK
TP-3-12	09		1120		1	(X)	(X)	(X)									
TP-3-15	10	✓	1135	✓	✓												

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>Julie Higgins</u>	Julie Higgins	HC	12/5/19	1443
Received by: <u>R. J.</u>	BISRAJ TADESSE	FBI	12/5/19	↓
Relinquished by:		Samples received at	3	00
Received by:				

912093

SAMPLE CHAIN OF CUSTODY

ME 12-05-19

Page # 2 of 3 154 3014

Report To Angie Goodwin
 Company Hart Crowser
 Address 3131 Elliot Ave
 City, State, ZIP Seattle WA
 Phone (206) 454-2549 Email angie.goodwin@hartcrowser.com

SAMPLERS (signature) Jolie Higgins
 PROJECT NAME KOSMOS PO # 19499-00
 REMARKS _____ INVOICE TO _____
 Project specific RLs? - Yes / No _____

TURNAROUND TIME WJ3
 Standard turnaround COY
 RUSH
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples
 Other
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED											Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Metals	Hardness	pH	RCRA 8 Metals			
TP-3-20	11 A-E	12/5/19	1200	Soil	5	X													
D-2	12 A-G	12/5/19	1500	water	7	X	X						X	X	X				Total Metals: ASK Andrew
U-1	13	12/5/19	1510	water	7	X	X						X	X	X				Angie for metal
D-1	14	12/5/19	1520	water	7	X	X						X	X	X				analysis
SP1-1	15 A-E	12/5/19	1552	soil	5	X	X	X			X					X			Total Metals:
SP1-3	16	12/5/19	1605	soil	5	X	X	X			X					X			As
SP1-4	17	12/5/19	1611	soil	5	X	X	X			X					X			Hex Cr
SP1-2	18	12/5/19	1559	soil	5	X	X	X			X					X			Cr
SP2-1	19	12/5/19	1625	soil	5	X	X	X			X					X			Pb
SP1-5	20 A-D	12/5/19	1616	soil	5	X	X	X			X					X			Cd
																			Hg
																			Cu
																			Ni
																			Zn

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>Jolie Higgins</u>	Jolie Higgins	HC	12/5/19	1943
Received by: <u>Bisrat Tadese</u>	Bisrat Tadese	FBI	↓	↓
Relinquished by:				
Received by:				

912095

SAMPLE CHAIN OF CUSTODY

ME 12-05-19

Page # 3 of 3

Report To Angie Goodwin
 Company Hart Crawler
 Address 3131 Elliot
 City, State, ZIP Seattle, WA
 Phone (206) 954-2549 Email angie.goodwin@hartcrawler.com

SAMPLERS (signature) [Signature]
 PROJECT NAME Rosmos PO # 19499-00
 REMARKS INVOICE TO
 Project specific RLs? - Yes / No

TURNAROUND TIME
 Standard turnaround
 RUSH
 Rush charges authorized by: vwB
 SAMPLE DISPOSAL
 Archive samples
 Other
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED								Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	RCRA 8 Metals		
SP2-2	21	12/5/19	1627	soil	5	X	X	X			X		X		
SP2-5	22	12/5/19	1625	soil	5	X	X	X			X		X		
SP2-4	23	12/5/19	1639	soil	5	X	X	X			X		X		
SP2-3	24	12/5/19	1630	soil	4 6	X	X	X			X		X		only 3 uoa received @ 1625

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Jolie Higgins	HC	12/5/19	1443
Received by: <u>[Signature]</u>	BUSRAT TADESSE	FBI	↓	↓
Relinquished by:				
Received by:				



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912095
Work Order Number: 1912084

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 12/6/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B
Mercury by Method 1631E

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

CC:
Eric Young

CLIENT: Friedman & Bruya
Project: 912095
Work Order: 1912084

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912084-001	D-2	12/05/2019 3:00 PM	12/06/2019 11:09 AM
1912084-002	U-1	12/05/2019 3:10 PM	12/06/2019 11:09 AM
1912084-003	D-1	12/05/2019 3:20 PM	12/06/2019 11:09 AM

CLIENT: Friedman & Bruya

Project: 912095

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya
Project: 912095
Lab ID: 1912084-001
Client Sample ID: D-2

Collection Date: 12/5/2019 3:00:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55811 Analyst: WF

Chromium, Hexavalent	ND	0.0450		mg/L	1	12/6/2019 12:15:00 PM
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Client: Friedman & Bruya
Project: 912095
Lab ID: 1912084-002
Client Sample ID: U-1

Collection Date: 12/5/2019 3:10:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55811 Analyst: WF

Chromium, Hexavalent	ND	0.0450		mg/L	1	12/6/2019 12:34:00 PM
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Client: Friedman & Bruya

Collection Date: 12/5/2019 3:20:00 PM

Project: 912095

Lab ID: 1912084-003

Matrix: Water

Client Sample ID: D-1

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55811

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/6/2019 12:39:00 PM

Work Order: 1912084
 CLIENT: Friedman & Bruya
 Project: 912095

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-R55811	SampType: MBLK	Units: mg/L	Prep Date: 12/6/2019	RunNo: 55811							
Client ID: MBLKW	Batch ID: R55811		Analysis Date: 12/6/2019	SeqNo: 1110979							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450

Sample ID: LCS-R55811	SampType: LCS	Units: mg/L	Prep Date: 12/6/2019	RunNo: 55811							
Client ID: LCSW	Batch ID: R55811		Analysis Date: 12/6/2019	SeqNo: 1110980							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.247 0.0450 0.2500 0 99.0 80.9 115

Sample ID: 1912084-001ADUP	SampType: DUP	Units: mg/L	Prep Date: 12/6/2019	RunNo: 55811							
Client ID: D-2	Batch ID: R55811		Analysis Date: 12/6/2019	SeqNo: 1110982							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450 0 30

Sample ID: 1912084-001AMS	SampType: MS	Units: mg/L	Prep Date: 12/6/2019	RunNo: 55811							
Client ID: D-2	Batch ID: R55811		Analysis Date: 12/6/2019	SeqNo: 1110983							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.216 0.0450 0.2500 0 86.2 46.2 138

Sample ID: 1912084-001AMSD	SampType: MSD	Units: mg/L	Prep Date: 12/6/2019	RunNo: 55811							
Client ID: D-2	Batch ID: R55811		Analysis Date: 12/6/2019	SeqNo: 1110984							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.221 0.0450 0.2500 0 88.5 46.2 138 0.2156 2.61 20

Client Name: **FB**
 Logged by: **Carissa True**

Work Order Number: **1912084**
 Date Received: **12/6/2019 11:09:00 AM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
 2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not Required
 6. Was an attempt made to cool the samples? Yes No NA
 7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
 8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
BrCl added to B fractions
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:
 12/13/19: 1631 analysis cancelled due to instrument delays.

Item Information

Item #	Temp °C
Cooler 1	4.4
Sample 1	6.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912084

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <u>Firmant</u>	
PROJECT NAME/NO. <u>912095</u>	PO # <u>A-500</u>
REMARKS <u>Please Email Results Hg to 0.0005 ug/L</u>	

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH 24 hrs
 Rush charges authorized by: ME

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED				Notes
						Dioxins/Furans	EPH	VPH	Hexachloro-chlorocyclopentadiene	
D-2		12/5/19	1520	1420			X	X		
U-1			1510				X	X		
D-1			1520				X	X		

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

Retinquished by: Received by: <u>Michael Erdahl</u>	SIGNATURE PRINT NAME Michael Erdahl
Retinquished by: Received by:	COMPANY Friedman & Bruya
Received by: <u>Mahmi M. ...</u>	DATE 12/6/19
Received by:	TIME 10:15

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 20, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the amended results from the testing of material submitted on December 6, 2019 from the Kosmos, F&BI 912124 project. Per request, the results were submitted as a single data package.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1217R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 6, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912124 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID
912124 -01

Hart Crowser
D-1

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/06/19
Project: Kosmos, F&BI 912124
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D-1 912124-01	0.00096
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/06/19
Project: Kosmos, F&BI 912124
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
D-1 912124-01	<1	<1	<1	<3	<100	77
Method Blank 09-2914 MB	<1	<1	<1	<3	<100	79

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/06/19
Project: Kosmos, F&BI 912124
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-Dx
Extended to Include Motor Oil Range Compounds**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
D-1 912124-01	<250	101
Method Blank 09-2990 MB	<250	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/06/19
Project: Kosmos, F&BI 912124
Date Extracted: NA
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D-1 912124-01	7.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos, F&BI 912124
Date Extracted:	12/09/19	Lab ID:	912124-01 x10
Date Analyzed:	12/10/19	Data File:	912124-01 x10.030
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.9
Magnesium	2.70
Hardness (as CaCO3)	38.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912124
Date Extracted:	12/09/19	Lab ID:	I9-778 mb
Date Analyzed:	12/10/19	Data File:	I9-778 mb.023
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO ₃)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos, F&BI 912124
Date Extracted:	12/09/19	Lab ID:	912124-01
Date Analyzed:	12/09/19	Data File:	912124-01.075
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	60.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912124
Date Extracted:	12/09/19	Lab ID:	I9-776 mb
Date Analyzed:	12/09/19	Data File:	I9-776 mb.064
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/06/19

Project: Kosmos, F&BI 912124

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912124-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	100	65-118
Toluene	ug/L (ppb)	50	96	72-122
Ethylbenzene	ug/L (ppb)	50	100	73-126
Xylenes	ug/L (ppb)	150	93	74-118
Gasoline	ug/L (ppb)	1,000	99	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/06/19

Project: Kosmos, F&BI 912124

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	92	63-142	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/06/19

Project: Kosmos, F&BI 912124

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912133-03 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.7	7.6	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/06/19

Project: Kosmos, F&BI 912124

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912133-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	9.85	105	126	70-130	18
Magnesium	mg/L (ppm)	1.0	2.47	96	97	70-130	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	98	85-115
Magnesium	mg/L (ppm)	1.0	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/06/19

Project: Kosmos, F&BI 912124

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912133-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	98	95	70-130	3
Cadmium	ug/L (ppb)	5	<0.25	96	93	70-130	3
Chromium	ug/L (ppb)	20	<1	97	96	70-130	1
Copper	ug/L (ppb)	20	<2	94	92	70-130	2
Lead	ug/L (ppb)	10	<0.5	98	95	70-130	3
Nickel	ug/L (ppb)	20	<0.5	95	94	70-130	1
Zinc	ug/L (ppb)	50	<2.5	93	91	70-130	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	94	85-115
Cadmium	ug/L (ppb)	5	98	85-115
Chromium	ug/L (ppb)	20	94	85-115
Copper	ug/L (ppb)	20	96	85-115
Lead	ug/L (ppb)	10	96	85-115
Nickel	ug/L (ppb)	20	97	85-115
Zinc	ug/L (ppb)	50	95	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/06/19

Project: Kosmos, F&BI 912124

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912133-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0014	102	103	71-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	111	78-125

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

912124

SAMPLE CHAIN OF CUSTODY

ME 12/6/19

UW/AF2
Page # of

Report To Angie Goodwin
 Company Hart Crousser
 Address _____
 City, State, ZIP _____
 Phone _____ Email _____

SAMPLERS (signature) <u>Jolie Higgins</u>		PO # _____
PROJECT NAME <u>Basins</u>		INVOICE TO _____
REMARKS Project specific RIs? - Yes / No	SAMPLE DISPOSAL <input type="checkbox"/> Standard turnaround <input checked="" type="checkbox"/> RUSH 24hr <input type="checkbox"/> Archive samples <input type="checkbox"/> Other _____ Rush charges authorized by: _____ Default: Dispose after 30 days	

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED								Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals		pH	Hardness
D-1	OIA-6	12/6/19	1415			X	X	(X)				X	(X)	(X)	(X)	(X) per AG 12/6/19 ML Notes
																Metals: 200.8 As, Al, Cr, Cu, Pb, Ni, Zn 1621E H ₂ to 0.0005 mg/L.
																Samples received at 3°C

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Relinquished by: <u>Jolie Higgins</u>		Jolie Higgins		Hart Crousser		12/6/19	1856
Received by: <u>Jolie Higgins</u>		Jolie Higgins		Hart Crousser		12/6/19	1856
Relinquished by:							
Received by:							

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 20, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the amended results from the testing of material submitted on December 9, 2019 from the Kosmos, F&BI 912133 project. Per request, the results were submitted as a single data package.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1217R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 9, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912133 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912133 -01	D-1
912133 -02	D-1
912133 -03	D-1A

The water samples were sent to Fremont Analytical trace level mercury analyses. The report will be forwarded to your office upon receipt.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912133
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D-1 912133-01	0.0016
D-1 912133-02	0.0015
D-1A 912133-03	0.0014
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912133
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
D-1 912133-01	<1	<1	<1	<3	<100	76
D-1 912133-02	<1	<1	<1	<3	<100	80
D-1A 912133-03	<1	<1	<1	<3	<100	78
Method Blank 09-2914 MB	<1	<1	<1	<3	<100	79

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912133
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-Dx
Extended to Include Motor Oil Range Compounds**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
D-1 912133-01	<250	87
D-1 912133-02	<250	93
D-1A 912133-03	<250	102
Method Blank 09-2990 MB	<250	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912133
Date Extracted: NA
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D-1 912133-01	7.8
D-1 912133-02	7.8
D-1A 912133-03	7.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	912133-01 x10
Date Analyzed:	12/10/19	Data File:	912133-01 x10.025
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.85
Magnesium	2.47
Hardness (as CaCO ₃)	34.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	912133-02 x10
Date Analyzed:	12/10/19	Data File:	912133-02 x10.028
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.3
Magnesium	2.54
Hardness (as CaCO3)	36.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1A	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	912133-03 x10
Date Analyzed:	12/10/19	Data File:	912133-03 x10.029
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.2
Magnesium	2.79
Hardness (as CaCO ₃)	37.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	I9-778 mb
Date Analyzed:	12/10/19	Data File:	I9-778 mb.023
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO3)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	912133-01
Date Analyzed:	12/09/19	Data File:	912133-01.067
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	912133-02
Date Analyzed:	12/09/19	Data File:	912133-02.068
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1A	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	912133-03
Date Analyzed:	12/09/19	Data File:	912133-03.071
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	2.82
Lead	<0.5
Nickel	0.900
Zinc	2.76

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912133
Date Extracted:	12/09/19	Lab ID:	I9-776 mb
Date Analyzed:	12/09/19	Data File:	I9-776 mb.064
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912133

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912124-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	100	65-118
Toluene	ug/L (ppb)	50	96	72-122
Ethylbenzene	ug/L (ppb)	50	100	73-126
Xylenes	ug/L (ppb)	150	93	74-118
Gasoline	ug/L (ppb)	1,000	99	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912133

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	92	63-142	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912133

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912133-01 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.7	7.6	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912133

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912133-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	9.85	105	126	70-130	18
Magnesium	mg/L (ppm)	1.0	2.47	96	97	70-130	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	98	85-115
Magnesium	mg/L (ppm)	1.0	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912133

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912133-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	98	95	70-130	3
Cadmium	ug/L (ppb)	5	<0.25	96	93	70-130	3
Chromium	ug/L (ppb)	20	<1	97	96	70-130	1
Copper	ug/L (ppb)	20	<2	94	92	70-130	2
Lead	ug/L (ppb)	10	<0.5	98	95	70-130	3
Nickel	ug/L (ppb)	20	<0.5	95	94	70-130	1
Zinc	ug/L (ppb)	50	<2.5	93	91	70-130	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	94	85-115
Cadmium	ug/L (ppb)	5	98	85-115
Chromium	ug/L (ppb)	20	94	85-115
Copper	ug/L (ppb)	20	96	85-115
Lead	ug/L (ppb)	10	96	85-115
Nickel	ug/L (ppb)	20	97	85-115
Zinc	ug/L (ppb)	50	95	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912133

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912133-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0014	102	103	71-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	111	78-125

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912133
Work Order Number: 1912110

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 12/9/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

CC:
Eric Young



CLIENT: Friedman & Bruya
Project: 912133
Work Order: 1912110

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912110-001	D-1	12/07/2019 1:30 PM	12/09/2019 11:16 AM
1912110-002	D-1	12/08/2019 1:35 PM	12/09/2019 11:16 AM
1912110-003	D-1A	12/08/2019 1:55 PM	12/09/2019 11:16 AM

CLIENT: Friedman & Bruya

Project: 912133

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya

Collection Date: 12/8/2019 1:35:00 PM

Project: 912133

Lab ID: 1912110-002

Matrix: Water

Client Sample ID: D-1

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55822

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/9/2019 11:59:00 AM



Client: Friedman & Bruya

Collection Date: 12/8/2019 1:55:00 PM

Project: 912133

Lab ID: 1912110-003

Matrix: Water

Client Sample ID: D-1A

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55822

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/9/2019 12:19:00 PM

Work Order: 1912110
CLIENT: Friedman & Bruya
Project: 912133

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-55822		SampType: MBLK		Units: mg/L		Prep Date: 12/9/2019		RunNo: 55822			
Client ID: MBLKW		Batch ID: R55822				Analysis Date: 12/9/2019		SeqNo: 1112059			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	ND	0.0450									

Sample ID: LCS-55822		SampType: LCS		Units: mg/L		Prep Date: 12/9/2019		RunNo: 55822			
Client ID: LCSW		Batch ID: R55822				Analysis Date: 12/9/2019		SeqNo: 1112060			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	0.249	0.0450	0.2500	0	99.6	80.9	115				

Sample ID: 1912110-002BDUP		SampType: DUP		Units: mg/L		Prep Date: 12/9/2019		RunNo: 55822			
Client ID: D-1		Batch ID: R55822				Analysis Date: 12/9/2019		SeqNo: 1112062			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	ND	0.0450						0		30	

Sample ID: 1912110-002BMS		SampType: MS		Units: mg/L		Prep Date: 12/9/2019		RunNo: 55822			
Client ID: D-1		Batch ID: R55822				Analysis Date: 12/9/2019		SeqNo: 1112063			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	0.250	0.0450	0.2500	0	99.8	46.2	138				

Sample ID: 1912110-002BMSD		SampType: MSD		Units: mg/L		Prep Date: 12/9/2019		RunNo: 55822			
Client ID: D-1		Batch ID: R55822				Analysis Date: 12/9/2019		SeqNo: 1112064			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	0.251	0.0450	0.2500	0	100	46.2	138	0.2496	0.400	20	

Client Name: **FB**

 Work Order Number: **1912110**

 Logged by: **Clare Griggs**

 Date Received: **12/9/2019 11:16:00 AM**
Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of >0°C to 10.0°C* Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Per client request, do not analyze Hex Cr for sample collected on 12/7/19.
 12/13/19: 1631 analysis cancelled due to instrument delays.

Item Information

Item #	Temp °C
Cooler	4.6
Sample	3.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY 1912110

Send Report To Michael Erdahl

Company Friedman and Bryya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <u>Fremont</u>	
PROJECT NAME/NO. <u>912133</u>	PO # <u>A.501</u>
REMARKS <u>Please Email Results</u>	

Page # 1 of 1

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH 24 hour
 Rush charges authorized by: ME

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED					Notes	
						Dioxins/Furans	EPH	VPH	Hexavalent Chromium	Low level Hg to 0.005µg/L		
D-1		12/7/19	1330	H ₂ O					X	X		
D-1		12/8/19	1335						X	X		
D-1A		↓	1355	↓					X	X		

Friedman & Bryya, Inc. 3012 16th Avenue West Seattle, WA 98119-2029 Ph. (206) 285-8282 Fax (206) 283-5044	SIGNATURE 	PRINT NAME <u>Michael Erdahl</u>	COMPANY <u>Friedman & Bryya</u>	DATE <u>12/9/19</u>	TIME <u>0947</u>
	Received by:				
	Relinquished by:	<u>Michael Erdahl</u>			
	Received by:	<u>Michael Erdahl</u>	<u>FAI</u>	<u>12/9/19</u>	<u>1146</u> <u>Samson</u>
	Relinquished by:				
	Received by:				

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912110

Page # 1 of 1

Send Report To Michael Erdahl
 Company Friedman and Bruya, Inc.
 Address 3012 16th Ave W
 City, State, ZIP Seattle, WA 98119
 Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <u>Furman</u>	
PROJECT NAME/NO. <u>912133</u>	PO # <u>A.501</u>
REMARKS <u>Please Email Results</u>	

TURNAROUND TIME

Standard (2 Weeks)

RUSH 24 hour

Rush charges authorized by: ME

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED						Notes	
						Dioxins/Furans	EPH	VPH	Hexavalent Chromium	Low level Hg to 0.0005µg/L			
D-1		12/7/19	1330	H ₂ O					X	X			
D-1		12/8/19	1335						X	X			
D-1A		↓	1355	↓					X	X			

Pre-Volume
12/19/19
Received
12/19/19

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

Relinquished by: <u>[Signature]</u>	SIGNATURE	Michael Erdahl	PRINT NAME	Friedman & Bruya	COMPANY	12/9/19	DATE	0947	TIME
Received by: <u>[Signature]</u>		Sara Becker-Lange				12/9/19		1146	
Relinquished by:									
Received by:									

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 20, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the amended results from the testing of material submitted on December 9, 2019 from the Kosmos, F&BI 912148 project. Per request, the data were submitted as a single report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1217R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 9, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912148 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912148 -01	Boom 1
912148 -02	D-1B
912148 -03	Trip Blank

The water samples were sent to Fremont Analytical for hexavalent chromium and trace level mercury analyses. The report will be forwarded to your office upon receipt.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912148
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
Boom 1 912148-01	0.00094
D-1B 912148-02	0.0012
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912148
Date Extracted: 12/11/19
Date Analyzed: 12/11/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
Boom 1 912148-01	<1	<1	<1	<3	<100	80
D-1B 912148-02	<1	<1	<1	<3	<100	79
Method Blank 09-2917 MB	<1	<1	<1	<3	<100	81

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912148
Date Extracted: 12/10/19
Date Analyzed: 12/10/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-Dx
Extended to Include Motor Oil Range Compounds**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
Boom 1 912148-01	<250	81
D-1B 912148-02	<250	82
Method Blank 09-3003 MB	<250	81

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912148
Date Extracted: NA
Date Analyzed: 12/10/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
Boom 1 912148-01	7.8
D-1B 912148-02	7.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom 1	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912148
Date Extracted:	12/10/19	Lab ID:	912148-01
Date Analyzed:	12/10/19	Data File:	912148-01.068
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.522
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912148
Date Extracted:	12/10/19	Lab ID:	912148-02
Date Analyzed:	12/10/19	Data File:	912148-02.071
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912148
Date Extracted:	12/10/19	Lab ID:	I9-781 mb
Date Analyzed:	12/10/19	Data File:	I9-781 mb.066
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom 1	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912148
Date Extracted:	12/10/19	Lab ID:	912148-01 x10
Date Analyzed:	12/10/19	Data File:	912148-01 x10.088
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.85
Magnesium	2.56
Hardness (as CaCO3)	35.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912148
Date Extracted:	12/10/19	Lab ID:	912148-02 x10
Date Analyzed:	12/10/19	Data File:	912148-02 x10.089
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.59
Magnesium	2.45
Hardness (as CaCO3)	34.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912148
Date Extracted:	12/10/19	Lab ID:	I9-778 mb2
Date Analyzed:	12/10/19	Data File:	I9-778 mb2.087
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO ₃)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912148

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912074-04 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	94	65-118
Toluene	ug/L (ppb)	50	100	72-122
Ethylbenzene	ug/L (ppb)	50	107	73-126
Xylenes	ug/L (ppb)	150	99	74-118
Gasoline	ug/L (ppb)	1,000	95	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912148

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	88	63-142	9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912148

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912148-01 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.8	7.8	0	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912148

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912148-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	94	96	70-130	2
Cadmium	ug/L (ppb)	5	<0.25	94	96	70-130	2
Chromium	ug/L (ppb)	20	<1	96	96	70-130	0
Copper	ug/L (ppb)	20	<2	93	93	70-130	0
Lead	ug/L (ppb)	10	<0.5	96	97	70-130	1
Nickel	ug/L (ppb)	20	0.522	96	95	70-130	1
Zinc	ug/L (ppb)	50	<2.5	93	91	70-130	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	91	85-115
Cadmium	ug/L (ppb)	5	94	85-115
Chromium	ug/L (ppb)	20	94	85-115
Copper	ug/L (ppb)	20	94	85-115
Lead	ug/L (ppb)	10	94	85-115
Nickel	ug/L (ppb)	20	94	85-115
Zinc	ug/L (ppb)	50	92	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/12/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912148

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912133-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	9.85	105	126	70-130	18
Magnesium	mg/L (ppm)	1.0	2.47	96	97	70-130	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	98	85-115
Magnesium	mg/L (ppm)	1.0	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912148

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912133-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0014	102	103	71-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	111	78-125

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

9112148

SAMPLE CHAIN OF CUSTODY

ME 12/9/19

12/3/19

Report To Angie Goodwin

Company Hard Crower

Address _____

City, State, ZIP _____

Phone _____ Email angie.goodwin@hardcrower.com

SAMPLERS *Signature* John Kevin

PROJECT NAME K65mos

PO # _____

REMARKS _____

INVOICE TO _____

Project specific RIIs? - Yes / No _____

Page # 1 of 1

TURNAROUND TIME _____

Standard turnaround

RUSH 24hr

Rush charges authorized by: _____

SAMPLE DISPOSAL

Archive samples

Other _____

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of <i>class</i>	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metal	Hardness	pH		hex chrome
BOOM 1	01 A F	12/9/19	1330	Water	8	X	X	X					X	X	X		* other 10hrs sample bottle
D-1B	02 A-H	↓	1430	↓	8	X	X	X					X	X	X		* add hex Cr. ↑ used soil
BOOM 2	03 A-B	12/9/19			8												used soil
Trip Blank	03 A-B				2												

Samples received at 2 °C

per AG 12/10/19 ME

SIGNATURE

Relinquished by: John Kevin

PRINT NAME

Jake Higgins

COMPANY

HC

DATE

12/9/19

TIME

1850

Received by:

John Kevin

BISSEAT

HC

↓

Relinquished by:

John Kevin

BISSEAT

HC

↓

Received by:

John Kevin

BISSEAT

HC

↓

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912148
Work Order Number: 1912127

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 2 sample(s) on 12/10/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

CLIENT: Friedman & Bruya
Project: 912148
Work Order: 1912127

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912127-001	Boom1	12/09/2019 1:30 PM	12/10/2019 11:55 AM
1912127-002	D-1B	12/09/2019 2:30 PM	12/10/2019 11:55 AM

CLIENT: Friedman & Bruya

Project: 912148

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya
Project: 912148
Lab ID: 1912127-001
Client Sample ID: Boom1

Collection Date: 12/9/2019 1:30:00 PM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
-----------------	---------------	-----------	-------------	--------------	-----------	----------------------

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55878 Analyst: TN

Chromium, Hexavalent	ND	0.0450		mg/L	1	12/10/2019 1:41:00 PM
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Client: Friedman & Bruya

Collection Date: 12/9/2019 2:30:00 PM

Project: 912148

Lab ID: 1912127-002

Matrix: Water

Client Sample ID: D-1B

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55878

Analyst: TN

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/10/2019 1:45:00 PM

Work Order: 1912127
 CLIENT: Friedman & Bruya
 Project: 912148

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-R55878	SampType: MBLK	Units: mg/L	Prep Date: 12/10/2019	RunNo: 55878							
Client ID: MBLKW	Batch ID: R55878		Analysis Date: 12/10/2019	SeqNo: 1112371							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450

Sample ID: LCS-R55878	SampType: LCS	Units: mg/L	Prep Date: 12/10/2019	RunNo: 55878							
Client ID: LCSW	Batch ID: R55878		Analysis Date: 12/10/2019	SeqNo: 1112372							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.252 0.0450 0.2500 0 101 80.9 115

Sample ID: 1912127-001ADUP	SampType: DUP	Units: mg/L	Prep Date: 12/10/2019	RunNo: 55878							
Client ID: Boom1	Batch ID: R55878		Analysis Date: 12/10/2019	SeqNo: 1112375							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450 0 30

Sample ID: 1912127-001AMS	SampType: MS	Units: mg/L	Prep Date: 12/10/2019	RunNo: 55878							
Client ID: Boom1	Batch ID: R55878		Analysis Date: 12/10/2019	SeqNo: 1112376							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.261 0.0450 0.2500 0 105 46.2 138

Sample ID: 1912127-001AMSD	SampType: MSD	Units: mg/L	Prep Date: 12/10/2019	RunNo: 55878							
Client ID: Boom1	Batch ID: R55878		Analysis Date: 12/10/2019	SeqNo: 1112377							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.246 0.0450 0.2500 0 98.3 46.2 138 0.2613 6.15 20

Client Name: FB	Work Order Number: 1912127
Logged by: Carissa True	Date Received: 12/10/2019 11:55:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

12/13/19: 1631 analysis cancelled due to instrument delays.

Item Information

Item #	Temp °C
Cooler 1	4.9
Sample 1	6.3

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912127

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <u>Fremont</u>	PROJECT NAME/NO. <u>912148</u>
PO # <u>A-501</u>	REMARKS <u>Please Email Results</u>

Page # 1 of 1

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH 24 hrs.
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED				Notes										
						Dioxins/Furans	EPH	VPH												
Room 1		12/6/16	1330	H ₂ O	2															
D-18		1	1430	↑	2															

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

SIGNATURE 	PRINT NAME <u>Michael Erdahl</u>	COMPANY <u>Friedman & Bruya</u>	DATE <u>12/10/19</u>	TIME <u>10:00AM</u>
Relinquished by: _____	Michael Erdahl	Friedman & Bruya		
Received by: <u>Makense Neinhart</u>	<u>Makense Neinhart</u>	<u>FAL</u>	<u>12/10/19</u>	<u>11:55</u>
Relinquished by: _____				
Received by: _____				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 20, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the amended results from the testing of material submitted on December 10, 2019 from the Kosmos, F&BI 912164 project. Per request, the results were submitted as a single data package.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1218R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 10, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912164 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912164 -01	Boom 2
912164 -02	Boom 1
912164 -03	D3
912164 -04	D-2
912164 -05	D-1B

The samples were sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/18/19
Date Received: 12/10/19
Project: Kosmos, F&BI 912164
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
Boom 2 912164-01	<0.0007
Boom 1 912164-02	<0.0007
D3 912164-03	<0.0007
D-2 912164-04	0.0017
D-1B 912164-05	<0.0007
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
 Date Received: 12/10/19
 Project: Kosmos, F&BI 912164
 Date Extracted: 12/11/19
 Date Analyzed: 12/11/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
Boom 2 912164-01	<1	<1	<1	<3	<100	78
Boom 1 912164-02	<1	<1	<1	<3	<100	78
D3 912164-03	<1	<1	<1	<3	<100	78
D-2 912164-04	<1	<1	<1	<3	<100	78
D-1B 912164-05	<1	<1	<1	<3	<100	79
Method Blank 09-2917 MB	<1	<1	<1	<3	<100	81

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
Date Received: 12/10/19
Project: Kosmos, F&BI 912164
Date Extracted: 12/11/19
Date Analyzed: 12/11/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-Dx
Extended to Include Motor Oil Range Compounds**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
Boom 2 912164-01	<250	88
Boom 1 912164-02	<250	93
D3 912164-03	<250	88
D-2 912164-04	<250	84
D-1B 912164-05	<250	95
Method Blank 09-3003 MB3	<250	103

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
Date Received: 12/10/19
Project: Kosmos, F&BI 912164
Date Extracted: NA
Date Analyzed: 12/11/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
Boom 2 912164-01	7.8
Boom 1 912164-02	7.9
D3 912164-03	7.0
D-2 912164-04	7.7
D-1B 912164-05	7.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom 2	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-01
Date Analyzed:	12/11/19	Data File:	912164-01.081
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom 1	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-02
Date Analyzed:	12/11/19	Data File:	912164-02.082
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D3	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-03
Date Analyzed:	12/11/19	Data File:	912164-03.083
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	0.599
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.608
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-04
Date Analyzed:	12/11/19	Data File:	912164-04.084
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	1.18
Copper	5.01
Lead	0.947
Nickel	1.55
Zinc	12.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-05
Date Analyzed:	12/11/19	Data File:	912164-05.085
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	I9-781 mb2
Date Analyzed:	12/11/19	Data File:	I9-781 mb2.080
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom 2	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-01 x10
Date Analyzed:	12/11/19	Data File:	912164-01 x10.144
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.3
Magnesium	2.54
Hardness (as CaCO ₃)	36.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom 1	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-02 x10
Date Analyzed:	12/11/19	Data File:	912164-02 x10.147
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.7
Magnesium	2.59
Hardness (as CaCO3)	37.4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D3	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-03 x10
Date Analyzed:	12/11/19	Data File:	912164-03 x10.148
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	12.9
Magnesium	3.15
Hardness (as CaCO3)	45.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-04 x10
Date Analyzed:	12/11/19	Data File:	912164-04 x10.149
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	11.3
Magnesium	3.29
Hardness (as CaCO ₃)	41.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/10/19	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	912164-05 x10
Date Analyzed:	12/11/19	Data File:	912164-05 x10.150
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.8
Magnesium	2.64
Hardness (as CaCO ₃)	37.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912164
Date Extracted:	12/11/19	Lab ID:	I9-782 mb
Date Analyzed:	12/11/19	Data File:	I9-782 mb.142
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO3)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/10/19

Project: Kosmos, F&BI 912164

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912074-04 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	94	65-118
Toluene	ug/L (ppb)	50	100	72-122
Ethylbenzene	ug/L (ppb)	50	107	73-126
Xylenes	ug/L (ppb)	150	99	74-118
Gasoline	ug/L (ppb)	1,000	95	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/10/19

Project: Kosmos, F&BI 912164

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	88	63-142	9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/10/19

Project: Kosmos, F&BI 912164

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912164-05 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.8	7.7	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/10/19

Project: Kosmos, F&BI 912164

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912148-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	94	96	70-130	2
Cadmium	ug/L (ppb)	5	<0.25	94	96	70-130	2
Chromium	ug/L (ppb)	20	<1	96	96	70-130	0
Copper	ug/L (ppb)	20	<2	93	93	70-130	0
Lead	ug/L (ppb)	10	<0.5	96	97	70-130	1
Nickel	ug/L (ppb)	20	0.522	96	95	70-130	1
Zinc	ug/L (ppb)	50	<2.5	93	91	70-130	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	91	85-115
Cadmium	ug/L (ppb)	5	94	85-115
Chromium	ug/L (ppb)	20	94	85-115
Copper	ug/L (ppb)	20	94	85-115
Lead	ug/L (ppb)	10	94	85-115
Nickel	ug/L (ppb)	20	94	85-115
Zinc	ug/L (ppb)	50	92	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/10/19

Project: Kosmos, F&BI 912164

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912164-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	10.3	155 b	145 b	70-130	7 b
Magnesium	mg/L (ppm)	1.0	2.54	103	112	70-130	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	101	85-115
Magnesium	mg/L (ppm)	1.0	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/18/19

Date Received: 12/10/19

Project: Kosmos, F&BI 912164

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912133-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0014	102	103	71-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	111	78-125

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

912164

SAMPLE CHAIN OF CUSTODY ME 12/10/19 1003/413/005

Report To Angie Goodwin

Company Hart-Crosser

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLERS (signature) Jolie Higgins
PROJECT NAME K6smos

PO # _____

INVOICE TO _____

Project specific RIs? - Yes / No

Page # _____ of _____
TURNAROUND TIME
 Standard turnaround
 RUSH 29
Rush charges authorized by: _____
SAMPLE DISPOSAL
 Archive samples
 Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED								Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals		Mercury	Hexachloro Chromium # 12115 # Co.0005
Room 2	01A-C	12/10/19	1025	water	7	X	X	(X)							X	Hex. Cr
Room 1	02		1040	water	7	X	X	(X)							X	mercury
D3	03		1050	water	7	X	X	(X)							X	
D-2	04		1155	water	7	X	X	(X)							X	
D-2B	05		1205	water	7	X	X	(X)							X	ME

SIGNATURE		PRINT NAME		COMPANY		DATE		TIME	
Relinquished by: <u>Jolie Higgins</u>		Jolie Higgins		Hart-Crosser		12/9/19		1440	
Received by: <u>Juan</u>		Juan		FBI		12/10/19		1445	
Relinquished by: _____		_____		_____		_____		_____	
Received by: _____		_____		_____		_____		_____	

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

Samples received at 4 OC



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912164
Work Order Number: 1912155

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 5 sample(s) on 12/11/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

CLIENT: Friedman & Bruya
Project: 912164
Work Order: 1912155

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912155-001	Boom2	12/10/2019 10:25 AM	12/11/2019 9:40 AM
1912155-002	Boom1	12/10/2019 10:40 AM	12/11/2019 9:40 AM
1912155-003	D3	12/10/2019 10:50 AM	12/11/2019 9:40 AM
1912155-004	D-2	12/10/2019 11:55 AM	12/11/2019 9:40 AM
1912155-005	D-1B	12/10/2019 12:05 PM	12/11/2019 9:40 AM

CLIENT: Friedman & Bruya

Project: 912164

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya
Project: 912164
Lab ID: 1912155-001
Client Sample ID: Boom2

Collection Date: 12/10/2019 10:25:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Hexavalent Chromium by SM 3500 Cr B				Batch ID: R55895		Analyst: WF
Chromium, Hexavalent	ND	0.0450		mg/L	1	12/11/2019 10:44:00 AM



Client: Friedman & Bruya

Collection Date: 12/10/2019 10:40:00 AM

Project: 912164

Lab ID: 1912155-002

Matrix: Water

Client Sample ID: Boom1

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55895

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/11/2019 11:03:00 AM



Client: Friedman & Bruya

Collection Date: 12/10/2019 10:50:00 AM

Project: 912164

Lab ID: 1912155-003

Matrix: Water

Client Sample ID: D3

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55895

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/11/2019 11:07:00 AM



Client: Friedman & Bruya

Collection Date: 12/10/2019 11:55:00 AM

Project: 912164

Lab ID: 1912155-004

Matrix: Water

Client Sample ID: D-2

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55895

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/11/2019 11:13:00 AM



Client: Friedman & Bruya

Collection Date: 12/10/2019 12:05:00 PM

Project: 912164

Lab ID: 1912155-005

Matrix: Water

Client Sample ID: D-1B

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55895

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/11/2019 11:18:00 AM

Work Order: 1912155
 CLIENT: Friedman & Bruya
 Project: 912164

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-R55895	SampType: MBLK	Units: mg/L	Prep Date: 12/11/2019	RunNo: 55895							
Client ID: MBLKW	Batch ID: R55895		Analysis Date: 12/11/2019	SeqNo: 1113468							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450

Sample ID: LCS-R55895	SampType: LCS	Units: mg/L	Prep Date: 12/11/2019	RunNo: 55895							
Client ID: LCSW	Batch ID: R55895		Analysis Date: 12/11/2019	SeqNo: 1113469							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.250 0.0450 0.2500 0 100 80.9 115

Sample ID: 1912155-001ADUP	SampType: DUP	Units: mg/L	Prep Date: 12/11/2019	RunNo: 55895							
Client ID: Boom2	Batch ID: R55895		Analysis Date: 12/11/2019	SeqNo: 1113471							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450 0 30

Sample ID: 1912155-001AMS	SampType: MS	Units: mg/L	Prep Date: 12/11/2019	RunNo: 55895							
Client ID: Boom2	Batch ID: R55895		Analysis Date: 12/11/2019	SeqNo: 1113472							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.247 0.0450 0.2500 0 98.8 46.2 138

Sample ID: 1912155-001AMSD	SampType: MSD	Units: mg/L	Prep Date: 12/11/2019	RunNo: 55895							
Client ID: Boom2	Batch ID: R55895		Analysis Date: 12/11/2019	SeqNo: 1113473							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.246 0.0450 0.2500 0 98.5 46.2 138 0.2471 0.365 20

Client Name: **FB**
 Logged by: **Carissa True**

 Work Order Number: **1912155**
 Date Received: **12/11/2019 9:40:00 AM**
Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text" value="Michael Erdahl"/>	Date:	<input type="text" value="12/11/2019"/>
By Whom:	<input type="text" value="Carissa True"/>	Via:	<input checked="" type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

1631- sample bottles were not labeled at time of receipt. Labeled bags containing "Boom2" and "D-1B" bottles were removed during sample receipt and bottles were potentially swapped. 1631 will also be run on the other containers we received for confirmation.
 12/13/19: 1631 analysis cancelled due to instrument delays.

Item Information

Item #	Temp °C
Cooler 1	9.5
Sample 1	5.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Client Name: **FB**

Work Order Number: **1912155**

Logged by: **Carissa True**

Date Received: **12/11/2019 9:40:00 AM**

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Page # 1 of 1

1912155

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W


City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <u>Furnco</u>	
PROJECT NAME/NO. <u>912164</u>	PO # <u>A-503</u>
REMARKS <u>Please Email Results</u>	

TURNOURUND TIME <input type="checkbox"/> Standard (2 Weeks) <input checked="" type="checkbox"/> RUSH <u>24 hrs</u> Rush charges authorized by: <u>ME</u>	SAMPLE DISPOSAL <input type="checkbox"/> Dispose after 30 days <input type="checkbox"/> Return samples <input type="checkbox"/> Will call with instructions
---	--

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED				Notes
						Dioxins/Furans	EPH	VPH	Hexavalent Chromium Hg by 163E to 0.0005µg/L	
Boom 2		12/10/19	1025	H ₂ O	2		X	X		
Boom 1			1040		2		X	X		
D3			1155		2		X	X		
D-2			1205		2		X	X		
D-1B										

SIGNATURE  Received by: <u>Michael Erdahl</u> Relinquished by: <u>For Keller Meyer</u>	PRINT NAME Michael Erdahl For Keller Meyer
COMPANY Friedman & Bruya	COMPANY FAI
DATE 12/11/19	DATE 12/11/19
TIME 08:00AM	TIME 0940
Received by:	Received by:

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 26, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the additional results from the testing of material submitted on December 11, 2019 from the Kosmos, F&BI 912192 project. There are 8 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparaos
HCR1226R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 11, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912192 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912192 -01	D-1B
912192 -02	D-2
912192 -03	Boom1
912192 -04	U-2

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	D-1B	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/19/19	Lab ID:	912192-01
Date Analyzed:	12/19/19	Data File:	121950.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	105	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.2
Toluene	<0.2
Ethylbenzene	<0.2
m,p-Xylene	<0.4
o-Xylene	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	D-2	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/19/19	Lab ID:	912192-02
Date Analyzed:	12/20/19	Data File:	121951.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	108	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.2
Toluene	<0.2
Ethylbenzene	<0.2
m,p-Xylene	<0.4
o-Xylene	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Boom1	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/19/19	Lab ID:	912192-03
Date Analyzed:	12/20/19	Data File:	121952.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	108	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.2
Toluene	<0.2
Ethylbenzene	<0.2
m,p-Xylene	<0.4
o-Xylene	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	U-2	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/19/19	Lab ID:	912192-04
Date Analyzed:	12/20/19	Data File:	121953.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	109	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.2
Toluene	<0.2
Ethylbenzene	<0.2
m,p-Xylene	<0.4
o-Xylene	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912192
Date Extracted:	12/19/19	Lab ID:	09-3067 mb
Date Analyzed:	12/19/19	Data File:	121937.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	110	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.2
Toluene	<0.2
Ethylbenzene	<0.2
m,p-Xylene	<0.4
o-Xylene	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912298-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	
				Recovery MS	Acceptance Criteria
Benzene	ug/L (ppb)	50	<0.35	112	75-114
Toluene	ug/L (ppb)	50	<1	107	73-117
Ethylbenzene	ug/L (ppb)	50	<1	107	66-124
m,p-Xylene	ug/L (ppb)	100	<2	104	63-128
o-Xylene	ug/L (ppb)	50	<1	104	64-129

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent		Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Benzene	ug/L (ppb)	50	103	109	75-116	6
Toluene	ug/L (ppb)	50	96	102	79-115	6
Ethylbenzene	ug/L (ppb)	50	99	105	83-111	6
m,p-Xylene	ug/L (ppb)	100	98	104	81-112	6
o-Xylene	ug/L (ppb)	50	99	104	81-117	5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY ME 12/11/19 VW3/AF3/905

Report To: Angie Goodwin
 Company: HC

Address: _____
 City, State, ZIP: _____

Phone: _____ Email: _____

SAMPLE # 1001 (signature)
 PROJECT NAME: KOSMOS
 PO #: _____
 REMARKS: _____
 INVOICE TO: _____
 Page # _____ of _____
 TURNAROUND TIME
 Standard turnaround
 RUSH 24hr
 Rush charges authorized by: _____

Project specific flus? Yes / No _____
 ANALYSES REQUESTED
 Standard
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Notes
D-1B	01AC	12/11	1140	water	7	*	*	+	⊗	⊗	+	+	⊗ per Ag 12/14/19 mt
D-2	02		1203			*	*	+	⊗	⊗	+	+	
BOOM 1	03		1230			*	*	+	⊗	⊗	+	+	do not take any of B
U-2	04		1300			*	*	+	⊗	⊗	+	+	

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2039
 Ph. (206) 385-8282

Requisitioned by: <u>[Signature]</u>	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Received by: <u>[Signature]</u>		Jolie Higgins	HC	12/11	15:40
Requisitioned by: <u>[Signature]</u>		Eric [Signature]	HC	12/11	15:40
Received by: _____					

Samples received at: HC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 19, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin :

Included are the amended results from the testing of material submitted on December 11, 2019 from the Kosmos, F&BI 912192 project. Per request, the results were submitted as a single report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1219R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 11, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912192 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912192 -01	D-1B
912192 -02	D-2
912192 -03	Boom1
912192 -04	U-2

The samples were sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19
Date Received: 12/11/19
Project: Kosmos, F&BI 912192
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D-1B 912192-01	0.0037
D-2 912192-02	0.015
Boom1 912192-03	0.0017
U-2 912192-04	<0.0007
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19
 Date Received: 12/11/19
 Project: Kosmos, F&BI 912192
 Date Extracted: 12/12/19
 Date Analyzed: 12/12/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
D-1B 912192-01	<1	<1	<1	<3	<100	79
D-2 912192-02	<1	<1	<1	<3	<100	77
Boom1 912192-03	<1	<1	<1	<3	<100	76
U-2 912192-04	<1	<1	<1	<3	<100	79
Method Blank 09-2920 MB	<1	<1	<1	<3	<100	82

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19
Date Received: 12/11/19
Project: Kosmos, F&BI 912192
Date Extracted: 12/12/19
Date Analyzed: 12/12/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-Dx
Extended to Include Motor Oil Range Compounds**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 47-140)
D-1B 912192-01	<250	106
D-2 912192-02	270 x	108
Boom1 912192-03	<250	128
U-2 912192-04	<250	104
Method Blank 09-3026 MB2	<250	106

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19
Date Received: 12/11/19
Project: Kosmos, F&BI 912192
Date Extracted: NA
Date Analyzed: 12/12/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D-1B 912192-01	7.4
D-2 912192-02	7.4
Boom1 912192-03	7.6
U-2 912192-04	7.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-01 x10
Date Analyzed:	12/13/19	Data File:	912192-01 x10.048
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.8
Magnesium	2.80
Hardness (as CaCO ₃)	38.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-02 x10
Date Analyzed:	12/13/19	Data File:	912192-02 x10.049
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	12.7
Magnesium	4.11
Hardness (as CaCO ₃)	48.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-03 x10
Date Analyzed:	12/13/19	Data File:	912192-03 x10.050
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.7
Magnesium	2.74
Hardness (as CaCO3)	38.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	U-2	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-04 x10
Date Analyzed:	12/13/19	Data File:	912192-04 x10.051
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.7
Magnesium	2.63
Hardness (as CaCO3)	37.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	I9-782 mb2
Date Analyzed:	12/13/19	Data File:	I9-782 mb2.047
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO ₃)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-01
Date Analyzed:	12/12/19	Data File:	912192-01.111
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.743
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-02
Date Analyzed:	12/12/19	Data File:	912192-02.114
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	0.722
Cadmium	<0.25
Chromium	3.14
Copper	13.5
Lead	1.80
Nickel	3.30
Zinc	17.9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-03
Date Analyzed:	12/12/19	Data File:	912192-03.115
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.683
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	U-2	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	912192-04
Date Analyzed:	12/12/19	Data File:	912192-04.116
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912192
Date Extracted:	12/12/19	Lab ID:	I9-788 mb
Date Analyzed:	12/12/19	Data File:	I9-788 mb.107
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912123-18 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	94	65-118
Toluene	ug/L (ppb)	50	98	72-122
Ethylbenzene	ug/L (ppb)	50	107	73-126
Xylenes	ug/L (ppb)	150	100	74-118
Gasoline	ug/L (ppb)	1,000	106	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	104	96	61-133	8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912192-04 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.7	7.7	0	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912164-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	10.3	155 b	145 b	70-130	7 b
Magnesium	mg/L (ppm)	1.0	2.54	103	112	70-130	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	101	85-115
Magnesium	mg/L (ppm)	1.0	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/16/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912192-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	94	96	70-130	2
Cadmium	ug/L (ppb)	5	<0.25	96	98	70-130	2
Chromium	ug/L (ppb)	20	<1	95	96	70-130	1
Copper	ug/L (ppb)	20	<2	93	94	70-130	1
Lead	ug/L (ppb)	10	<0.5	91	93	70-130	2
Nickel	ug/L (ppb)	20	0.743	94	94	70-130	0
Zinc	ug/L (ppb)	50	<2.5	89	90	70-130	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	94	85-115
Cadmium	ug/L (ppb)	5	98	85-115
Chromium	ug/L (ppb)	20	97	85-115
Copper	ug/L (ppb)	20	97	85-115
Lead	ug/L (ppb)	10	94	85-115
Nickel	ug/L (ppb)	20	97	85-115
Zinc	ug/L (ppb)	50	95	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912192

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912133-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0014	102	103	71-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	111	78-125

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY ME 12/11/19 VW3/AF3/905

Report To: Angie Goodwin
 Company: HC

Address: _____
 City, State, ZIP: _____

Phone: _____ Email: _____

SAMPLE # 1001 (signature)
 PROJECT NAME: KOSMOS
 PO #: _____
 REMARKS: _____
 INVOICE TO: _____
 Page # _____ of _____
 TURNAROUND TIME
 Standard turnaround
 RUSH 24hr
 Rush charges authorized by: _____

Project specific flus? Yes / No _____
 ANALYSES REQUESTED
 Standard
 Archive samples
 Other
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TOTAL/MTA	Hex Cr	low level Hg	PH	Notes
D-1B	01AC	12/11	1140	water	7	*	*	+	⊗	⊗			+	+	+	+	⊗ per Ag 12/14/19 mt
D-2	02		1203			+	+	+	⊗	⊗			+	+	+	+	do not take any of B
BOOM 1	03		1230			+	+	+	⊗	⊗			+	+	+	+	
U-2	04		1300			+	+	+	⊗	⊗			+	+	+	+	

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2039
 Ph. (206) 385-8282

Requisitioned by: <u>[Signature]</u>	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Received by: <u>[Signature]</u>		<u>Jolie Higgins</u>	<u>HC</u>	<u>12/11</u>	<u>131540</u>
Requisitioned by: <u>[Signature]</u>		<u>Eric [Signature]</u>	<u>HC</u>	<u>12/11</u>	<u>1540</u>
Received by: _____					

Samples received at HC



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912192
Work Order Number: 1912176

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 4 sample(s) on 12/12/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Friedman & Bruya
Project: 912192
Work Order: 1912176

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912176-001	D-1B	12/11/2019 11:40 AM	12/12/2019 9:12 AM
1912176-002	D-2	12/11/2019 12:03 PM	12/12/2019 9:12 AM
1912176-003	Boom1	12/11/2019 12:30 PM	12/12/2019 9:12 AM
1912176-004	U-2	12/11/2019 1:00 PM	12/12/2019 9:12 AM

CLIENT: Friedman & Bruya

Project: 912192

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya

Collection Date: 12/11/2019 11:40:00 AM

Project: 912192

Lab ID: 1912176-001

Matrix: Water

Client Sample ID: D-1B

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55920

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/12/2019 10:27:00 AM



Client: Friedman & Bruya

Collection Date: 12/11/2019 12:03:00 PM

Project: 912192

Lab ID: 1912176-002

Matrix: Water

Client Sample ID: D-2

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55920

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/12/2019 10:46:00 AM



Client: Friedman & Bruya

Collection Date: 12/11/2019 12:30:00 PM

Project: 912192

Lab ID: 1912176-003

Matrix: Water

Client Sample ID: Boom1

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R55920

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/12/2019 10:56:00 AM



Client: Friedman & Bruya
Project: 912192
Lab ID: 1912176-004
Client Sample ID: U-2

Collection Date: 12/11/2019 1:00:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Hexavalent Chromium by SM 3500 Cr B</u>					Batch ID: R55920	Analyst: WF
Chromium, Hexavalent	ND	0.0450		mg/L	1	12/12/2019 10:51:00 AM

Work Order: 1912176
CLIENT: Friedman & Bruya
Project: 912192

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-R55920		SampType: MBLK		Units: mg/L		Prep Date: 12/12/2019		RunNo: 55920			
Client ID: MBLKW		Batch ID: R55920				Analysis Date: 12/12/2019		SeqNo: 1113501			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	ND	0.0450									

Sample ID: LCS-R55920		SampType: LCS		Units: mg/L		Prep Date: 12/12/2019		RunNo: 55920			
Client ID: LCSW		Batch ID: R55920				Analysis Date: 12/12/2019		SeqNo: 1113502			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	0.242	0.0450	0.2500	0	96.8	80.9	115				

Sample ID: 1912176-001BDUP		SampType: DUP		Units: mg/L		Prep Date: 12/12/2019		RunNo: 55920			
Client ID: D-1B		Batch ID: R55920				Analysis Date: 12/12/2019		SeqNo: 1113504			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	ND	0.0450						0		30	

Sample ID: 1912176-001BMS		SampType: MS		Units: mg/L		Prep Date: 12/12/2019		RunNo: 55920			
Client ID: D-1B		Batch ID: R55920				Analysis Date: 12/12/2019		SeqNo: 1113505			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	0.240	0.0450	0.2500	0	95.9	46.2	138				

Sample ID: 1912176-001BMSD		SampType: MSD		Units: mg/L		Prep Date: 12/12/2019		RunNo: 55920			
Client ID: D-1B		Batch ID: R55920				Analysis Date: 12/12/2019		SeqNo: 1113506			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium, Hexavalent	0.241	0.0450	0.2500	0	96.5	46.2	138	0.2398	0.582	20	

Client Name: **FB**
 Logged by: **Carissa True**

Work Order Number: **1912176**
 Date Received: **12/12/2019 9:12:00 AM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
 2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not Required
 6. Was an attempt made to cool the samples? Yes No NA
 7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
 8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:
 12/13/19: 1631 analysis cancelled due to instrument delays.

Item Information

Item #	Temp °C
Cooler 1	3.4
Sample 1	6.5

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912176

Send Report To Michael Erdahl
 Company Friedman and Bruya, Inc.
 Address 3012 16th Ave W
 City, State, ZIP Seattle, WA 98119
 Phone # (206) 285-8282 Fax # (206) 283-5044


SUBCONTRACTOR <u>Fremont</u>	
PROJECT NAME/NO. <u>912192</u>	PO # <u>A-503</u>
REMARKS <u>Please Email Results</u>	

Page # 1 of 1

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH 24hrs
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED					Notes	
						Dioxins/Furans	EPH	VPH	Low Level Hg <small>0.0005 mg/L</small>	Hex Chrome		
D-1B		12/11/19	1140	H ₂ O					X	X		
D-2			1203						X	X		
Room 1			1230						X	X		
V-2			1300						X	X		

Friedman & Bruya, Inc. 3012 16th Avenue West Seattle, WA 98119-2029 Ph. (206) 285-8282 Fax (206) 283-5044	SIGNATURE  Michael Erdahl PRINT NAME Michael Erdahl COMPANY Friedman & Bruya DATE 12/12/19 TIME 0730 AM
Received by: _____ Relinquished by: _____ Received by: _____ Relinquished by: _____	Received by: <u>Sara Beyer-Nagy</u> Relinquished by: _____ Received by: _____ Relinquished by: _____

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 20, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin :

Included are the amended results from the testing of material submitted on December 12, 2019 from the Kosmos, F&BI 912213 project. Per request, the results were submitted as a single data package.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1217R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 12, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912213 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912213 -01	D-1B
912213 -02	D-2
912213 -03	Boom1

The samples were sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912213
Date Extracted: 12/13/19
Date Analyzed: 12/13/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
D-1B 912213-01	<1	<1	<1	<3	<100	78
D-2 912213-02	<1	<1	<1	<3	<100	78
Boom1 912213-03	<1	<1	<1	<3	<100	78
Method Blank 09-2922 MB	<1	<1	<1	<3	<100	80

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912213
Date Extracted: 12/13/19
Date Analyzed: 12/13/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
D-1B 912213-01	72 x	<250	104
D-2 912213-02	150 x	<250	101
Boom1 912213-03	<50	<250	98
Method Blank 09-3035 MB	<50	<250	108

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912213
Date Extracted: NA
Date Analyzed: 12/13/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D-1B 912213-01	7.5
D-2 912213-02	7.6
Boom1 912213-03	7.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	912213-01
Date Analyzed:	12/13/19	Data File:	912213-01.110
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	912213-02
Date Analyzed:	12/13/19	Data File:	912213-02.111
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	1.69
Copper	8.16
Lead	0.726
Nickel	1.77
Zinc	5.98

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	912213-03
Date Analyzed:	12/13/19	Data File:	912213-03.112
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.695
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	I9-788 mb2
Date Analyzed:	12/13/19	Data File:	I9-788 mb2.109
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-1B	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	912213-01 x10
Date Analyzed:	12/13/19	Data File:	912213-01 x10.054
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.1
Magnesium	2.46
Hardness (as CaCO ₃)	35.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D-2	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	912213-02 x10
Date Analyzed:	12/13/19	Data File:	912213-02 x10.058
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	11.2
Magnesium	3.36
Hardness (as CaCO ₃)	41.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	912213-03 x10
Date Analyzed:	12/13/19	Data File:	912213-03 x10.059
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.91
Magnesium	2.46
Hardness (as CaCO3)	34.9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912213
Date Extracted:	12/13/19	Lab ID:	I9-793 mb
Date Analyzed:	12/13/19	Data File:	I9-793 mb.052
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO3)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912213
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D-1B 912213-01	0.00097
D-2 912213-02	0.0034
Boom1 912213-03	0.0015
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912213

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912169-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	94	65-118
Toluene	ug/L (ppb)	50	97	72-122
Ethylbenzene	ug/L (ppb)	50	104	73-126
Xylenes	ug/L (ppb)	150	97	74-118
Gasoline	ug/L (ppb)	1,000	105	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912213

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	112	116	63-142	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912213

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912192-04 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.7	7.7	0	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912213

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912192-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	94	96	70-130	2
Cadmium	ug/L (ppb)	5	<0.25	96	98	70-130	2
Chromium	ug/L (ppb)	20	<1	95	96	70-130	1
Copper	ug/L (ppb)	20	<2	93	94	70-130	1
Lead	ug/L (ppb)	10	<0.5	91	93	70-130	2
Nickel	ug/L (ppb)	20	0.743	94	94	70-130	0
Zinc	ug/L (ppb)	50	<2.5	89	90	70-130	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	94	85-115
Cadmium	ug/L (ppb)	5	98	85-115
Chromium	ug/L (ppb)	20	97	85-115
Copper	ug/L (ppb)	20	97	85-115
Lead	ug/L (ppb)	10	94	85-115
Nickel	ug/L (ppb)	20	97	85-115
Zinc	ug/L (ppb)	50	95	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912213

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912213-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	10.1	106 b	84 b	70-130	23 b
Magnesium	mg/L (ppm)	1.0	2.46	99	94	70-130	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	104	85-115
Magnesium	mg/L (ppm)	1.0	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/17/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912213

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912213-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.00097	115	113	71-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	108	78-125

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

912213

SAMPLE CHAIN OF CUSTODY

ME 12/12/19

12/2/2020 of 1/1/19

Report To Angie Goodwin

Company Harv Crooner

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLES (signature) Angie Goodwin
PROJECT NAME KOSMOS

PO # _____

REMARKS

INVOICE TO

Project specific Rls? - Yes / No

TURNAROUND TIME
 Standard turnaround
 RUSH 24hr
Rush charges authorized by: _____

SAMPLE DISPOSAL
 Archive samples
 Other _____
Default: Dispose after 30 days

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals	Hex Cr	Lowlevel Hg		PH
D-2B	01A-G	12/12/19	1145	water	7	X	X	X					X	X	X		
D-2	02	↓	↓	↓	↓	X	X	X					X	X	X		
BOOM 1	03	↓	↓	↓	↓	X	X	X					X	X	X		

Samples received at 4 °C

SIGNATURE

Relinquished by: Jolie Higgins

PRINT NAME

Jolie Higgins

COMPANY

HC

DATE

12/12

TIME

2030

Received by: Jolie Higgins

Jolie Higgins

HC

12/12

2030

Relinquished by: _____

Eric Spence

HC

12/19

2030

Received by: _____

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912213
Work Order Number: 1912213

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 12/13/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Friedman & Bruya
Project: 912213
Work Order: 1912213

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912213-001	D-1B	12/12/2019 11:45 AM	12/13/2019 9:30 AM
1912213-002	D-2	12/12/2019 11:45 AM	12/13/2019 9:30 AM
1912213-003	Boom1	12/12/2019 11:45 AM	12/13/2019 9:30 AM

CLIENT: Friedman & Bruya

Project: 912213

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Friedman & Bruya

Project: 912213

Lab ID: 1912213-001

Collection Date: 12/12/2019 11:45:00 AM

Client Sample ID: D-1B

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56000

Analyst: WF

Chromium, Hexavalent	ND	0.0450	H	mg/L	1	12/13/2019 12:33:00 PM
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Lab ID: 1912213-002

Collection Date: 12/12/2019 11:45:00 AM

Client Sample ID: D-2

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56000

Analyst: WF

Chromium, Hexavalent	ND	0.0450	H	mg/L	1	12/13/2019 12:53:00 PM
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Lab ID: 1912213-003

Collection Date: 12/12/2019 11:45:00 AM

Client Sample ID: Boom1

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56000

Analyst: WF

Chromium, Hexavalent	ND	0.0450	H	mg/L	1	12/13/2019 12:58:00 PM
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Work Order: 1912213
 CLIENT: Friedman & Bruya
 Project: 912213

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-56000	SampType: MBLK	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: MBLKW	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115098							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450

Sample ID: LCS-56000	SampType: LCS	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: LCSW	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115099							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.250 0.0450 0.2500 0 99.9 80.9 115

Sample ID: 1912213-001ADUP	SampType: DUP	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: D-1B	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115101							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450 0 30 H

Sample ID: 1912213-001AMS	SampType: MS	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: D-1B	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115102							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.246 0.0450 0.2500 0 98.4 46.2 138 H

Sample ID: 1912213-001AMSD	SampType: MSD	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: D-1B	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115103							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.249 0.0450 0.2500 0 99.6 46.2 138 0.2460 1.21 20 H

Client Name: **FB**
 Logged by: **Carissa True**

Work Order Number: **1912213**
 Date Received: **12/13/2019 9:30:00 AM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
 2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not Required
 6. Was an attempt made to cool the samples? Yes No NA
 7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
 8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:
 12/13/19: 1631 analysis cancelled due to instrument delays.

Item Information

Item #	Temp °C
Cooler 1	8.2
Sample 1	2.3

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912213

SUBCONTRACTER <i>Fremont</i>	
PROJECT NAME/NO. <i>912213</i>	PO # <i>A-503</i>
REMARKS Please Email Results	

Page # 1 of 1

TURNAROUND TIME

Standard (2 Weeks)
 RUSH *24 hr*

Rush charges authorized by: ME

SAMPLE DISPOSAL

Dispose after 30 days
 Return samples
 Will call with instructions

Send Report To Michael Erdahl
 Company Friedman and Bruya, Inc.
 Address 3012 16th Ave W
 City, State, ZIP Seattle, WA 98119
 Phone # (206) 285-8282 Fax # (206) 283-5044

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED			Notes
						Dioxins/Furans	EPH	VPH	
D-1B		12/12/19	1145	water					
D-2									
ROOM 1									

RECEIVED BY: <i>Marianna</i> RECEIVED BY: <i>Marianna</i>	SIGNATURE: <i>[Signature]</i> SIGNATURE: <i>[Signature]</i>
PRINT NAME: <i>Michael Erdahl</i> PRINT NAME: <i>Michael Erdahl</i>	COMPANY: <i>Friedman & Bruya</i> COMPANY: <i>Friedman & Bruya</i>
DATE: <i>12/13/19</i> DATE: <i>12/13/19</i>	TIME: <i>1023</i> TIME: <i>0736</i>

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912213

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <u>Fremont</u>	
PROJECT NAME/NO. <u>912213</u>	PO # <u>A-503</u>
REMARKS <u>Please Email Results</u>	

Page # 1 of 1

Page 9 of 9

TURNAROUND TIME <input type="checkbox"/> Standard (2 Weeks) <input checked="" type="checkbox"/> RUSH <u>24h</u> Rush charges authorized by: <u>ME</u>	SAMPLE DISPOSAL <input type="checkbox"/> Dispose after 30 days <input type="checkbox"/> Return samples <input type="checkbox"/> Will call with instructions
--	--

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED						Notes	
						Dioxins/Furans	EPH	VPH	Hex Chrome	Lowlevel Hg	0.0005/mL		
D-1B		12/12/19	1145	water					X	X			
D-2									X	X			
ROOM1									X	X			

returned to client 12/13

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>[Signature]</u>	Michael Erdahl	Friedman & Bruya	12/13/19	0736
<u>[Signature]</u>	MW K... MAJIMA	FAT	12/13/19	1023
<u>[Signature]</u>	CAESSA TROC	CB	12/13/19	1522
<u>[Signature]</u>	ERIC CHAIKIN	ECB	12/13/19	1527

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 19, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin :

Included are the results from the testing of material submitted on December 13, 2019 from the Kosmos, F&BI 912243 project. There are 20 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1219R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 13, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912243 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912243 -01	Boom 1
912243 -02	D1B
912243 -03	D2

The samples were sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19
Date Received: 12/13/19
Project: Kosmos, F&BI 912243
Date Extracted: 12/16/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
Boom 1 912243-01	<1	<1	<1	<3	<100	79
D1B 912243-02	<1	<1	<1	<3	<100	80
D2 912243-03	<1	<1	<1	<3	<100	79
Method Blank 09-2924 MB	<1	<1	<1	<3	<100	80

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19
Date Received: 12/13/19
Project: Kosmos, F&BI 912243
Date Extracted: 12/16/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-D_x
Extended to Include Motor Oil Range Compounds
Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 47-140)
Boom 1 912243-01	<250	116
D1B 912243-02	<250	114
D2 912243-03	<250	70
Method Blank 09-3043 MB	<250	110

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19
Date Received: 12/13/19
Project: Kosmos, F&BI 912243
Date Extracted: NA
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
Boom 1 912243-01	7.4
D1B 912243-02	7.3
D2 912243-03	7.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom 1	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912243
Date Extracted:	12/16/19	Lab ID:	912243-01
Date Analyzed:	12/16/19	Data File:	912243-01.081
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	2.80
Lead	<0.5
Nickel	0.849
Zinc	2.25

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912243
Date Extracted:	12/16/19	Lab ID:	912243-02
Date Analyzed:	12/16/19	Data File:	912243-02.082
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	2.41
Lead	<0.5
Nickel	0.771
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D2	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912243
Date Extracted:	12/16/19	Lab ID:	912243-03
Date Analyzed:	12/16/19	Data File:	912243-03.083
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	0.965
Cadmium	<0.25
Chromium	3.99
Copper	19.0
Lead	2.96
Nickel	3.87
Zinc	29.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912243
Date Extracted:	12/16/19	Lab ID:	I9-797 mb
Date Analyzed:	12/16/19	Data File:	I9-797 mb.079
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom 1	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912243
Date Extracted:	12/17/19	Lab ID:	912243-01 x10
Date Analyzed:	12/17/19	Data File:	912243-01 x10.053
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	7.38
Magnesium	2.02
Hardness (as CaCO ₃)	26.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912243
Date Extracted:	12/17/19	Lab ID:	912243-02 x10
Date Analyzed:	12/17/19	Data File:	912243-02 x10.056
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	7.62
Magnesium	1.96
Hardness (as CaCO ₃)	27.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D2	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912243
Date Extracted:	12/17/19	Lab ID:	912243-03 x10
Date Analyzed:	12/17/19	Data File:	912243-03 x10.057
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.69
Magnesium	3.88
Hardness (as CaCO ₃)	40.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912243
Date Extracted:	12/17/19	Lab ID:	I9-810 mb
Date Analyzed:	12/17/19	Data File:	I9-810 mb.051
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO ₃)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19
Date Received: 12/13/19
Project: Kosmos, F&BI 912243
Date Extracted: 12/13/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
Boom 1 912243-01	0.0034
D1B 912243-02	0.0030
D2 912243-03	0.0038
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912243

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912178-04 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	90	65-118
Toluene	ug/L (ppb)	50	93	72-122
Ethylbenzene	ug/L (ppb)	50	101	73-126
Xylenes	ug/L (ppb)	150	93	74-118
Gasoline	ug/L (ppb)	1,000	106	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912243

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	100	100	61-133	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912243

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912243-03 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.2	7.3	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912243

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912238-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	3.38	97	95	70-130	2
Cadmium	ug/L (ppb)	5	<0.25	99	98	70-130	1
Chromium	ug/L (ppb)	20	<1	88	87	70-130	1
Copper	ug/L (ppb)	20	10.3	56 b	39 b	70-130	36 b
Lead	ug/L (ppb)	10	<0.5	83	84	70-130	1
Nickel	ug/L (ppb)	20	3.22	91	91	70-130	0
Zinc	ug/L (ppb)	50	<2.5	83	81	70-130	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	96	85-115
Cadmium	ug/L (ppb)	5	98	85-115
Chromium	ug/L (ppb)	20	98	85-115
Copper	ug/L (ppb)	20	97	85-115
Lead	ug/L (ppb)	10	99	85-115
Nickel	ug/L (ppb)	20	100	85-115
Zinc	ug/L (ppb)	50	98	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912243

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912243-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	7.38	104 b	136 b	70-130	27 b
Magnesium	mg/L (ppm)	1.0	2.02	92	105	70-130	13

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	103	85-115
Magnesium	mg/L (ppm)	1.0	103	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/19/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912243

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912213-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.00097	115	113	71-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	108	78-125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912243
Work Order Number: 1912247

December 16, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 12/13/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Friedman & Bruya
Project: 912243
Work Order: 1912247

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912247-001	Room 1	12/13/2019 10:55 AM	12/13/2019 5:11 PM
1912247-002	D1 B	12/13/2019 11:15 AM	12/13/2019 5:11 PM
1912247-003	D2	12/13/2019 10:30 AM	12/13/2019 5:11 PM

CLIENT: Friedman & Bruya

Project: 912243

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



CLIENT: Friedman & Bruya

Project: 912243

Lab ID: 1912247-001

Client Sample ID: Room 1

Collection Date: 12/13/2019 10:55:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56000

Analyst: WF

Chromium, Hexavalent	ND	0.0450		mg/L	1	12/13/2019 6:19:00 PM
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Lab ID: 1912247-002

Client Sample ID: D1 B

Collection Date: 12/13/2019 11:15:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56000

Analyst: WF

Chromium, Hexavalent	ND	0.0450		mg/L	1	12/13/2019 6:23:00 PM
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Lab ID: 1912247-003

Client Sample ID: D2

Collection Date: 12/13/2019 10:30:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56000

Analyst: WF

Chromium, Hexavalent	ND	0.0450		mg/L	1	12/13/2019 6:29:00 PM
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Work Order: 1912247
 CLIENT: Friedman & Bruya
 Project: 912243

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-56000	SampType: MBLK	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: MBLKW	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115098							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450

Sample ID: LCS-56000	SampType: LCS	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: LCSW	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115099							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.250 0.0450 0.2500 0 99.9 80.9 115

Sample ID: 1912213-001ADUP	SampType: DUP	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: BATCH	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115101							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450 0 30 H

Sample ID: 1912213-001AMS	SampType: MS	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: BATCH	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115102							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.246 0.0450 0.2500 0 98.4 46.2 138 H

Sample ID: 1912213-001AMSD	SampType: MSD	Units: mg/L	Prep Date: 12/13/2019	RunNo: 56000							
Client ID: BATCH	Batch ID: R56000		Analysis Date: 12/13/2019	SeqNo: 1115103							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.249 0.0450 0.2500 0 99.6 46.2 138 0.2460 1.21 20 H

Client Name: FB	Work Order Number: 1912247
Logged by: Clare Griggs	Date Received: 12/13/2019 5:11:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes No NA
No cooler present.
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
Unknown prior to receipt.
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
Refer to item information.
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Sample	12.7

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912243

Send Report To Michael Erdahl

Company Friedman and Bryva, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER <i>Friedman</i>	
PROJECT NAME/NO. 912243	PO # A-485
REMARKS Please Email Results	

Page # _____ of _____

TURNAROUND TIME

Standard (2 Weeks)
 RUSH by Mon 12/16
 Rush charges authorized by: *[Signature]*

SAMPLE DISPOSAL

Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED			Notes
						Dioxins/Furans	EPH	VPH	
Room 1		1055 ← →	12/13	W	1			Hex Cr	
D1B		1115 ← →	↓	W	1			✓	
D2		1030 ← →	↓	W	1			✓	

Friedman & Bryva, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

Relinquished by: <i>[Signature]</i>	SIGNATURE	Michael Erdahl	PRINT NAME	Friedman & Bryva	COMPANY	12/13	DATE	16:25	TIME
Relinquished by: <i>[Signature]</i>	SIGNATURE	Michael Erdahl	PRINT NAME	Friedman & Bryva	COMPANY	12/13	DATE	17:11	TIME

912243

SAMPLE CHAIN OF CUSTODY

M E 12-13-19 12-13-19 of 12-13-19

Report To Angie Goodwin

Company Hill Country

Address _____

City, State, ZIP _____

Phone _____ Email angie.goodwin@hillcountry.com

SAMPLERS (signature)	PROJECT NAME	PO #
<u>Angie Goodwin</u>	<u>CGMS</u>	
REMARKS	INVOICE TO	
Project specific RIIS? - Yes / No		

TURNAROUND TIME	SAMPLE DISPOSAL
Standard turnaround	<input type="checkbox"/> Archive samples
RUSH	<input type="checkbox"/> Other
Rush charges authorized by:	Default: Dispose after 30 days
<u>ATI</u>	

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
<u>B Room 1</u>	<u>01A-G</u>	<u>12/13</u>	<u>1055</u>	<u>water</u>	<u>7</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>low level Hg</u>	<u>ASL CPL 5/14/19</u>
<u>D1B</u>	<u>021</u>	<u>↓</u>	<u>1115</u>	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>Total Metals</u>	
<u>DZ</u>	<u>031</u>	<u>↓</u>	<u>1030</u>	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>Hg + Chrome</u>	

Samples received at 4 °C

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>Angie Goodwin</u>	<u>Angie Goodwin</u>	<u>HC</u>	<u>12/13</u>	<u>1604</u>
<u>Liz Weber-Bruya</u>	<u>Liz Weber-Bruya</u>	<u>F161</u>	<u>12/13/19</u>	<u>1604</u>
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 23, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 16, 2019 from the Kosmos, F&BI 912264 project. There are 26 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1223R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 16, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912264 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912264 -01	D1B
912264 -02	Boom1
912264 -03	D2
912264 -04	D1B
912264 -05	Boom1
912264 -06	D2

Sample D1B, Boom1, and D2 were sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

The 1631E sample Boom1 (912264-02) preserved at the laboratory on 12/18/19. The data were qualified accordingly.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
 Date Received: 12/16/19
 Project: Kosmos, F&BI 912264
 Date Extracted: 12/17/19
 Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
D1B 912264-01	<1	<1	<1	<3	<100	87
Boom1 912264-02	<1	<1	<1	<3	<100	83
D2 912264-03	<1	<1	<1	<3	<100	85
D1B 912264-04	<1	<1	<1	<3	<100	83
Boom1 912264-05	<1	<1	<1	<3	<100	82
D2 912264-06	<1	<1	<1	<3	<100	82
Method Blank 09-2927 MB	<1	<1	<1	<3	<100	77

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912264
Date Extracted: 12/17/19
Date Analyzed: 12/17/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-D_x
Extended to Include Motor Oil Range Compounds
Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
D1B 912264-01	<250	102
Boom1 912264-02	<250	108
D2 912264-03	1,100 x	79
D1B 912264-04	<250	101
Boom1 912264-05	<250	93
D2 912264-06	450 x	103
Method Blank 09-3050 MB	<250	78

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912264
Date Extracted: NA
Date Analyzed: 12/17/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D1B 912264-01	7.5
Boom1 912264-02	7.5
D2 912264-03	7.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-01 x10
Date Analyzed:	12/17/19	Data File:	912264-01 x10.059
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	8.46
Magnesium	1.98
Hardness (as CaCO ₃)	29.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-02 x10
Date Analyzed:	12/17/19	Data File:	912264-02 x10.060
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	8.54
Magnesium	2.00
Hardness (as CaCO ₃)	29.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-03 x10
Date Analyzed:	12/17/19	Data File:	912264-03 x10.061
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	10.9
Magnesium	3.82
Hardness (as CaCO ₃)	42.9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-04 x10
Date Analyzed:	12/17/19	Data File:	912264-04 x10.062
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.06
Magnesium	2.11
Hardness (as CaCO ₃)	31.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-05 x10
Date Analyzed:	12/17/19	Data File:	912264-05 x10.063
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	8.98
Magnesium	2.06
Hardness (as CaCO ₃)	30.9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-06 x10
Date Analyzed:	12/17/19	Data File:	912264-06 x10.064
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	11.4
Magnesium	3.54
Hardness (as CaCO ₃)	43.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	I9-810 mb
Date Analyzed:	12/17/19	Data File:	I9-810 mb.051
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO ₃)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-01
Date Analyzed:	12/17/19	Data File:	912264-01.103
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-02
Date Analyzed:	12/17/19	Data File:	912264-02.106
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-03
Date Analyzed:	12/17/19	Data File:	912264-03.107
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	0.654
Cadmium	<0.25
Chromium	2.95
Copper	16.2
Lead	1.36
Nickel	1.92
Zinc	38.4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-04
Date Analyzed:	12/19/19	Data File:	912264-04.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-05
Date Analyzed:	12/19/19	Data File:	912264-05.073
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	0.510
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	912264-06
Date Analyzed:	12/17/19	Data File:	912264-06.110
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	4.22
Lead	<0.5
Nickel	<0.5
Zinc	47.7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912264
Date Extracted:	12/17/19	Lab ID:	I9-809 mb
Date Analyzed:	12/19/19	Data File:	I9-809 mb.069
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912264
Date Extracted: 12/17/19
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D1B 912264-01	0.0016
Boom1 pc 912264-02	0.0020
D2 912264-03	0.019
D1B 912264-04	0.00077
Boom1 912264-05	0.00085
D2 912264-06	0.0052
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912264

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912184-03 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	77	65-118
Toluene	ug/L (ppb)	50	88	72-122
Ethylbenzene	ug/L (ppb)	50	103	73-126
Xylenes	ug/L (ppb)	150	97	74-118
Gasoline	ug/L (ppb)	1,000	103	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912264

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	100	63-142	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912264

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912243-03 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.2	7.3	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912264

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912243-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	7.38	104 b	136 b	70-130	27 b
Magnesium	mg/L (ppm)	1.0	2.02	92	105	70-130	13

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	103	85-115
Magnesium	mg/L (ppm)	1.0	103	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912264

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912264-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	104	98	70-130	6
Cadmium	ug/L (ppb)	5	<0.25	99	94	70-130	5
Chromium	ug/L (ppb)	20	<0.5	103	99	70-130	4
Copper	ug/L (ppb)	20	<2	99	95	70-130	4
Lead	ug/L (ppb)	10	<0.5	103	97	70-130	6
Nickel	ug/L (ppb)	20	<0.5	103	117	70-130	13
Zinc	ug/L (ppb)	50	<2.5	96	94	70-130	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	103	85-115
Cadmium	ug/L (ppb)	5	100	85-115
Chromium	ug/L (ppb)	20	100	85-115
Copper	ug/L (ppb)	20	103	85-115
Lead	ug/L (ppb)	10	101	85-115
Nickel	ug/L (ppb)	20	106	85-115
Zinc	ug/L (ppb)	50	101	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912264

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912264-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0052	100	92	71-125	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	99	78-125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



Friedman & Bruya

Michael Erdahl

3012 16th Ave. W.

Seattle, WA 98119

RE: 912264

Work Order Number: 1912270

December 18, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 12/17/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

CLIENT: Friedman & Bruya
Project: 912264
Work Order: 1912270

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912270-001	D1B	12/16/2019 11:20 AM	12/17/2019 10:34 AM
1912270-002	Boom 1	12/16/2019 11:00 AM	12/17/2019 10:34 AM
1912270-003	D2	12/16/2019 11:50 AM	12/17/2019 10:34 AM

CLIENT: Friedman & Bruya
Project: 912264

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya

Collection Date: 12/16/2019 11:20:00 AM

Project: 912264

Lab ID: 1912270-001

Matrix: Water

Client Sample ID: D1B

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56084

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/17/2019 11:42:00 AM



Client: Friedman & Bruya

Collection Date: 12/16/2019 11:00:00 AM

Project: 912264

Lab ID: 1912270-002

Matrix: Water

Client Sample ID: Boom 1

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56084

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/17/2019 11:22:00 AM



Client: Friedman & Bruya

Collection Date: 12/16/2019 11:50:00 AM

Project: 912264

Lab ID: 1912270-003

Matrix: Water

Client Sample ID: D2

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56084

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/17/2019 11:47:00 AM

Client Name: **FB**

 Work Order Number: **1912270**

 Logged by: **Clare Griggs**

 Date Received: **12/17/2019 10:34:00 AM**

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
7. Were all items received at a temperature of $>0^{\circ}\text{C}$ to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	8.6
Sample	6.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1912264

Page # of

Send Report To Michael Erdahl
Friedman and Bruya, Inc.

Company 3012 16th Ave W

Address Seattle, WA 98119

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTOR

PROJECT NAME/NO.

912264

PO #

A-485

REMARKS

Please Email Results

ANALYSES REQUESTED

Standard (2 Weeks)
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Notes
D1B		12/16	1120	Water	1				
Room 1			1100		1			X	
D2			1150		1			X	

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Reinquished by: Stan D. W. By

~~Michael Erdahl~~ Liz Webber-Bruya

Friedman & Bruya

12/17/19

9:00

Received by: _____

Sara Beller-Mayer

FBI

12/17/19

1034

Reinquished by:

Received by:

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

912264

Report To Angie Goodwin

Company _____

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLE CHAIN OF CUSTODY

ME 12/16/19 Page # 1 of 1 11/23/Day

SAMPLERS (signature)

PROJECT NAME

CSMS

PO #

REMARKS

INVOICE TO

Project specific RIs? - Yes / No

TURNAROUND TIME

Standard turnaround

RUSH

Rush charges authorized by: ADK

SAMPLE DISPOSAL

Archive samples

Other

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	pH	Total Metals	Other		Com. level th	
D1B	D1AG	12/14	1400	water	7	X	X	X					X	X	X	X		AS, G, Pb, Cd, Cr, Ni, Zn
Boom 1			1410			X	X	X					X	X	X	X		
P2			1420			X	X	X					X	X	X	X		
D1B		12/16				X	X	X					X	X	X	X		
Boom 1						X	X	X					X	X	X	X		
D2						X	X	X					X	X	X	X		

SIGNATURE

Relinquished by: [Signature]

Received by: [Signature]

Relinquished by: _____

Received by: _____

PRINT NAME

Andrew Johnson

BISWAT ADJESSE

COMPANY

HC

DATE

12/16

TIME

1215

Samples received at: 200

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 23, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 17, 2019 from the Kosmos, F&BI 912295 project. There are 18 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1223R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 17, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912295 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912295 -01	D1B
912295 -02	Boom1

The samples were sent to Fremont Analytical for hexavalent chromium analysis. The sample analysis could not happen within the holding time, therefore the analysis was canceled.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/17/19
Project: Kosmos, F&BI 912295
Date Extracted: 12/18/19
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
D1B 912295-01	<1	<1	<1	<3	<100	78
Boom1 912295-02	<1	<1	<1	<3	<100	78
Method Blank 09-2930 MB	<1	<1	<1	<3	<100	79

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/17/19
Project: Kosmos, F&BI 912295
Date Extracted: 12/18/19
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-D_x
Extended to Include Motor Oil Range Compounds
Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 47-140)
D1B 912295-01	<250	133
Boom1 912295-02	<250	132
Method Blank 09-3050 MB2	<250	138

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/17/19
Project: Kosmos, F&BI 912295
Date Extracted: NA
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D1B 912295-01	7.7
Boom1 912295-02	7.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912295
Date Extracted:	12/18/19	Lab ID:	912295-01 x10
Date Analyzed:	12/19/19	Data File:	912295-01 x10.020
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	13.5
Magnesium	2.74
Hardness (as CaCO ₃)	45.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912295
Date Extracted:	12/18/19	Lab ID:	912295-02 x10
Date Analyzed:	12/19/19	Data File:	912295-02 x10.021
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	11.5
Magnesium	2.36
Hardness (as CaCO ₃)	38.4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912295
Date Extracted:	12/18/19	Lab ID:	I9-810 mb2
Date Analyzed:	12/19/19	Data File:	I9-810 mb2.019
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.3
Magnesium	<0.05
Hardness (as CaCO ₃)	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912295
Date Extracted:	12/19/19	Lab ID:	912295-01
Date Analyzed:	12/19/19	Data File:	912295-01.067
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Boom1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912295
Date Extracted:	12/19/19	Lab ID:	912295-02
Date Analyzed:	12/19/19	Data File:	912295-02.068
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912295
Date Extracted:	12/19/19	Lab ID:	I9-817 mb
Date Analyzed:	12/19/19	Data File:	I9-817 mb.084
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/17/19
Project: Kosmos, F&BI 912295
Date Extracted: 12/17/19
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D1B 912295-01	0.00071
Boom1 912295-02	<0.0007
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912295

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912295-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	97	65-118
Toluene	ug/L (ppb)	50	97	72-122
Ethylbenzene	ug/L (ppb)	50	102	73-126
Xylenes	ug/L (ppb)	150	96	74-118
Gasoline	ug/L (ppb)	1,000	100	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912295

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	100	63-142	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912295

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912295-02 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.5	7.6	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912295

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: 912243-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	7.38	104 b	136 b	70-130	27 b
Magnesium	mg/L (ppm)	1.0	2.02	92	105	70-130	13

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Calcium	mg/L (ppm)	1.0	103	85-115
Magnesium	mg/L (ppm)	1.0	103	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912295

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912329-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	95	94	70-130	1
Cadmium	ug/L (ppb)	5	<0.25	97	95	70-130	2
Chromium	ug/L (ppb)	20	<1	100	98	70-130	2
Copper	ug/L (ppb)	20	4.54	94	89	70-130	5
Lead	ug/L (ppb)	10	0.541	98	96	70-130	2
Nickel	ug/L (ppb)	20	1.30	97	93	70-130	4
Zinc	ug/L (ppb)	50	3.82	91	87	70-130	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	97	85-115
Cadmium	ug/L (ppb)	5	99	85-115
Chromium	ug/L (ppb)	20	103	85-115
Copper	ug/L (ppb)	20	100	85-115
Lead	ug/L (ppb)	10	99	85-115
Nickel	ug/L (ppb)	20	102	85-115
Zinc	ug/L (ppb)	50	100	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912295

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912264-06 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0052	100	92	71-125	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	99	78-125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

9/12/2015

Samples Shipped to: _____



HART CROWSER

ME 12/17/19

Andy Boy / UW2
31 Elliott Avenue, Suite 600
Seattle, Washington 98121

Hart Crowser, Inc.

Office: 206.324.9530 • Fax 206.328.5581

JOB 1944900 LAB NUMBER _____

PROJECT NAME cas mos

HART CROWSER CONTACT Angie Cookman

SAMPLED BY: AAV

REQUESTED ANALYSIS

Dr
Gx/BTEX
Lowlevel Hg
Hex C
Total metals

NO. OF CONTAINERS

OBSERVATIONS/COMMENTS/
COMPOSITING INSTRUCTIONS

LAB NO. 014-6 SAMPLE ID DIB DESCRIPTION 12/17 1000 water DATE 12/17 TIME 1000 MATRIX water

021 Bom 1 cos cos cos

ASGC Pb, Cd, Cu, Ni, Zn
could not be performed within AT performance in 12/17/14

Samples received at 600

SPECIAL SHIPMENT HANDLING OR
STORAGE REQUIREMENTS:

TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: YES NO N/A
GOOD CONDITION: YES NO

TEMPERATURE: _____
SHIPMENT METHOD: HAND OVERNIGHT
 COURIER

TURNAROUND TIME:

24 HOURS 1 WEEK
 48 HOURS STANDARD
 72 HOURS OTHER _____

COOLER NO.:

STORAGE LOCATION:

See Lab Work Order No. _____
for Other Contract Requirements

RELINQUISHED BY	DATE	RECEIVED BY	DATE
<i>[Signature]</i>	12/17	<i>[Signature]</i>	12/17/19
PRINT NAME: <u>Anden Nakagawa</u>	TIME: _____	PRINT NAME: <u>Y. P. [Signature]</u>	TIME: _____
COMPANY: _____	DATE: 8/17/35	COMPANY: _____	DATE: 1/7:55

RELINQUISHED BY	DATE	RECEIVED BY	DATE
_____	_____	_____	_____

SIGNATURE	TIME	SIGNATURE	TIME
_____	_____	_____	_____

PRINT NAME	TIME	PRINT NAME	TIME
_____	_____	_____	_____

COMPANY	COMPANY
_____	_____

White to Lab Yellow to Project Manager Pink to Sample Custodian

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 23, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin :

Included are the results from the testing of material submitted on December 18, 2019 from the Kosmos, F&BI 912329 project. There are 16 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1223R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 18, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912329 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912329 -01	D1B

Sample D1B was sent to Fremont Analytical for hexavalent chromium analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/18/19
Project: Kosmos, F&BI 912329
Date Extracted: 12/19/19
Date Analyzed: 12/19/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 52-124)
D1B 912329-01	<1	<1	<1	<3	<100	77
Method Blank 09-2932 MB	<1	<1	<1	<3	<100	78

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/18/19
Project: Kosmos, F&BI 912329
Date Extracted: 12/19/19
Date Analyzed: 12/19/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL
USING METHOD NWTPH-Dx
Extended to Include Motor Oil Range Compounds
Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C ₁₀ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
D1B 912329-01	<250	86
Method Blank 09-3058 MB2	<250	90

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/18/19
Project: Kosmos, F&BI 912329
Date Extracted: NA
Date Analyzed: 12/19/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH
USING EPA METHOD 150.2**

<u>Sample ID</u> Laboratory ID	<u>pH</u>
D1B 912329-01	7.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912329
Date Extracted:	12/19/19	Lab ID:	912329-01
Date Analyzed:	12/19/19	Data File:	912329-01.086
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	4.54
Lead	0.541
Nickel	1.30
Zinc	3.82

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912329
Date Extracted:	12/19/19	Lab ID:	I9-817 mb
Date Analyzed:	12/19/19	Data File:	I9-817 mb.084
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<0.5
Cadmium	<0.25
Chromium	<1
Copper	<2
Lead	<0.5
Nickel	<0.5
Zinc	<2.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	D1B	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912329
Date Extracted:	12/19/19	Lab ID:	912329-01 x10
Date Analyzed:	12/19/19	Data File:	912329-01 x10.080
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	9.75
Magnesium	2.46
Hardness (as CaCO ₃)	34.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Hardness By EPA Method 200.8 and SM 2340B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912329
Date Extracted:	12/19/19	Lab ID:	I9-818 mb
Date Analyzed:	12/19/19	Data File:	I9-818 mb.077
Matrix:	Water	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)
Calcium	<0.05
Magnesium	<0.05
Hardness (as CaCO ₃)	<0.35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19
Date Received: 12/18/19
Project: Kosmos, F&BI 912329
Date Extracted: 12/19/19
Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL MERCURY
USING EPA METHOD 1631E**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Total Mercury</u>
D1B 912329-01	0.0052
Method Blank	<0.0007

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912329

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912319-29 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	96	65-118
Toluene	ug/L (ppb)	50	97	72-122
Ethylbenzene	ug/L (ppb)	50	102	73-126
Xylenes	ug/L (ppb)	150	94	74-118
Gasoline	ug/L (ppb)	1,000	101	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912329

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	112	108	61-133	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912329

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF WATER SAMPLES
FOR pH BY METHOD 150.2**

Laboratory Code: 912295-02 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	7.5	7.6	1	0-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912329

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912329-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<0.5	95	94	70-130	1
Cadmium	ug/L (ppb)	5	<0.25	97	95	70-130	2
Chromium	ug/L (ppb)	20	<1	100	98	70-130	2
Copper	ug/L (ppb)	20	4.54	94	89	70-130	5
Lead	ug/L (ppb)	10	0.541	98	96	70-130	2
Nickel	ug/L (ppb)	20	1.30	97	93	70-130	4
Zinc	ug/L (ppb)	50	3.82	91	87	70-130	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	97	85-115
Cadmium	ug/L (ppb)	5	99	85-115
Chromium	ug/L (ppb)	20	103	85-115
Copper	ug/L (ppb)	20	100	85-115
Lead	ug/L (ppb)	10	99	85-115
Nickel	ug/L (ppb)	20	102	85-115
Zinc	ug/L (ppb)	50	100	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912329

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8 AND SM 2340B**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Calcium	mg/L (ppm)	1.0	104	102	85-115	2
Magnesium	mg/L (ppm)	1.0	98	96	85-115	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/23/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912329

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS
OF WATER SAMPLES FOR TOTAL MERCURY
USING EPA METHOD 1631E**

Laboratory Code: 912329-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Mercury	ug/L (ppb)	0.01	0.0052	97	101	71-125	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Mercury	ug/L (ppb)	0.01	99	78-125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 912329
Work Order Number: 1912325

December 20, 2019

Attention Michael Erdahl:

Fremont Analytical, Inc. received 1 sample(s) on 12/19/2019 for the analyses presented in the following report.

Hexavalent Chromium by SM 3500 Cr B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)



Date: 12/20/2019

CLIENT: Friedman & Bruya
Project: 912329
Work Order: 1912325

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1912325-001	DIB	12/18/2019 12:45 PM	12/19/2019 9:29 AM

CLIENT: Friedman & Bruya

Project: 912329

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Friedman & Bruya

Collection Date: 12/18/2019 12:45:00 PM

Project: 912329

Lab ID: 1912325-001

Matrix: Water

Client Sample ID: DIB

Analyses

Result

RL

Qual

Units

DF

Date Analyzed

Hexavalent Chromium by SM 3500 Cr B

Batch ID: R56143

Analyst: WF

Chromium, Hexavalent

ND

0.0450

mg/L

1

12/19/2019 10:49:00 AM

Work Order: 1912325
 CLIENT: Friedman & Bruya
 Project: 912329

QC SUMMARY REPORT
Hexavalent Chromium by SM 3500 Cr B

Sample ID: MB-56143	SampType: MBLK	Units: mg/L	Prep Date: 12/19/2019	RunNo: 56143							
Client ID: MBLKW	Batch ID: R56143		Analysis Date: 12/19/2019	SeqNo: 1118479							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450

Sample ID: LCS-56143	SampType: LCS	Units: mg/L	Prep Date: 12/19/2019	RunNo: 56143							
Client ID: LCSW	Batch ID: R56143		Analysis Date: 12/19/2019	SeqNo: 1118480							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.241 0.0450 0.2500 0 96.6 80.9 115

Sample ID: 1912325-001ADUP	SampType: DUP	Units: mg/L	Prep Date: 12/19/2019	RunNo: 56143							
Client ID: DIB	Batch ID: R56143		Analysis Date: 12/19/2019	SeqNo: 1118482							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent ND 0.0450 0 30

Sample ID: 1912325-001AMS	SampType: MS	Units: mg/L	Prep Date: 12/19/2019	RunNo: 56143							
Client ID: DIB	Batch ID: R56143		Analysis Date: 12/19/2019	SeqNo: 1118483							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.242 0.0450 0.2500 0 96.8 46.2 138

Sample ID: 1912325-001AMSD	SampType: MSD	Units: mg/L	Prep Date: 12/19/2019	RunNo: 56143							
Client ID: DIB	Batch ID: R56143		Analysis Date: 12/19/2019	SeqNo: 1118484							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chromium, Hexavalent 0.248 0.0450 0.2500 0 99.1 46.2 138 0.2419 2.41 20

Client Name: FB	Work Order Number: 1912325
Logged by: Carissa True	Date Received: 12/19/2019 9:29:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes No NA
No cooler present
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) Yes No Not Required
6. Was an attempt made to cool the samples? Yes No NA
Sample received at appropriate temperature
7. Were all items received at a temperature of >0°C to 10.0°C * Yes No NA
8. Sample(s) in proper container(s)? Yes No
9. Sufficient sample volume for indicated test(s)? Yes No
10. Are samples properly preserved? Yes No
11. Was preservative added to bottles? Yes No NA
12. Is there headspace in the VOA vials? Yes No NA
13. Did all samples containers arrive in good condition(unbroken)? Yes No
14. Does paperwork match bottle labels? Yes No
15. Are matrices correctly identified on Chain of Custody? Yes No
16. Is it clear what analyses were requested? Yes No
17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text" value="Michael Erdahl"/>	Date:	<input type="text" value="12/18/2019"/>
By Whom:	<input type="text" value="Carissa True"/>	Via:	<input type="checkbox"/> eMail <input checked="" type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text" value="Confirm sample date and time"/>		
Client Instructions:	<input type="text" value="See updated COC"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Sample 1	6.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 13, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 6, 2019 from the Kosmos 19499-00, F&BI 912125 project. There are 16 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1213R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 6, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos 19499-00, F&BI 912125 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912125 -01	SP2-6
912125 -02	SP2-7
912125 -03	SP1-5

A 6020B internal standard failed the acceptance criteria for samples SP2-6 and SP2-7. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported. In addition, selenium in the matrix spike failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the result was due to matrix effect.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
Date Received: 12/06/19
Project: Kosmos 19499-00, F&BI 912125
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**
Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
SP2-6 912125-01 1/5	<0.02 j	<0.1	<0.1	<0.3	<25	89
SP2-7 912125-02 1/5	<0.02 j	<0.1	<0.1	<0.3	<25	89
Method Blank 09-2915 MB	<0.02	<0.02	<0.02	<0.06	<5	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
Date Received: 12/06/19
Project: Kosmos 19499-00, F&BI 912125
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 48-168)
SP2-6 912125-01	660	2,300	99
SP2-7 912125-02	12,000	12,000	117
Method Blank 09-2988 MB	<50	<250	108

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-6	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	912125-01
Date Analyzed:	12/09/19	Data File:	912125-01.083
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.81
Barium	54.8
Cadmium	<1
Chromium	11.0 J
Lead	9.06
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-6	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	912125-01 x5
Date Analyzed:	12/10/19	Data File:	912125-01 x5.058
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	13.5
----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-7	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	912125-02
Date Analyzed:	12/09/19	Data File:	912125-02.084
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.18
Barium	70.1
Cadmium	<1
Chromium	12.0 J
Lead	21.8
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-7	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	912125-02 x5
Date Analyzed:	12/10/19	Data File:	912125-02 x5.059
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Chromium	15.6
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	I9-777 mb
Date Analyzed:	12/09/19	Data File:	I9-777 mb.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-6	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	912125-01 1/25
Date Analyzed:	12/10/19	Data File:	121011.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	119 d	31	163
Benzo(a)anthracene-d12	118 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	0.070
Fluorene	0.14
Phenanthrene	0.41
Anthracene	0.11
Fluoranthene	0.063
Pyrene	0.66
Benz(a)anthracene	0.16
Chrysene	0.30
Benzo(a)pyrene	0.14
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-7	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	912125-02 1/250
Date Analyzed:	12/09/19	Data File:	120925.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	376 d	31	163
Benzo(a)anthracene-d12	138 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	0.90
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	2.1
Benz(a)anthracene	0.52
Chrysene	0.96
Benzo(a)pyrene	0.35
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912125
Date Extracted:	12/09/19	Lab ID:	09-2991 mb 1/5
Date Analyzed:	12/09/19	Data File:	120915.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	88	31	163
Benzo(a)anthracene-d12	96	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912125

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912073-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	89	69-120
Toluene	mg/kg (ppm)	0.5	88	70-117
Ethylbenzene	mg/kg (ppm)	0.5	87	65-123
Xylenes	mg/kg (ppm)	1.5	90	66-120
Gasoline	mg/kg (ppm)	20	90	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912125

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912120-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	180	92	94	73-135	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	104	74-139

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912125

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912132-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	75	78	75-125	4
Barium	mg/kg (ppm)	50	42.5	118	102	75-125	15
Cadmium	mg/kg (ppm)	10	<5	98	98	75-125	0
Chromium	mg/kg (ppm)	50	10.8	88	86	75-125	2
Lead	mg/kg (ppm)	50	10.2	99	103	75-125	4
Mercury	mg/kg (ppm)	5	<5	93	87	75-125	7
Selenium	mg/kg (ppm)	5	<5	71 vo	79	75-125	11
Silver	mg/kg (ppm)	10	<5	98	100	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	93	80-120
Barium	mg/kg (ppm)	50	110	80-120
Cadmium	mg/kg (ppm)	10	108	80-120
Chromium	mg/kg (ppm)	50	103	80-120
Lead	mg/kg (ppm)	50	112	80-120
Mercury	mg/kg (ppm)	5	90	80-120
Selenium	mg/kg (ppm)	5	103	80-120
Silver	mg/kg (ppm)	10	112	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912125

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	85	90	58-121	6
Acenaphthylene	mg/kg (ppm)	0.17	91	101	54-121	10
Acenaphthene	mg/kg (ppm)	0.17	88	95	54-123	8
Fluorene	mg/kg (ppm)	0.17	94	99	56-127	5
Phenanthrene	mg/kg (ppm)	0.17	88	93	55-122	6
Anthracene	mg/kg (ppm)	0.17	88	91	50-120	3
Fluoranthene	mg/kg (ppm)	0.17	96	98	54-129	2
Pyrene	mg/kg (ppm)	0.17	94	99	53-127	5
Benz(a)anthracene	mg/kg (ppm)	0.17	95	99	51-115	4
Chrysene	mg/kg (ppm)	0.17	91	96	55-129	5
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	88	89	56-123	1
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	89	91	54-131	2
Benzo(a)pyrene	mg/kg (ppm)	0.17	83	84	51-118	1
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	71	83	49-148	16
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	68	79	50-141	15
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	63	74	52-131	16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

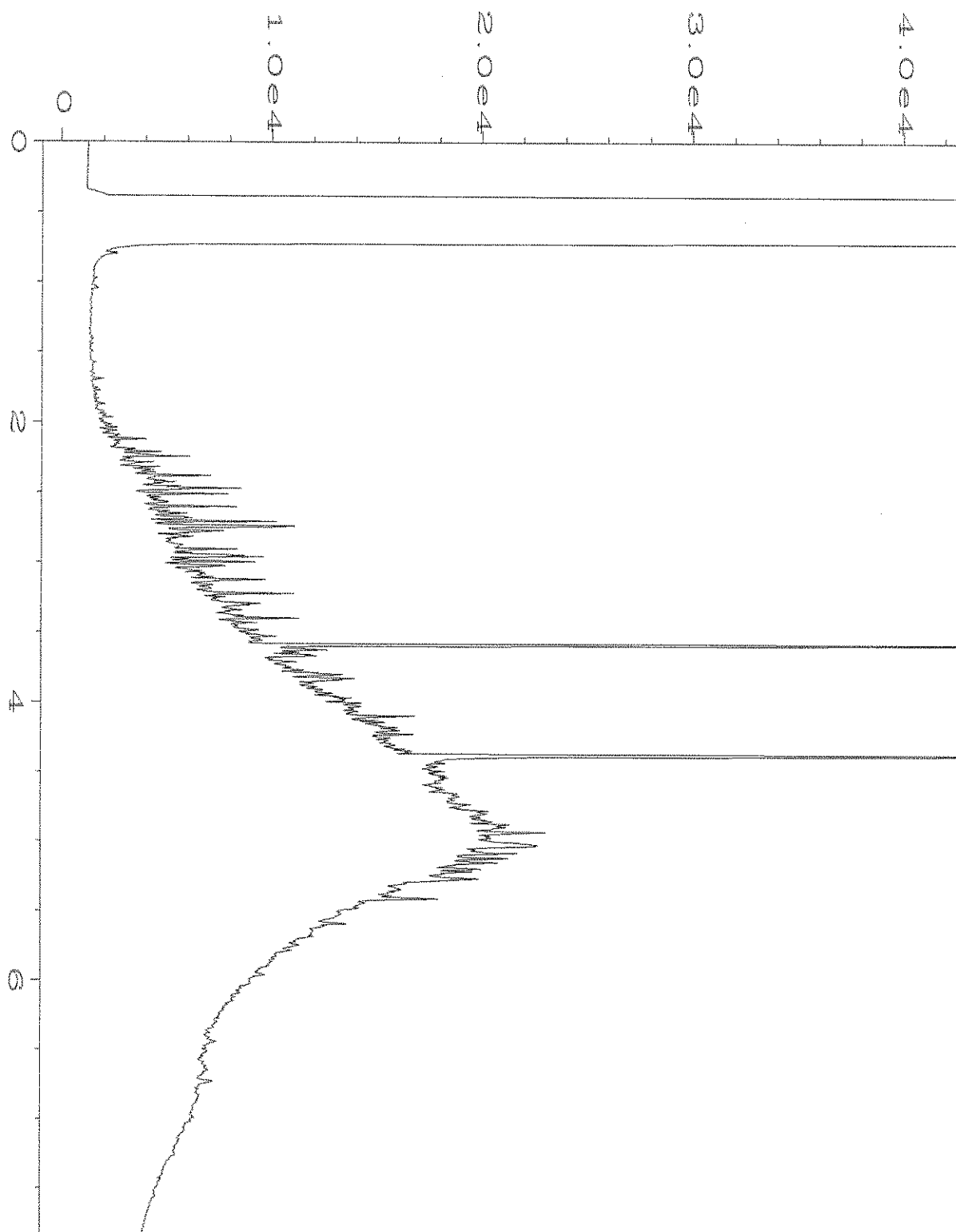
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

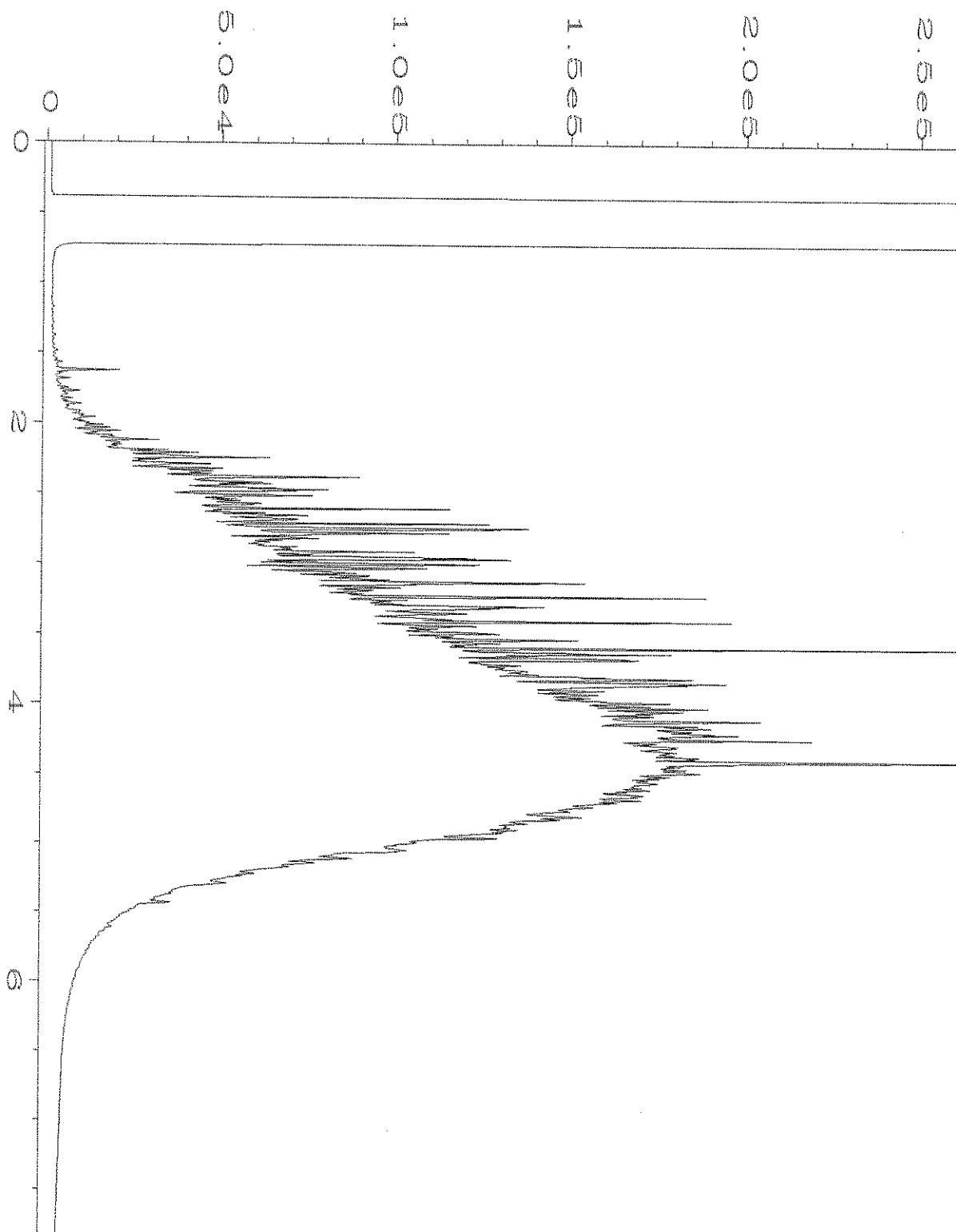
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

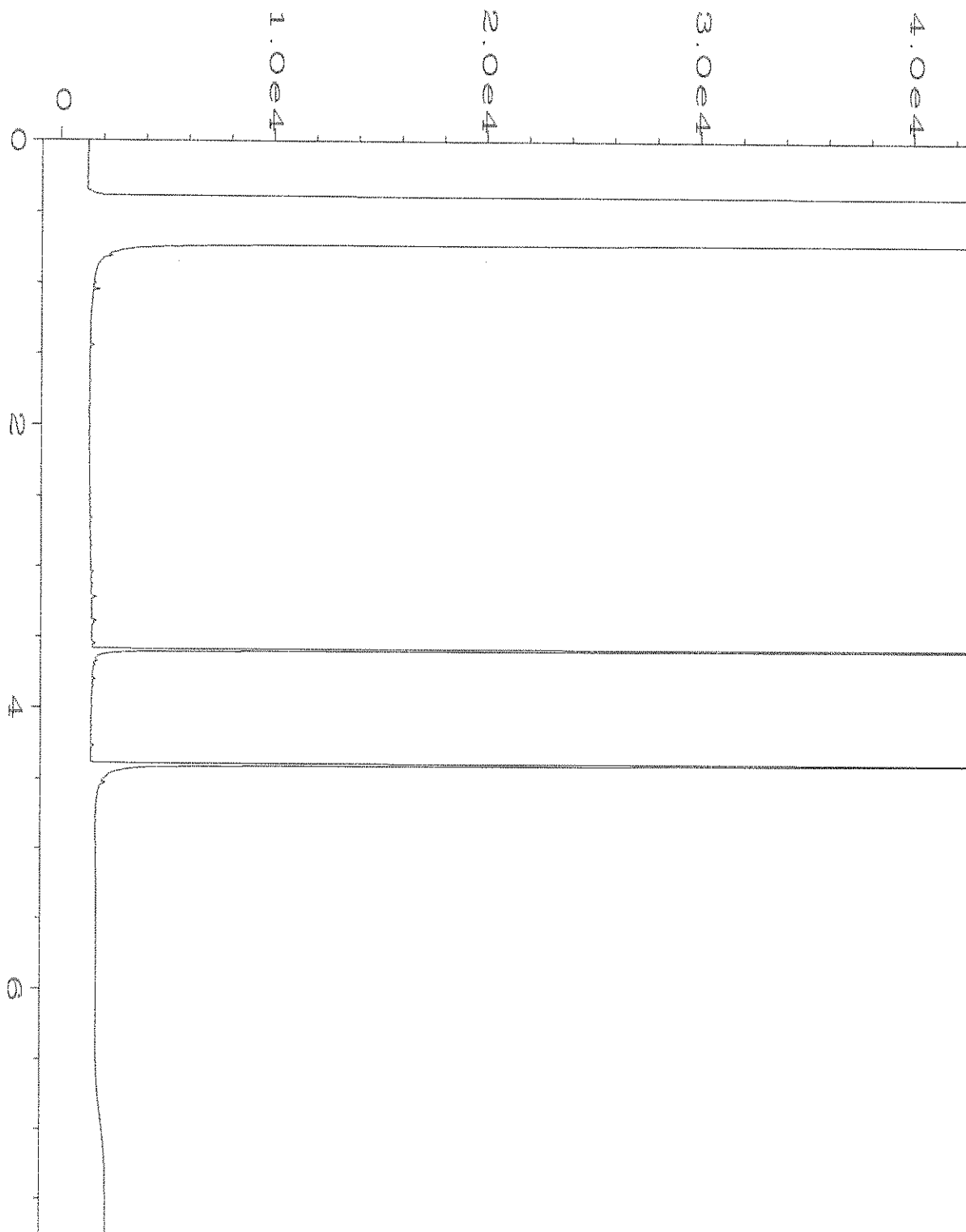
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



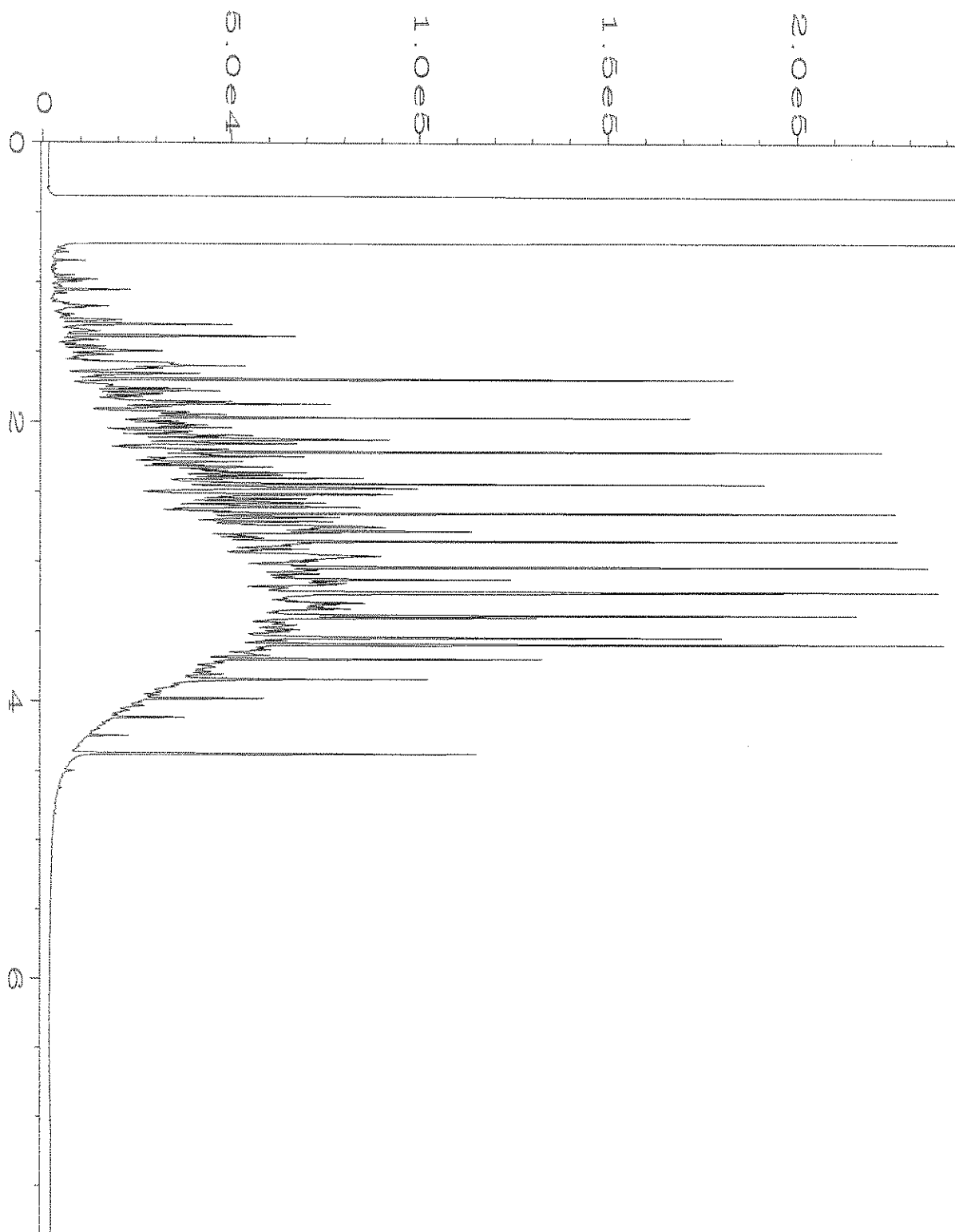
Data File Name	: C:\HPCHEM\4\DATA\12-09-19\023F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 23
Instrument	: GC#4	Injection Number	: 1
Sample Name	: 912125-01	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 11:43 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	10 Dec 19 08:05 AM		



Data File Name	: C:\HPCHEM\4\DATA\12-09-19\024F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 24
Instrument	: GC#4	Injection Number	: 1
Sample Name	: 912125-02	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 12:07 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	10 Dec 19 08:05 AM		



Data File Name	: C:\HPCHEM\4\DATA\12-09-19\006F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 6
Instrument	: GC#4	Injection Number	: 1
Sample Name	: 09-2988 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 08:21 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	10 Dec 19 07:59 AM		



Data File Name	: C:\HPCHEM\4\DATA\12-09-19\005F0401.D	Page Number	: 1
Operator	: TL	Vial Number	: 5
Instrument	: GC#4	Injection Number	: 1
Sample Name	: 1000 Dx 58-146C	Sequence Line	: 4
Run Time Bar Code:		Instrument Method	: DX.MTH
Acquired on	: 09 Dec 19 02:09 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	10 Dec 19 08:04 AM		

912125

SAMPLE CHAIN OF CUSTODY

ME 12/6/19

VSI / BEI

Report To Angie Goodwin

Company Hart Crousser

Address 3131 Elliott Ave

City, State, ZIP 98119, Seattle, WA

Phone _____ Email Angie.goodwin@hartcrousser.com

SAMPLERS (signature)

PROJECT NAME

KOSMDS

PO #

19499-00

REMARKS

INVOICE TO

Project specific RLS? - Yes / No

Page # 1 of 1

TURNAROUND TIME

Standard turnaround

RUSH 24hr

Rush charges authorized by: _____

SAMPLE DISPOSAL

Archive samples

Other _____

Default: Dispose after 30 days

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED								Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	RCRA 8 Metals			
SP2-6	01AE	12/6/19	1538	SOI1	5	X	X	X			X					
SP2-7		12/6/19	1538	SOI1	5	X	X	X			X					
SP2-7	02AE	12/6/19	1543	SOI1	5	X	X	X			X		X			
SP1-5	03			SOI1	1											added to COC BIR5
																Samples received at 300

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Relinquished by: Valeri Niemi

Received by: Jolie Higgins

Relinquished by: [Signature]

Received by: [Signature]

Jolie Higgins

BIR5

Hart Crousser

#31

12/6/19

1856

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

January 13, 2020

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the additional results from the testing of material submitted on December 9, 2019 from the Kosmos, F&BI 912132 project. There are 8 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR0113R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 9, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912132 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912132 -01	SP2-8
912132 -02	SP2-9
912132 -03	SP2-10
912132 -04	SP2-11

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-8	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-01 x5
Date Analyzed:	12/10/19	Data File:	912132-01 x5.062
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	46.7
Nickel	15.4
Zinc	61.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-9	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-02 x5
Date Analyzed:	12/10/19	Data File:	912132-02 x5.065
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	51.1
Nickel	14.8
Zinc	55.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-10	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-03 x5
Date Analyzed:	12/10/19	Data File:	912132-03 x5.074
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	45.0
Nickel	13.7
Zinc	53.9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-11	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-04 x5
Date Analyzed:	12/10/19	Data File:	912132-04 x5.075
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	54.8
Nickel	16.4
Zinc	62.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	I9-777 mb
Date Analyzed:	12/09/19	Data File:	I9-777 mb.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	<5
Nickel	<1
Zinc	<5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 01/13/20

Date Received: 12/09/19

Project: Kosmos, F&BI 912132

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912132-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Copper	mg/kg (ppm)	50	35.0	95	89	75-125	7
Nickel	mg/kg (ppm)	25	11.6	95	89	75-125	7
Zinc	mg/kg (ppm)	50	46.4	96	89	75-125	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Copper	mg/kg (ppm)	50	103	80-120
Nickel	mg/kg (ppm)	25	110	80-120
Zinc	mg/kg (ppm)	50	112	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Sample Custody Record 912132

Samples Shipped to: _____



ME 12-09-19

Hart Crowser, Inc.
3131 Elliott Avenue, Suite 600
Seattle, Washington 98121
Office: 206.324.9530 • Fax 206.328.5581

JOB <u>1949900</u> LAB NUMBER _____ PROJECT NAME <u>Kosmos</u> HART CROWSER CONTACT <u>Angie Goodwin,</u> <u>Andrew Kaparos</u> SAMPLED BY: _____						REQUESTED ANALYSIS NUTPH-DX NUTPH-CX/PLC PAH PCRAK Cu, Zn, Pb Ni										NO. OF CONTAINERS 57	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS BI1 EOT 2/B VSI 1/9/20 ME
LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX												
01A-E	SP2-8		12/8	1448	Soil	X	X	X	X	X							
02	SP2-9		↓	1452	↓	X	X	X	X	X							
03	SP2-10		↓	1500	↓	X	X	X	X	X							
04	SP2-11		↓	1510	↓	X	X	X	X	X							
RELINQUISHED BY				DATE	RECEIVED BY				DATE	SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS: Samples received at <u>4°C</u>						TOTAL NUMBER OF CONTAINERS	
SIGNATURE				TIME	SIGNATURE				TIME							SAMPLE RECEIPT INFORMATION	
PRINT NAME				TIME	PRINT NAME				TIME							CUSTODY SEALS:	
COMPANY				TIME	COMPANY				TIME							<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A GOOD CONDITION <input type="checkbox"/> YES <input type="checkbox"/> NO TEMPERATURE <u>4°</u> SHIPMENT METHOD: <input checked="" type="checkbox"/> HAND <input type="checkbox"/> COURIER <input type="checkbox"/> OVERNIGHT	
RELINQUISHED BY				DATE	RECEIVED BY				DATE	COOLER NO.:		STORAGE LOCATION:		TURNAROUND TIME:			
SIGNATURE				TIME	SIGNATURE				TIME					<input checked="" type="checkbox"/> 24 HOURS <input type="checkbox"/> 1 WEEK <input type="checkbox"/> 48 HOURS <input type="checkbox"/> STANDARD <input type="checkbox"/> 72 HOURS OTHER _____			
PRINT NAME				TIME	PRINT NAME				TIME	See Lab Work Order No. _____							
COMPANY				TIME	COMPANY				TIME	for Other Contract Requirements							

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 13, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 9, 2019 from the Kosmos, F&BI 912132 project. There are 22 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1213R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 9, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912132 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912132 -01	SP2-8
912132 -02	SP2-9
912132 -03	SP2-10
912132 -04	SP2-11

A 6020B internal standard failed the acceptance criteria for all samples. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912132
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**
Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
SP2-8 912132-01 1/5	<0.02 j	<0.1	<0.1	<0.3	<25	85
SP2-9 912132-02 1/5	<0.02 j	<0.1	0.28	0.88	240	91
SP2-10 912132-03 1/5	<0.02 j	<0.1	<0.1	<0.3	<25	84
SP2-11 912132-04 1/5	<0.02 j	<0.1	<0.1	<0.3	110	87
Method Blank 09-2915 MB	<0.02	<0.02	<0.02	<0.06	<5	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912132
Date Extracted: 12/09/19
Date Analyzed: 12/09/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
SP2-8 912132-01	110 x	<250	88
SP2-9 912132-02	4,300	4,300	86
SP2-10 912132-03	440	870	81
SP2-11 912132-04	1,700	3,000	88
Method Blank 09-2989 MB	<50	<250	105

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-8	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-01
Date Analyzed:	12/09/19	Data File:	912132-01.087
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.61
Barium	52.5
Cadmium	<1
Chromium	11.2 J
Lead	13.5
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-8	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-01 x5
Date Analyzed:	12/10/19	Data File:	912132-01 x5.062
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Chromium	14.3
----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-9	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-02
Date Analyzed:	12/09/19	Data File:	912132-02.090
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.59
Barium	42.6
Cadmium	<1
Chromium	10.1 J
Lead	6.19
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-9	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-02 x5
Date Analyzed:	12/10/19	Data File:	912132-02 x5.065
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	12.4
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-10	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-03
Date Analyzed:	12/09/19	Data File:	912132-03.091
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.79
Barium	56.9
Cadmium	<1
Chromium	11.2 J
Lead	6.45
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-10	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-03 x5
Date Analyzed:	12/10/19	Data File:	912132-03 x5.074
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	13.5
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-11	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-04
Date Analyzed:	12/09/19	Data File:	912132-04.092
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.79
Barium	50.0
Cadmium	<1
Chromium	11.4 J
Lead	4.91
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP2-11	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-04 x5
Date Analyzed:	12/10/19	Data File:	912132-04 x5.075
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	16.1
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	I9-777 mb
Date Analyzed:	12/09/19	Data File:	I9-777 mb.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-8	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-01 1/25
Date Analyzed:	12/10/19	Data File:	120935.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	110 d	31	163
Benzo(a)anthracene-d12	111 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	0.050
Fluorene	0.11
Phenanthrene	0.36
Anthracene	0.10
Fluoranthene	<0.05
Pyrene	0.43
Benz(a)anthracene	0.12
Chrysene	0.19
Benzo(a)pyrene	0.071
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-9	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-02 1/250
Date Analyzed:	12/09/19	Data File:	120926.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	226 d	31	163
Benzo(a)anthracene-d12	159 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	1.2
Fluorene	2.7
Phenanthrene	8.5
Anthracene	2.1
Fluoranthene	0.60
Pyrene	4.9
Benz(a)anthracene	1.6
Chrysene	2.0
Benzo(a)pyrene	0.62
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-10	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-03 1/25
Date Analyzed:	12/10/19	Data File:	120936.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	109 d	31	163
Benzo(a)anthracene-d12	115 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	0.058
Acenaphthylene	<0.05
Acenaphthene	0.20
Fluorene	0.45
Phenanthrene	1.4
Anthracene	0.38
Fluoranthene	0.12
Pyrene	1.1
Benz(a)anthracene	0.30
Chrysene	0.52
Benzo(a)pyrene	0.16
Benzo(b)fluoranthene	0.064
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	SP2-11	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	912132-04 1/250
Date Analyzed:	12/09/19	Data File:	120927.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	322 d	31	163
Benzo(a)anthracene-d12	143 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	0.71
Phenanthrene	2.4
Anthracene	0.66
Fluoranthene	<0.5
Pyrene	3.7
Benz(a)anthracene	0.93
Chrysene	1.6
Benzo(a)pyrene	0.72
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912132
Date Extracted:	12/09/19	Lab ID:	09-2991 mb 1/5
Date Analyzed:	12/09/19	Data File:	120915.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	88	31	163
Benzo(a)anthracene-d12	96	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912132

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912073-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	89	69-120
Toluene	mg/kg (ppm)	0.5	88	70-117
Ethylbenzene	mg/kg (ppm)	0.5	87	65-123
Xylenes	mg/kg (ppm)	1.5	90	66-120
Gasoline	mg/kg (ppm)	20	90	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912132

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912105-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	94	94	63-146	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	96	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912132

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912132-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	75	78	75-125	4
Barium	mg/kg (ppm)	50	42.5	118	102	75-125	15
Cadmium	mg/kg (ppm)	10	<5	98	98	75-125	0
Chromium	mg/kg (ppm)	50	10.8	88	86	75-125	2
Lead	mg/kg (ppm)	50	10.2	99	103	75-125	4
Mercury	mg/kg (ppm)	5	<5	93	87	75-125	7
Selenium	mg/kg (ppm)	5	<5	71 vo	79	75-125	11
Silver	mg/kg (ppm)	10	<5	98	100	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	93	80-120
Barium	mg/kg (ppm)	50	110	80-120
Cadmium	mg/kg (ppm)	10	108	80-120
Chromium	mg/kg (ppm)	50	103	80-120
Lead	mg/kg (ppm)	50	112	80-120
Mercury	mg/kg (ppm)	5	90	80-120
Selenium	mg/kg (ppm)	5	103	80-120
Silver	mg/kg (ppm)	10	112	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/13/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912132

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	85	90	58-121	6
Acenaphthylene	mg/kg (ppm)	0.17	91	101	54-121	10
Acenaphthene	mg/kg (ppm)	0.17	88	95	54-123	8
Fluorene	mg/kg (ppm)	0.17	94	99	56-127	5
Phenanthrene	mg/kg (ppm)	0.17	88	93	55-122	6
Anthracene	mg/kg (ppm)	0.17	88	91	50-120	3
Fluoranthene	mg/kg (ppm)	0.17	96	98	54-129	2
Pyrene	mg/kg (ppm)	0.17	94	99	53-127	5
Benz(a)anthracene	mg/kg (ppm)	0.17	95	99	51-115	4
Chrysene	mg/kg (ppm)	0.17	91	96	55-129	5
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	88	89	56-123	1
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	89	91	54-131	2
Benzo(a)pyrene	mg/kg (ppm)	0.17	83	84	51-118	1
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	71	83	49-148	16
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	68	79	50-141	15
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	63	74	52-131	16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

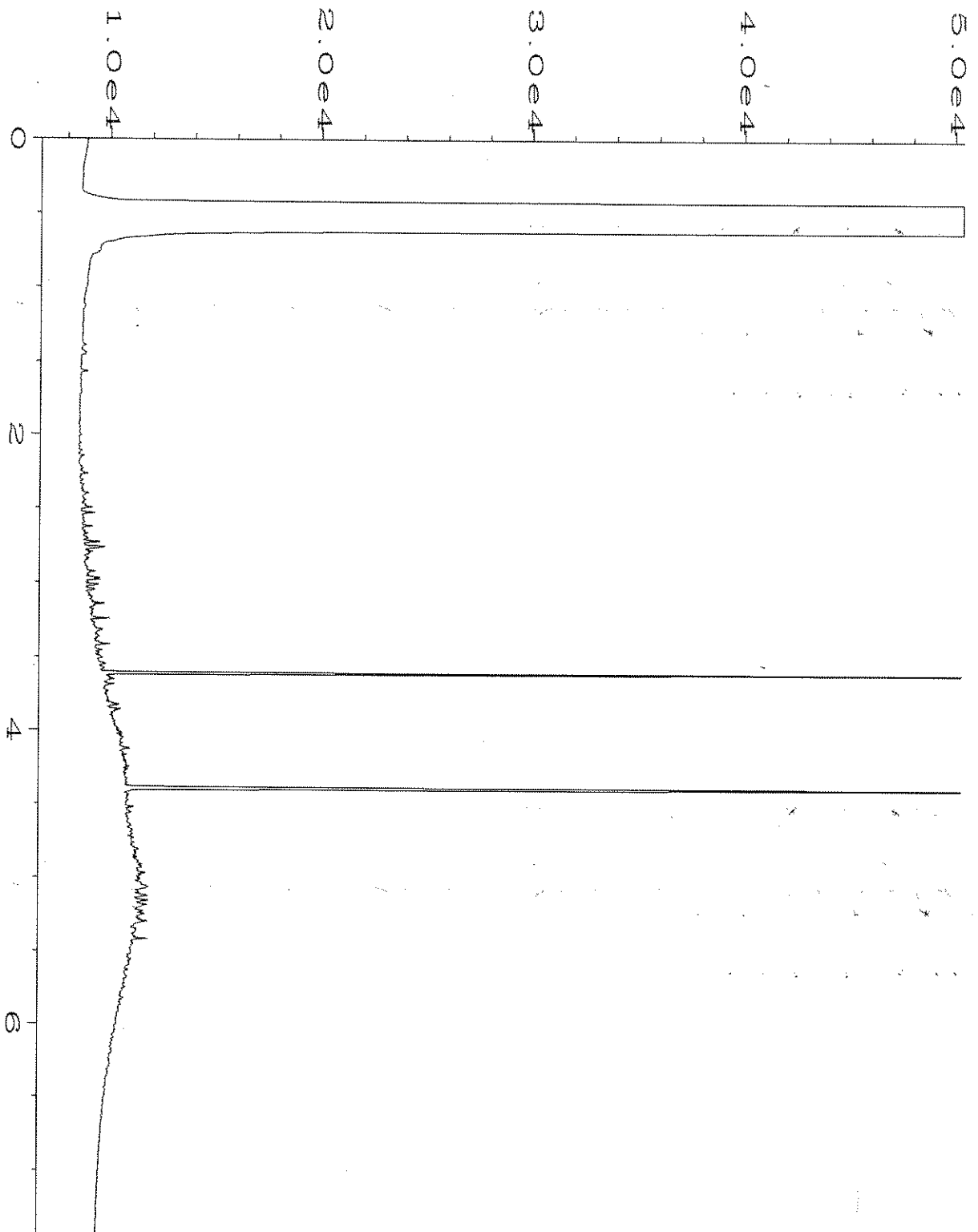
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

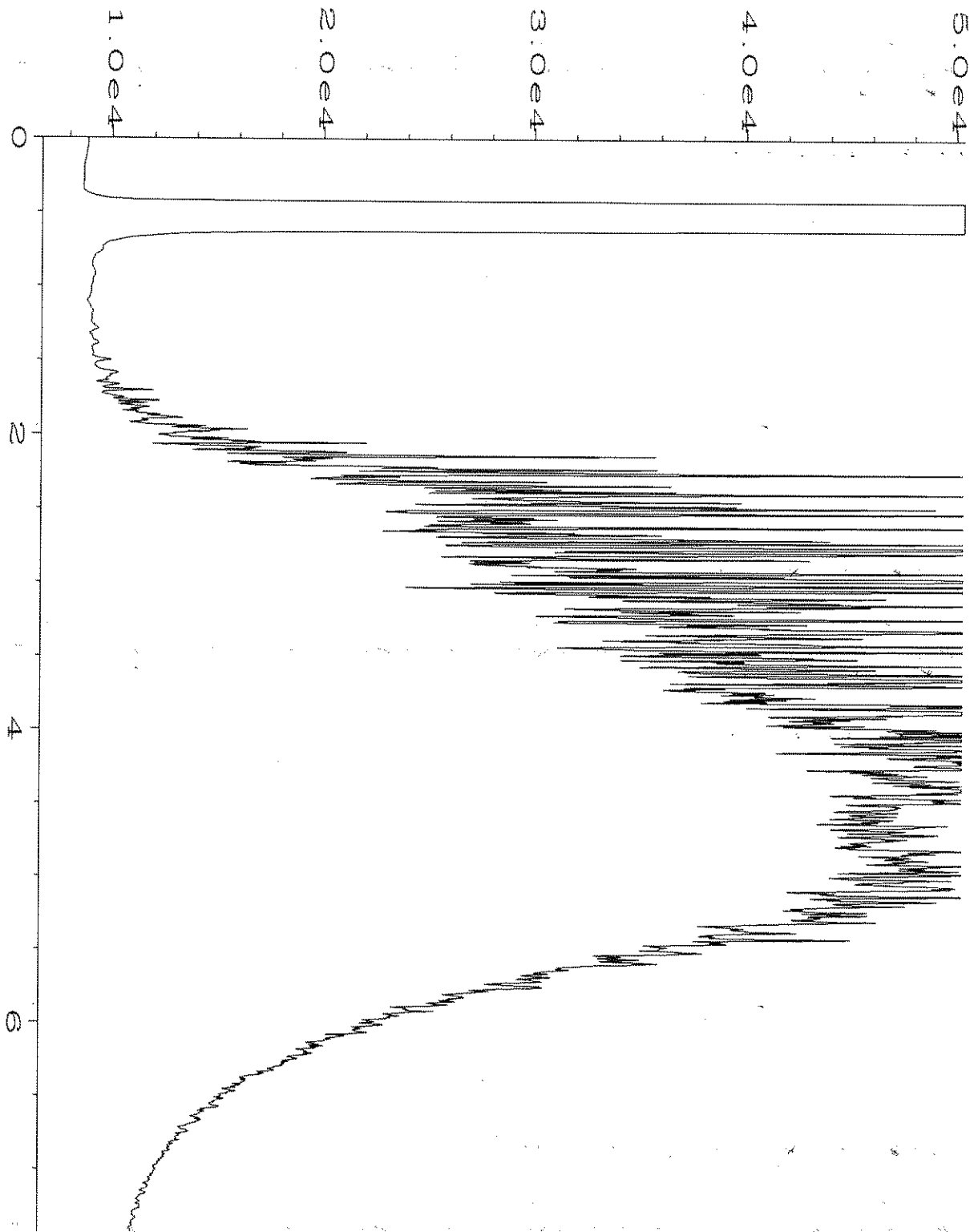
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

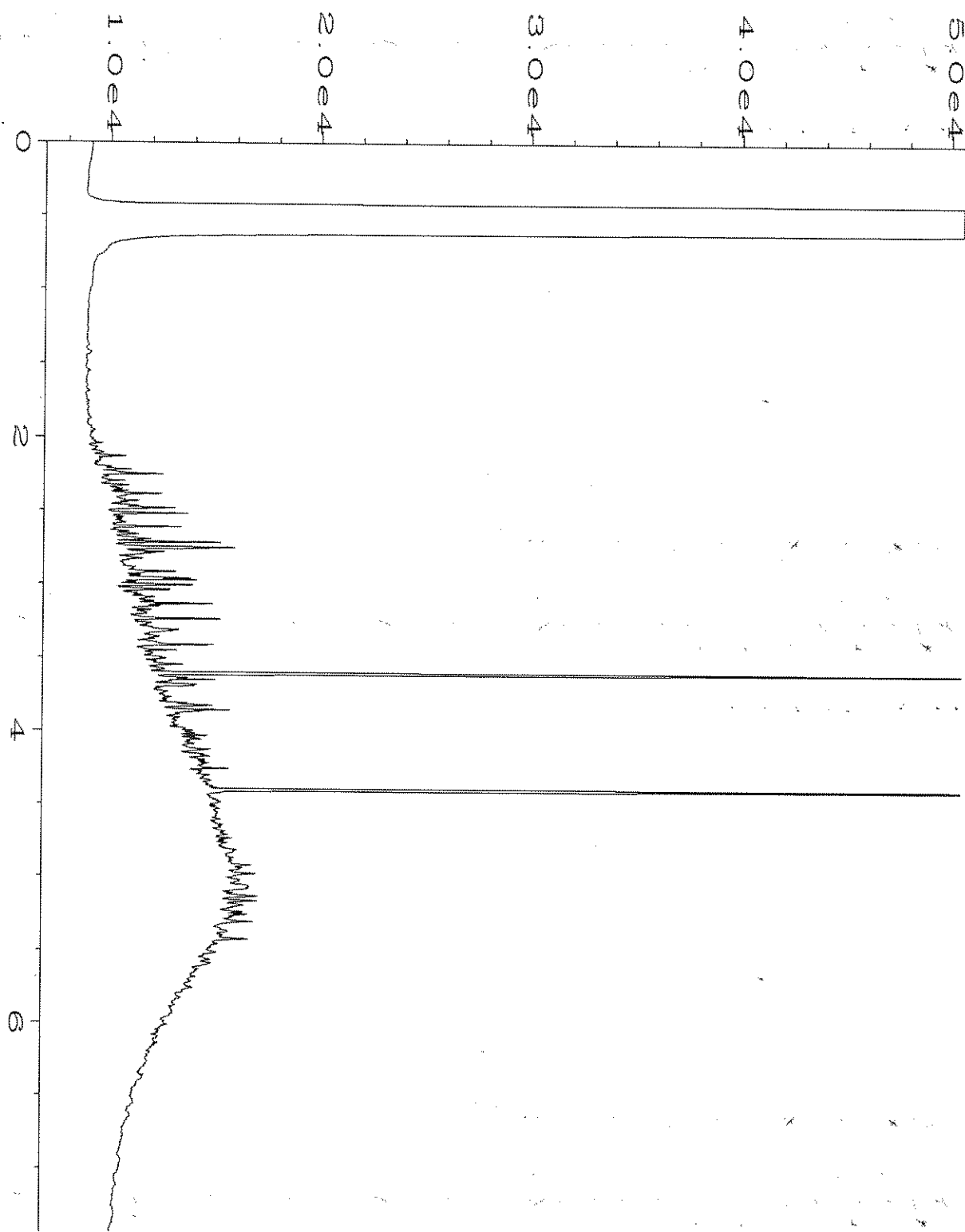
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



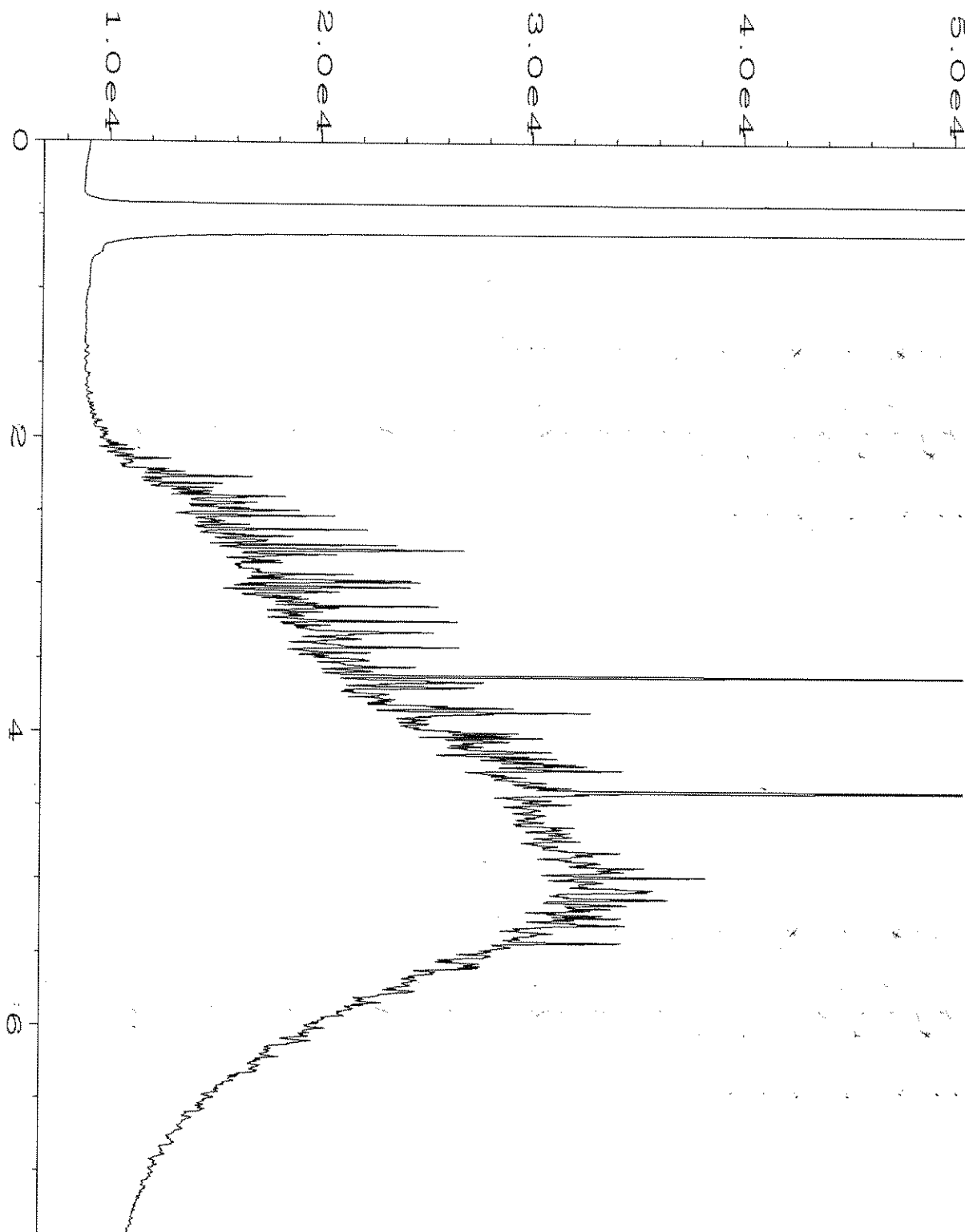
Data File Name	: C:\HPCHEM\1\DATA\12-09-19\017F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 17
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912132-01	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 12:00 PM	Analysis Method	: DX.MTH
Report Created on:	10 Dec 19 09:20 AM		



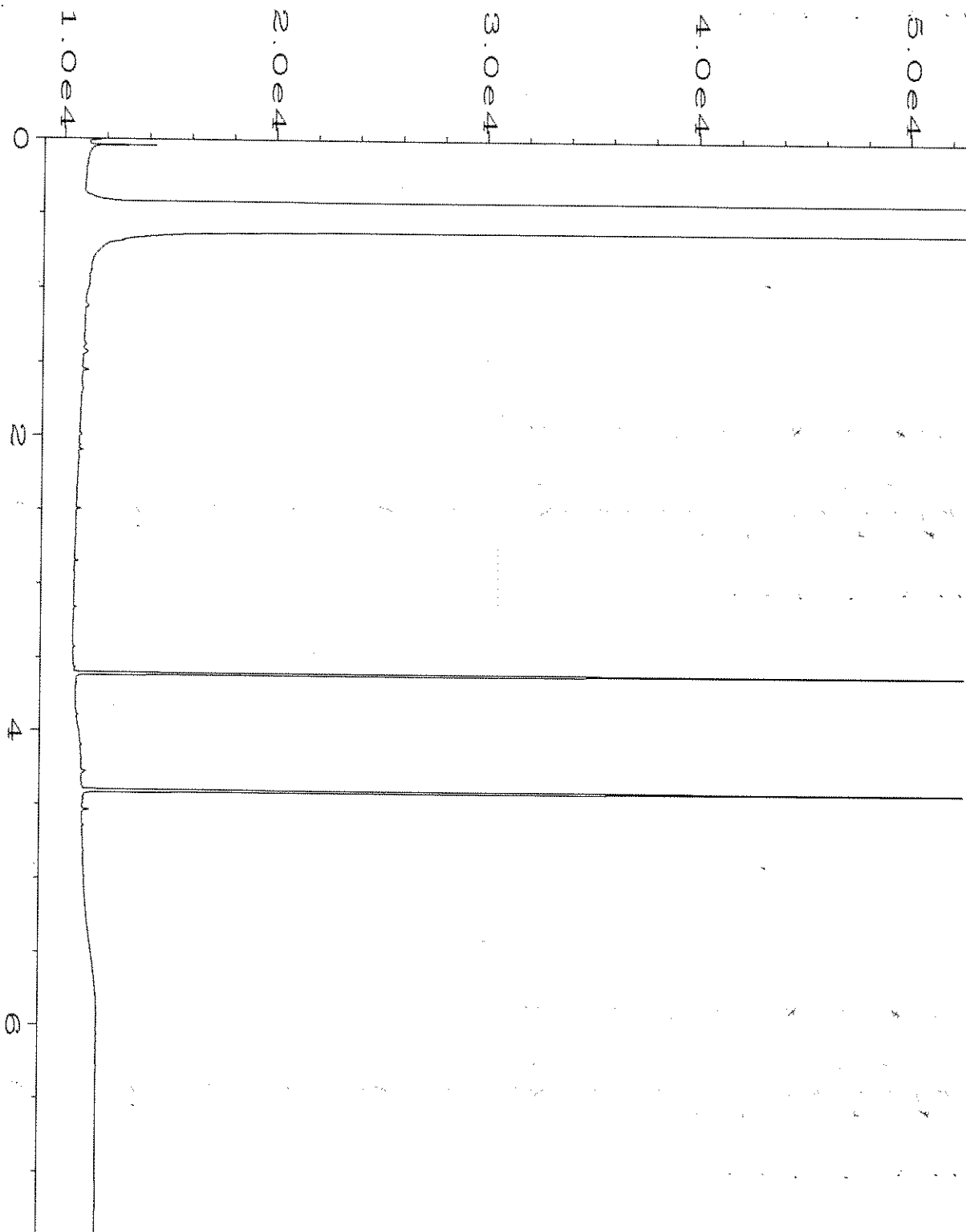
Data File Name	: C:\HPCHEM\1\DATA\12-09-19\018F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 18
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912132-02	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 12:11 PM	Analysis Method	: DX.MTH
Report Created on:	10 Dec 19 09:20 AM		



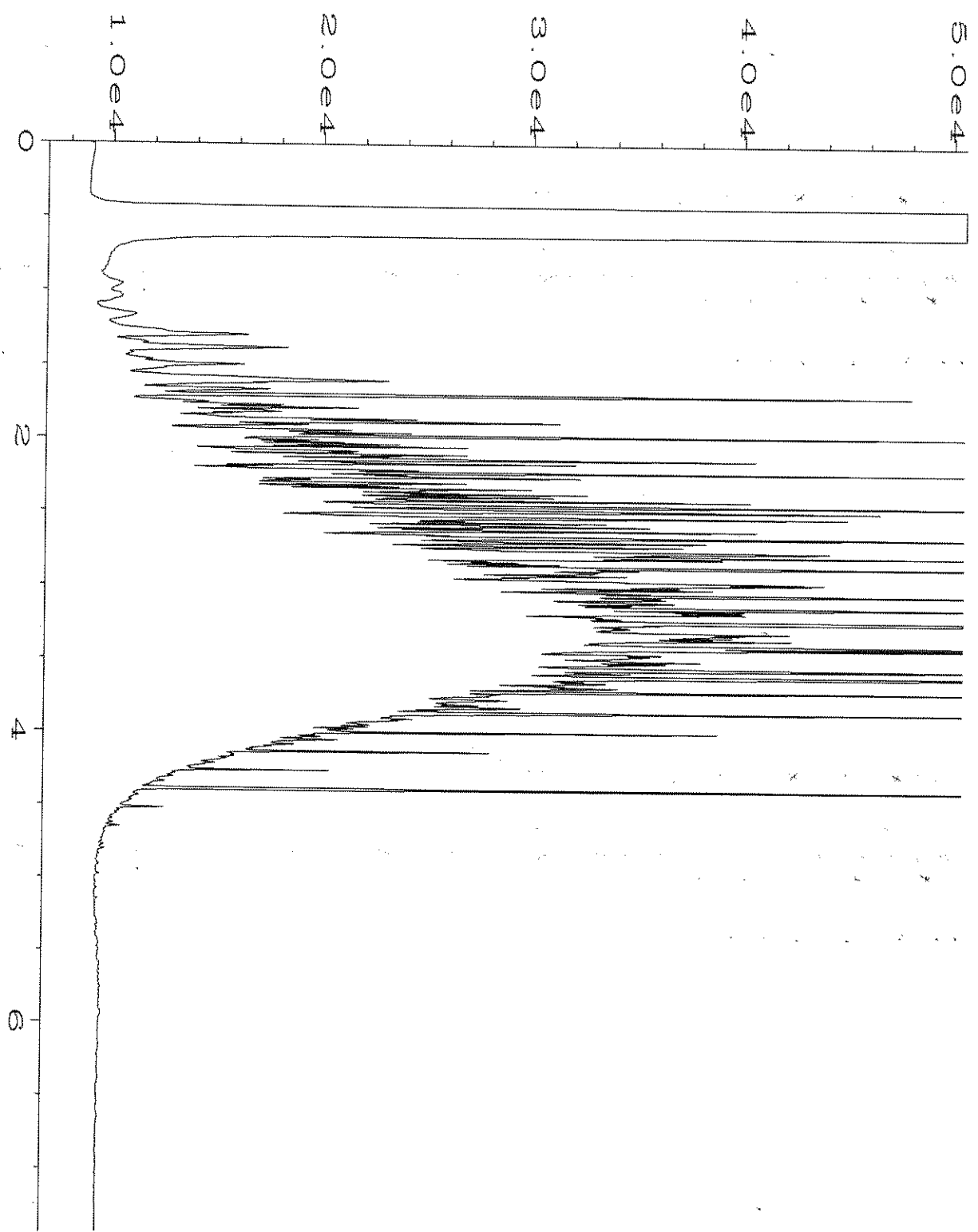
Data File Name	: C:\HPCHEM\1\DATA\12-09-19\019F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 19
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912132-03	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 01:45 PM	Analysis Method	: DX.MTH
Report Created on:	10 Dec 19 09:20 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-09-19\020F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 20
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912132-04	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 01:54 PM	Analysis Method	: DX.MTH
Report Created on:	10 Dec 19 09:20 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-09-19\006F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 6
Instrument	: GC1	Injection Number	: 1
Sample Name	: 09-2989 mb	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 09 Dec 19 09:30 AM	Analysis Method	: DX.MTH
Report Created on:	10 Dec 19 09:20 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-09-19\003F0901.D	Page Number	: 1
Operator	: TL	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 Dx 58-146B	Sequence Line	: 9
Run Time Bar Code:		Instrument Method	: DX.MTH
Acquired on	: 09 Dec 19 06:38 PM	Analysis Method	: DX.MTH
Report Created on:	10 Dec 19 09:20 AM		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
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December 5, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on November 26, 2019 from the Kosmos, F&BI 911412 project. There are 29 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR)
HCR1205R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on November 26, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 911412 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
911412 -01	TP-13-2.5
911412 -02	TP-13-5
911412 -03	TP-13-9
911412 -04	TP-14-2.5
911412 -05	TP-14-5
911412 -06	TP-14-10
911412 -07	TP-15-4
911412 -08	TP-15-6
911412 -09	TP-15-11
911412 -10	TP-15-14
911412 -11	TP-2-4
911412 -12	TP-2-8
911412 -13	TP-2-10.5
911412 -14	TP-15-8

A 6020B internal standard failed the acceptance criteria for samples TP-13-2.5, TP-15-4, and TP-2-4. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

An 8270D internal standard failed the acceptance criteria for sample TP-15-4. The sample was diluted and reanalyzed with acceptable results. Both data sets were reported.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19
Date Received: 11/26/19
Project: Kosmos, F&BI 911412
Date Extracted: 11/27/19
Date Analyzed: 11/27/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 58-139)
TP-13-2.5 911412-01	<5	91
TP-14-10 911412-06	<5	92
TP-15-8 911412-14	<5	91
Method Blank 09-2742 MB2	<5	81

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19
 Date Received: 11/26/19
 Project: Kosmos, F&BI 911412
 Date Extracted: 11/27/19
 Date Analyzed: 11/27/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-132)
TP-15-4 911412-07	<0.02	<0.02	<0.02	<0.06	<5	80
TP-15-6 911412-08	<0.02	<0.02	<0.02	<0.06	<5	81
TP-15-14 911412-10	<0.02	<0.02	<0.02	<0.06	<5	81
TP-2-4 911412-11	<0.02	<0.02	<0.02	<0.06	<5	81
TP-2-8 911412-12	<0.02	<0.02	<0.02	<0.06	<5	81
Method Blank 09-2742 MB2	<0.02	<0.02	<0.02	<0.06	<5	84

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19
Date Received: 11/26/19
Project: Kosmos, F&BI 911412
Date Extracted: 12/02/19
Date Analyzed: 12/02/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 48-168)
TP-13-2.5 911412-01	<50	<250	96
TP-14-10 911412-06	<50	<250	96
TP-15-4 911412-07	210 x	2,500	102
TP-15-6 911412-08	<50	<250	99
TP-15-14 911412-10	<50	<250	92
TP-2-4 911412-11	<50	<250	97
TP-2-8 911412-12	<50	<250	97
TP-15-8 911412-14	<50	<250	109
Method Blank 09-2948 MB	<50	<250	98

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-13-2.5	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-01
Date Analyzed:	12/02/19	Data File:	911412-01.035
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.67
Barium	68.3
Cadmium	<1
Chromium	14.1 J
Lead	2.94
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-13-2.5	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-01 x5
Date Analyzed:	12/02/19	Data File:	911412-01 x5.040
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	16.4
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-15-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-07
Date Analyzed:	12/02/19	Data File:	911412-07.036
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.57
Barium	84.6
Cadmium	<1
Chromium	12.2 J
Lead	51.0
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-15-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-07 x5
Date Analyzed:	12/02/19	Data File:	911412-07 x5.043
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	13.6
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-2-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-11
Date Analyzed:	12/02/19	Data File:	911412-11.037
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.74
Barium	102
Cadmium	<1
Chromium	16.1 J
Lead	3.21
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-2-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-11 x5
Date Analyzed:	12/02/19	Data File:	911412-11 x5.044
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	19.7
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	I9-761 mb
Date Analyzed:	12/02/19	Data File:	I9-761 mb.033
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-15-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-07 1/25
Date Analyzed:	12/02/19	Data File:	120209.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	139 d	31	163
Benzo(a)anthracene-d12	109 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	0.067
Anthracene	<0.05
Fluoranthene	0.23
Pyrene	0.40
Benz(a)anthracene	0.19
Chrysene	0.21
Benzo(a)pyrene	0.26 J
Benzo(b)fluoranthene	0.27 J
Benzo(k)fluoranthene	0.083 J
Indeno(1,2,3-cd)pyrene	0.099 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	0.12 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-15-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	911412-07 1/250
Date Analyzed:	12/02/19	Data File:	120210.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	320 d	31	163
Benzo(a)anthracene-d12	96 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 911412
Date Extracted:	12/02/19	Lab ID:	09-2905 mb 1/5
Date Analyzed:	12/02/19	Data File:	120206.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	99	31	163
Benzo(a)anthracene-d12	99	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-13-2.5	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/03/19	Lab ID:	911412-01
Date Analyzed:	12/03/19	Data File:	120329.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	62	145
Toluene-d8	100	55	145
4-Bromofluorobenzene	97	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-14-10	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/03/19	Lab ID:	911412-06
Date Analyzed:	12/03/19	Data File:	120330.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	62	145
Toluene-d8	102	55	145
4-Bromofluorobenzene	96	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-15-8	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	12/03/19	Lab ID:	911412-14
Date Analyzed:	12/03/19	Data File:	120331.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	62	145
Toluene-d8	101	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 911412
Date Extracted:	12/03/19	Lab ID:	09-2895 mb
Date Analyzed:	12/03/19	Data File:	120326.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	145
Toluene-d8	101	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	TP-15-4	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	11/27/19	Lab ID:	911412-07 1/6
Date Analyzed:	12/02/19	Data File:	120207.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	57	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	0.049
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	TP-15-8	Client:	Hart Crowser
Date Received:	11/26/19	Project:	Kosmos, F&BI 911412
Date Extracted:	11/27/19	Lab ID:	911412-14 1/6
Date Analyzed:	12/02/19	Data File:	120208.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	52	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 911412
Date Extracted:	11/27/19	Lab ID:	09-2904 mb 1/6
Date Analyzed:	12/02/19	Data File:	120204.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	77	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 911374-10 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	95	69-120
Toluene	mg/kg (ppm)	0.5	93	70-117
Ethylbenzene	mg/kg (ppm)	0.5	91	65-123
Xylenes	mg/kg (ppm)	1.5	94	66-120
Gasoline	mg/kg (ppm)	20	90	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 911412-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	96	96	73-135	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	102	74-139

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 911412-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	87	91	75-125	4
Barium	mg/kg (ppm)	50	51.6	65 b	66 b	75-125	2 b
Cadmium	mg/kg (ppm)	10	<5	97	101	75-125	4
Chromium	mg/kg (ppm)	50	12.5	87	95	75-125	9
Lead	mg/kg (ppm)	50	<5	99	104	75-125	5
Mercury	mg/kg (ppm)	5	<5	89	102	75-125	14
Selenium	mg/kg (ppm)	5	<5	83	86	75-125	4
Silver	mg/kg (ppm)	10	<5	93	100	75-125	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	88	80-120
Barium	mg/kg (ppm)	50	100	80-120
Cadmium	mg/kg (ppm)	10	98	80-120
Chromium	mg/kg (ppm)	50	99	80-120
Lead	mg/kg (ppm)	50	105	80-120
Mercury	mg/kg (ppm)	5	93	80-120
Selenium	mg/kg (ppm)	5	95	80-120
Silver	mg/kg (ppm)	10	99	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 911423-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	81	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	80	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	81	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	80	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	81	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	82	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	90	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	72	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	88	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	83	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	75	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	77	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	74	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	65	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	64	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	60	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	89	90	58-121	1
Acenaphthylene	mg/kg (ppm)	0.17	87	87	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	88	92	54-123	4
Fluorene	mg/kg (ppm)	0.17	87	91	56-127	4
Phenanthrene	mg/kg (ppm)	0.17	92	94	55-122	2
Anthracene	mg/kg (ppm)	0.17	91	91	50-120	0
Fluoranthene	mg/kg (ppm)	0.17	89	93	54-129	4
Pyrene	mg/kg (ppm)	0.17	82	84	53-127	2
Benz(a)anthracene	mg/kg (ppm)	0.17	94	98	51-115	4
Chrysene	mg/kg (ppm)	0.17	96	99	55-129	3
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	83	90	56-123	8
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	89	93	54-131	4
Benzo(a)pyrene	mg/kg (ppm)	0.17	75	78	51-118	4
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	78	70	49-148	11
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	83	75	50-141	10
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	81	73	52-131	10

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 911415-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	29	21	10-142	32 vo
Chloromethane	mg/kg (ppm)	2.5	<0.5	55	45	10-126	20
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	59	49	10-138	19
Bromomethane	mg/kg (ppm)	2.5	<0.5	76	64	10-163	17
Chloroethane	mg/kg (ppm)	2.5	<0.5	73	61	10-176	18
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	69	58	10-176	17
Acetone	mg/kg (ppm)	12.5	<0.5	95	87	10-163	9
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	85	74	10-160	14
Hexane	mg/kg (ppm)	2.5	<0.25	65	54	10-137	18
Methylene chloride	mg/kg (ppm)	2.5	<0.5	100	91	10-156	9
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	93	83	21-145	11
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	84	77	14-137	9
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	87	79	19-140	10
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	87	77	10-158	12
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	87	79	25-135	10
Chloroform	mg/kg (ppm)	2.5	<0.05	86	79	21-145	8
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	91	86	19-147	6
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	88	80	12-160	10
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	88	78	10-156	12
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	83	77	17-140	7
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	90	80	9-164	12
Benzene	mg/kg (ppm)	2.5	<0.03	84	77	29-129	9
Trichloroethene	mg/kg (ppm)	2.5	<0.02	84	77	21-139	9
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	87	80	30-135	8
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	94	86	23-155	9
Dibromomethane	mg/kg (ppm)	2.5	<0.05	89	80	23-145	11
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	94	86	24-155	9
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	96	89	28-144	8
Toluene	mg/kg (ppm)	2.5	<0.05	84	77	35-130	9
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	93	88	26-149	6
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	87	81	10-205	7
2-Hexanone	mg/kg (ppm)	12.5	<0.5	87	81	15-166	7
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	84	79	31-137	6
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	81	74	20-133	9
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	94	86	28-150	9
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	84	77	28-142	9
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	83	78	32-129	6
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	83	77	32-137	7
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	93	85	31-143	9
m,p-Xylene	mg/kg (ppm)	5	<0.1	85	78	34-136	9
o-Xylene	mg/kg (ppm)	2.5	<0.05	86	79	33-134	8
Styrene	mg/kg (ppm)	2.5	<0.05	86	80	35-137	7
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	87	79	31-142	10
Bromoform	mg/kg (ppm)	2.5	<0.05	103	95	21-156	8
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	82	78	23-146	5
Bromobenzene	mg/kg (ppm)	2.5	<0.05	82	77	34-130	6
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	83	78	18-149	6
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	85	80	28-140	6
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	81	79	25-144	2
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	81	76	31-134	6
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	81	77	31-136	5
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	81	76	30-137	6
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	82	77	10-182	6
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	82	77	23-145	6
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	82	76	21-149	8
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	81	76	30-131	6
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	79	76	29-129	4
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	81	77	31-132	5
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	93	87	11-161	7
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	89	82	22-142	8
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	83	76	10-142	9
Naphthalene	mg/kg (ppm)	2.5	<0.05	94	87	14-157	8
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	83	76	20-144	9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	65	10-146
Chloromethane	mg/kg (ppm)	2.5	85	27-133
Vinyl chloride	mg/kg (ppm)	2.5	91	22-139
Bromomethane	mg/kg (ppm)	2.5	102	38-114
Chloroethane	mg/kg (ppm)	2.5	98	9-163
Trichlorofluoromethane	mg/kg (ppm)	2.5	101	10-196
Acetone	mg/kg (ppm)	12.5	108	52-141
1,1-Dichloroethene	mg/kg (ppm)	2.5	112	47-128
Hexane	mg/kg (ppm)	2.5	96	43-142
Methylene chloride	mg/kg (ppm)	2.5	101	42-132
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	108	60-123
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	106	67-129
1,1-Dichloroethane	mg/kg (ppm)	2.5	106	68-115
2,2-Dichloropropane	mg/kg (ppm)	2.5	103	52-170
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	105	72-127
Chloroform	mg/kg (ppm)	2.5	103	66-120
2-Butanone (MEK)	mg/kg (ppm)	12.5	107	72-127
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	106	56-135
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	109	62-131
1,1-Dichloropropene	mg/kg (ppm)	2.5	106	69-128
Carbon tetrachloride	mg/kg (ppm)	2.5	111	60-139
Benzene	mg/kg (ppm)	2.5	103	68-114
Trichloroethene	mg/kg (ppm)	2.5	107	64-117
1,2-Dichloropropane	mg/kg (ppm)	2.5	106	72-127
Bromodichloromethane	mg/kg (ppm)	2.5	115	72-130
Dibromomethane	mg/kg (ppm)	2.5	107	70-120
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	111	45-145
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	119	75-136
Toluene	mg/kg (ppm)	2.5	105	66-126
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	120	72-132
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	108	75-113
2-Hexanone	mg/kg (ppm)	12.5	106	33-152
1,3-Dichloropropane	mg/kg (ppm)	2.5	107	72-130
Tetrachloroethene	mg/kg (ppm)	2.5	103	72-114
Dibromochloromethane	mg/kg (ppm)	2.5	113	74-125
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	106	74-132
Chlorobenzene	mg/kg (ppm)	2.5	105	76-111
Ethylbenzene	mg/kg (ppm)	2.5	105	64-123
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	115	69-135
m,p-Xylene	mg/kg (ppm)	5	106	78-122
o-Xylene	mg/kg (ppm)	2.5	106	77-124
Styrene	mg/kg (ppm)	2.5	108	74-126
Isopropylbenzene	mg/kg (ppm)	2.5	108	76-127
Bromoform	mg/kg (ppm)	2.5	123	56-132
n-Propylbenzene	mg/kg (ppm)	2.5	106	74-124
Bromobenzene	mg/kg (ppm)	2.5	106	72-122
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	108	76-126
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	56-143
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	105	61-137
2-Chlorotoluene	mg/kg (ppm)	2.5	104	74-121
4-Chlorotoluene	mg/kg (ppm)	2.5	104	75-122
tert-Butylbenzene	mg/kg (ppm)	2.5	108	73-130
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	106	76-125
sec-Butylbenzene	mg/kg (ppm)	2.5	107	71-130
p-Isopropyltoluene	mg/kg (ppm)	2.5	106	70-132
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	104	75-121
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	104	74-117
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	107	76-121
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	119	58-138
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	115	64-135
Hexachlorobutadiene	mg/kg (ppm)	2.5	112	50-153
Naphthalene	mg/kg (ppm)	2.5	119	63-140
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	110	63-138

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/05/19

Date Received: 11/26/19

Project: Kosmos, F&BI 911412

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 911396-02 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	86	30-123
Aroclor 1260	mg/kg (ppm)	0.25	0.046	93	26-131

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	82	80	55-137	2
Aroclor 1260	mg/kg (ppm)	0.25	81	83	51-150	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

911412

SAMPLE CHAIN OF CUSTODY

ME 11-26-19

US3/BOS
2/2

Report To: Annie Goodwin

Company: HST-Crowser

Address: 3131 Elliot Ave

City, State, ZIP: Seattle, WA

Phone: 206 954-2549 Email: AnnieGoodwin@hst-crowser.com

SAMPLES (signature) John P. Higgins

PROJECT NAME: KOSMOS PO #:

REMARKS: INVOICE TO:

Project specific RLs? - Yes / No

Page # 2 of 2

TURNAROUND TIME:

Standard turnaround

RUSH 24 HRS

Rush charges authorized by:

SAMPLE DISPOSAL: Archive samples Other

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED								Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	RCRA 8 metals			
TP-15-14	10A-E	11/20/19	1250	Soil	5	X	X	X								
TP-2-4	11		1320			X	X	X								
TP-2-8	13		1325			X	X	X								
TP-2-10.5	13		1330													
TP-15-8	14A-E		1740		5	X	X		X		X					added GB 11/27

Received by: John Higgins SIGNATURE

PRINT NAME: John Higgins

COMPANY: FBI

DATE: 11/20/19 TIME: 1811

Received by: John Higgins

PRINT NAME: John Higgins

COMPANY: FBI

DATE: 11/20/19 TIME: 1811

Received by:

PRINT NAME:

COMPANY:

DATE: TIME:

Samples received at 4 °C

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 30, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the additional results from the testing of material submitted on December 5, 2019 from the Kosmos 19499-00, F&BI 912095 project. There are 30 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Hart Crowser A/P (HCR), Andrew Kaparos
HCR1230R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 5, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos 19499-00, F&BI 912095 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912095 -01	TP-5-2.5
912095 -02	TP-5-5
912095 -03	TP-5-8
912095 -04	TP-5-10
912095 -05	TP-5-12
912095 -06	TP-5-15
912095 -07	TP-5-19
912095 -08	TP-3-8
912095 -09	TP-3-12
912095 -10	TP-3-15
912095 -11	TP-3-20
912095 -12	D-2
912095 -13	U-1
912095 -14	D-1
912095 -15	SP1-1
912095 -16	SP1-3
912095 -17	SP1-4
912095 -18	SP1-2
912095 -19	SP2-1
912095 -20	SP1-5
912095 -21	SP2-2
912095 -22	SP2-5
912095 -23	SP2-4
912095 -24	SP2-3

A 6020B internal standard failed the acceptance criteria for samples TP-5-8, TP-5-10, and TP-3-8. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

The NWTPH-Gx/8021B, NWTPH-Dx, 8270D SIM and 8260C analyses were requested outside of the holding time. The data were flagged accordingly.

The 8260C matrix spike and matrix spike duplicate failed the relative percent difference for acetone and 2-butanone. The analytes were not detected in the samples therefore the data were acceptable.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 58-139)
TP-5-8 ht 912095-03	160	ip
TP-5-10 ht 912095-04 1/10	930	117
TP-5-19 ht 912095-07	<5	85
TP-3-8 ht 912095-08	<5	87
Method Blank 09-2939 MB	<5	87

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-132)
TP-3-12 ht 912095-09	<0.02	<0.02	<0.02	<0.06	<5	78
Method Blank 09-2939 MB	<0.02	<0.02	<0.02	<0.06	<5	77

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/05/19
Project: Kosmos 19499-00, F&BI 912095
Date Extracted: 12/20/19
Date Analyzed: 12/20/19 and 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
TP-5-5 ht 912095-02	<50	<250	81
TP-5-8 ht 912095-03	560 x	650	85
TP-5-10 ht 912095-04	610 x	1,600	84
TP-5-12 ht 912095-05	<50	<250	80
TP-5-15 ht 912095-06	<50	<250	80
TP-5-19 ht 912095-07	<50	<250	80
TP-3-8 ht 912095-08	<50	<250	79
TP-3-12 ht 912095-09	<50	<250	80
TP-3-20 ht 912095-11	<50	<250	80
Method Blank 09-3091 MB	<50	<250	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-5-8	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-03
Date Analyzed:	12/20/19	Data File:	912095-03.090
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.05
Barium	104
Cadmium	<1
Chromium	14.8 J
Lead	11.0
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-5-8	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-03 x5
Date Analyzed:	12/23/19	Data File:	912095-03 x5.149
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	19.5
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-5-10	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-04
Date Analyzed:	12/20/19	Data File:	912095-04.091
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.72
Barium	73.3
Cadmium	<1
Chromium	11.6 J
Lead	15.8
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-5-10	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-04 x5
Date Analyzed:	12/23/19	Data File:	912095-04 x5.150
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	15.4
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-3-8	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-08
Date Analyzed:	12/20/19	Data File:	912095-08.092
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.02
Barium	49.1
Cadmium	<1
Chromium	10.7 J
Lead	1.96
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-3-8	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-08 x5
Date Analyzed:	12/23/19	Data File:	912095-08 x5.151
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	14.0
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	I9-819 mb2
Date Analyzed:	12/20/19	Data File:	I9-819 mb2.036
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-5-10 ht	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-04 1/5
Date Analyzed:	12/20/19	Data File:	122009.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	101	31	163
Benzo(a)anthracene-d12	124	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	0.020
Fluorene	0.064
Phenanthrene	0.10
Anthracene	<0.01
Fluoranthene	0.011
Pyrene	0.022
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-5-19 ht	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-07 1/5
Date Analyzed:	12/20/19	Data File:	122010.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	102	31	163
Benzo(a)anthracene-d12	119	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	09-3070 mb2 1/5
Date Analyzed:	12/20/19	Data File:	122007.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	163
Benzo(a)anthracene-d12	115	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-5-8 ht	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/23/19	Lab ID:	912095-03
Date Analyzed:	12/24/19	Data File:	122440.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	110	50	150
4-Bromofluorobenzene	111	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	0.68 lc	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	0.075
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	0.083
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-5-10 ht	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/23/19	Lab ID:	912095-04
Date Analyzed:	12/27/19	Data File:	122660.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	145
Toluene-d8	99	55	145
4-Bromofluorobenzene	97	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	0.11
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	0.36
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	0.52
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	0.061
Benzene	<0.03	sec-Butylbenzene	0.19
Trichloroethene	<0.02	p-Isopropyltoluene	0.067
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	0.079
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-5-19 ht	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/23/19	Lab ID:	912095-07
Date Analyzed:	12/24/19	Data File:	122441.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	50	150
Toluene-d8	108	50	150
4-Bromofluorobenzene	109	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-3-8 ht	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/23/19	Lab ID:	912095-08
Date Analyzed:	12/24/19	Data File:	122442.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	108	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	0.53 lc	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/23/19	Lab ID:	09-3082 mb
Date Analyzed:	12/23/19	Data File:	122311.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	93	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	TP-5-10	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-04 1/6
Date Analyzed:	12/20/19	Data File:	122023.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	54	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	TP-5-19	Client:	Hart Crowser
Date Received:	12/05/19	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	912095-07 1/6
Date Analyzed:	12/20/19	Data File:	122024.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	62	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912095
Date Extracted:	12/20/19	Lab ID:	09-3074 mb3 1/6
Date Analyzed:	12/20/19	Data File:	122022.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	85	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912405-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	82	66-121
Toluene	mg/kg (ppm)	0.5	88	72-128
Ethylbenzene	mg/kg (ppm)	0.5	90	69-132
Xylenes	mg/kg (ppm)	1.5	87	69-131
Gasoline	mg/kg (ppm)	20	95	61-153

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912360-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	69	90	88	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	88	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912286-05 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	5.41	84	90	75-125	7
Barium	mg/kg (ppm)	50	91.1	108	114	75-125	5
Cadmium	mg/kg (ppm)	10	8.16	71 b	36 b	75-125	65 b
Chromium	mg/kg (ppm)	50	48.1	107	101	75-125	6
Lead	mg/kg (ppm)	50	13.6	101	92	75-125	9
Mercury	mg/kg (ppm)	5	<5	94	102	75-125	8
Selenium	mg/kg (ppm)	5	<5	82	80	75-125	2
Silver	mg/kg (ppm)	10	<5	89	89	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	89	80-120
Barium	mg/kg (ppm)	50	99	80-120
Cadmium	mg/kg (ppm)	10	98	80-120
Chromium	mg/kg (ppm)	50	91	80-120
Lead	mg/kg (ppm)	50	105	80-120
Mercury	mg/kg (ppm)	5	98	80-120
Selenium	mg/kg (ppm)	5	99	80-120
Silver	mg/kg (ppm)	10	97	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912123-13 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	75	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	75	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	75	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	80	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	78	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	78	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	85	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	80	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	84	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	79	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	81	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	71	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	76	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	78	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	73	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	69	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	83	85	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	84	84	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	84	86	54-123	2
Fluorene	mg/kg (ppm)	0.17	88	88	56-127	0
Phenanthrene	mg/kg (ppm)	0.17	85	86	55-122	1
Anthracene	mg/kg (ppm)	0.17	85	86	50-120	1
Fluoranthene	mg/kg (ppm)	0.17	91	90	54-129	1
Pyrene	mg/kg (ppm)	0.17	87	91	53-127	4
Benz(a)anthracene	mg/kg (ppm)	0.17	90	91	51-115	1
Chrysene	mg/kg (ppm)	0.17	86	90	55-129	5
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	83	81	56-123	2
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	74	79	54-131	7
Benzo(a)pyrene	mg/kg (ppm)	0.17	75	75	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	79	84	49-148	6
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	77	85	50-141	10
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	73	83	52-131	13

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912147-01912147-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	21	23	10-56	9
Chloromethane	mg/kg (ppm)	2.5	<0.5	45	46	10-90	2
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	39	39	10-91	0
Bromomethane	mg/kg (ppm)	2.5	<0.5	53	61	10-110	14
Chloroethane	mg/kg (ppm)	2.5	<0.5	50	50	10-101	0
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	36	36	10-95	0
Acetone	mg/kg (ppm)	12.5	<0.5	81	114	11-141	34 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	42	46	22-107	9
Hexane	mg/kg (ppm)	2.5	<0.25	37	41	10-95	10
Methylene chloride	mg/kg (ppm)	2.5	0.80	60 b	61 b	14-128	2 b
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	76	78	17-134	3
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	64	66	13-112	3
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	75	79	23-115	5
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	63	61	18-117	3
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	73	74	25-120	1
Chloroform	mg/kg (ppm)	2.5	<0.05	78	82	29-117	5
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	97	122	20-133	23 vo
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	88	97	22-124	10
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	67	68	27-112	1
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	72	77	26-107	7
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	64	64	28-126	0
Benzene	mg/kg (ppm)	2.5	<0.03	74	80	26-114	8
Trichloroethene	mg/kg (ppm)	2.5	<0.02	74	81	30-112	9
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	83	92	31-119	10
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	84	92	31-131	9
Dibromomethane	mg/kg (ppm)	2.5	<0.05	75	83	27-124	10
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	92	100	16-147	8
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	83	94	28-137	12
Toluene	mg/kg (ppm)	2.5	<0.05	74	79	34-112	7
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	77	89	30-136	14
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	83	91	32-126	9
2-Hexanone	mg/kg (ppm)	12.5	<0.5	96	110	17-147	14
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	80	89	29-125	11
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	68	72	25-114	6
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	75	79	32-143	5
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	78	86	32-126	10
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	75	82	37-113	9
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	77	82	34-115	6
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	76	78	35-126	3
m,p-Xylene	mg/kg (ppm)	5	<0.1	76	80	25-125	5
o-Xylene	mg/kg (ppm)	2.5	<0.05	77	80	27-126	4
Styrene	mg/kg (ppm)	2.5	<0.05	80	84	39-121	5
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	77	80	34-123	4
Bromoform	mg/kg (ppm)	2.5	<0.05	80	82	18-155	2
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	77	88	31-120	13
Bromobenzene	mg/kg (ppm)	2.5	<0.05	74	82	40-115	10
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	76	84	24-130	10
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	89	98	27-148	10
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	86	96	33-123	11
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	78	86	39-110	10
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	76	87	39-111	13
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	76	85	36-116	11
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	76	83	35-116	9
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	78	84	33-118	7
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	76	82	32-119	8
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	74	83	38-111	11
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	75	82	39-109	9
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	76	82	40-111	8
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	87	92	44-112	6
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	76	82	31-121	8
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	78	80	24-128	3
Naphthalene	mg/kg (ppm)	2.5	<0.05	79	82	24-139	4
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	78	82	35-117	5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	61	10-146
Chloromethane	mg/kg (ppm)	2.5	79	27-133
Vinyl chloride	mg/kg (ppm)	2.5	82	22-139
Bromomethane	mg/kg (ppm)	2.5	90	38-114
Chloroethane	mg/kg (ppm)	2.5	104	9-163
Trichlorofluoromethane	mg/kg (ppm)	2.5	99	10-196
Acetone	mg/kg (ppm)	12.5	98	52-141
1,1-Dichloroethene	mg/kg (ppm)	2.5	108	47-128
Hexane	mg/kg (ppm)	2.5	120	43-142
Methylene chloride	mg/kg (ppm)	2.5	113	42-132
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	103	60-123
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	113	67-129
1,1-Dichloroethane	mg/kg (ppm)	2.5	111	68-115
2,2-Dichloropropane	mg/kg (ppm)	2.5	109	52-170
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	114	72-127
Chloroform	mg/kg (ppm)	2.5	109	66-120
2-Butanone (MEK)	mg/kg (ppm)	12.5	110	72-127
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	116	56-135
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	111	62-131
1,1-Dichloropropene	mg/kg (ppm)	2.5	112	69-128
Carbon tetrachloride	mg/kg (ppm)	2.5	115	60-139
Benzene	mg/kg (ppm)	2.5	114	68-114
Trichloroethene	mg/kg (ppm)	2.5	110	64-117
1,2-Dichloropropane	mg/kg (ppm)	2.5	118	72-127
Bromodichloromethane	mg/kg (ppm)	2.5	117	72-130
Dibromomethane	mg/kg (ppm)	2.5	115	70-120
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	118	45-145
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	128	75-136
Toluene	mg/kg (ppm)	2.5	105	66-126
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	117	72-132
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	106	75-113
2-Hexanone	mg/kg (ppm)	12.5	102	33-152
1,3-Dichloropropane	mg/kg (ppm)	2.5	108	72-130
Tetrachloroethene	mg/kg (ppm)	2.5	108	72-114
Dibromochloromethane	mg/kg (ppm)	2.5	115	74-125
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	106	74-132
Chlorobenzene	mg/kg (ppm)	2.5	104	76-111
Ethylbenzene	mg/kg (ppm)	2.5	106	64-123
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	69-135
m,p-Xylene	mg/kg (ppm)	5	106	78-122
o-Xylene	mg/kg (ppm)	2.5	102	77-124
Styrene	mg/kg (ppm)	2.5	104	74-126
Isopropylbenzene	mg/kg (ppm)	2.5	101	76-127
Bromoform	mg/kg (ppm)	2.5	118	56-132
n-Propylbenzene	mg/kg (ppm)	2.5	108	74-124
Bromobenzene	mg/kg (ppm)	2.5	108	72-122
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	107	76-126
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	56-143
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	106	61-137
2-Chlorotoluene	mg/kg (ppm)	2.5	106	74-121
4-Chlorotoluene	mg/kg (ppm)	2.5	107	75-122
tert-Butylbenzene	mg/kg (ppm)	2.5	107	73-130
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	104	76-125
sec-Butylbenzene	mg/kg (ppm)	2.5	103	71-130
p-Isopropyltoluene	mg/kg (ppm)	2.5	101	70-132
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	103	75-121
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	102	74-117
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	100	76-121
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	96	58-138
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	97	64-135
Hexachlorobutadiene	mg/kg (ppm)	2.5	94	50-153
Naphthalene	mg/kg (ppm)	2.5	92	63-140
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	93	63-138

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/05/19

Project: Kosmos 19499-00, F&BI 912095

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912340-01 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	68	30-123
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	67	26-131

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	93	89	55-137	4
Aroclor 1260	mg/kg (ppm)	0.25	93	92	51-150	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

912095

SAMPLE CHAIN OF CUSTODY

ME 12-05-19

Page # 1 of 2 US4

Report To Angie Goodwin

Company Halt Crosser

Address 3131 Elliot Ave

City, State, ZIP Seattle, WA

Phone (206) 954-2549 Email angie.goodwin@haltcrosser.com

SAMPLERS (signature) Jolie Higgins
PROJECT NAME KOSMOS
PO # 19499-00

REMARKS
INVOICE TO

Project specific RUSH? Yes / No

ANALYSES REQUESTED

- NWTPH-Dx
- NWTPH-Gx
- BTEX EPA 8021
- NWTPH-HCID
- VOCs EPA 8260
- PAHs EPA 8270
- PCBs EPA 8082
- PCRB

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Notes
TP-5-2.5	01AE	12/5/19	1000	Soil	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Hold for soil for 5 days before analysis - Contact PWS
TP-5-5	02		1005		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-5-8	03		1010		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-5-10	04		1015		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-5-12	05		1020		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-5-15	06		1030		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-5-19	07		1035		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-3-8	08		1115		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Added on 12/19/19
TP-3-12	09		1120		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TP-3-15	10		1135		1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

SIGNATURE

PRINT NAME

COMPANY

DATE TIME

Relinquished by: Jolie Higgins

Relinquished by: Jolie Higgins

Relinquished by: HC

Received by: PJ

Received by: BISSELL TROESSE

Received by: #81

Relinquished by: Jolie Higgins

Relinquished by: BISSELL TROESSE

Relinquished by: HC

Received by: PJ

Received by: BISSELL TROESSE

Received by: HC

Date: 12/5/19 Time: 1443

Date: 12/5/19 Time: 1

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

TURNAROUND TIME 3 DAYS
 Standard turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

912095

SAMPLE CHAIN OF CUSTODY

ME 02-05-19

Page # 2 of 3 304

Report To: Angie Goodwin
 Company: Hart Crewster
 Address: 3131 Elliott Ave
 City, State, ZIP: Seattle WA

Phone: (206) 454-2549 Email: angie.goodwin@hartcrewster.com

SAMPLE # (signature)	PROJECT NAME	PO #
<u>Angie Goodwin</u>	<u>WOSMOS</u>	<u>19499-00</u>
REMARKS	INVOICE TO	

TURNAROUND TIME	DATE
<u>12/3/19</u>	<u>12/3/19</u>
Standard turnaround	
RUSH	
Rush charges authorized by:	
SAMPLE DISPOSAL	
<input type="checkbox"/> Archive samples	
<input type="checkbox"/> Other	
Default: Dispose after 30 days	

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes					
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Hardness	pH	RCRA 8 Metals						
TP-3-20	11 A-E	12/5/19	1200	Soil	5	X	X														
D-2	12 A-G	12/5/19	1500	water	7	X	X							X	X	X					metals last analyzed Angie for metal
U-1	13	12/5/19	1510	water	7	X	X							X	X	X					
D-1	14	12/5/19	1520	water	7	X	X							X	X	X					
SP1-1	15 A-E	12/5/19	1552	soil	5	X	X							X		X					Analysis Total Metals: As Hex Cr
SP1-3	16	12/5/19	1605	soil	5	X	X							X		X					
SP1-4	17	12/5/19	1611	soil	5	X	X							X		X					
SP1-2	18	12/5/19	1559	soil	5	X	X							X		X					
SP2-1	19	12/5/19	1625	soil	5	X	X							X		X					
SP1-5	20 A-D	12/5/19	1616	soil	5	X	X							X		X					

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Relinquished by:	<u>Angie Goodwin</u>	<u>Angie Goodwin</u>	<u>HC</u>	<u>12/5/19</u>	<u>1443</u>		
Received by:	<u>Blie Higgins</u>	<u>Blie Higgins</u>	<u>HC</u>	<u>12/5/19</u>	<u>1443</u>		
Relinquished by:	<u>Blie Higgins</u>	<u>Blie Higgins</u>	<u>HC</u>	<u>12/5/19</u>	<u>1443</u>		
Received by:	<u>Blie Higgins</u>	<u>Blie Higgins</u>	<u>HC</u>	<u>12/5/19</u>	<u>1443</u>		

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 30, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin :

Included are the results from the testing of material submitted on December 6, 2019 from the Kosmos 19499-00, F&BI 912126 project. There are 27 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1230R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 6, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos 19499-00, F&BI 912126 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912126 -01	TP-7-2.5
912126 -02	TP-7-5
912126 -03	TP-7-7.5
912126 -04	TP-7-10
912126 -05	TP-7-15
912126 -06	TP-8-3.5
912126 -07	TP-8-6
912126 -08	TP-8-10
912126 -09	TP-8-15
912126 -10	TP-6-5
912126 -11	TP-6-8
912126 -12	TP-6-12

The motor oil range concentration for sample TP-7-2.5 exceeded the calibration range. The data were flagged accordingly.

A 6020B internal standard failed the acceptance criteria for sample TP-8-3.5. The sample was diluted and reanalyzed with acceptable results. Both data sets were reported.

Methylene chloride and acetone were detected in several samples due to laboratory contamination. The data were flagged accordingly.

2-Butanone and 1,2-dibromo-3-chloropropane in the 8260C matrix spike sample and matrix spike duplicate exceeded the acceptance criteria in. The laboratory control samples met the acceptance criteria, therefore the data were likely due to sample matrix effect.

The 8270D SIM sample TP-6-8 was not logged in for analysis. The data will be submitted as an additional report.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/06/19
Project: Kosmos 19499-00, F&BI 912126
Date Extracted: 12/20/19
Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
TP-7-7.5 912126-03 1/5	570	109
TP-7-15 912126-05	<5	86
TP-8-6 912126-07	14	81
TP-8-15 912126-09	<5	84
TP-6-8 912126-11	38	86
Method Blank 09-2935 MB	<5	87

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
 Date Received: 12/06/19
 Project: Kosmos 19499-00, F&BI 912126
 Date Extracted: 12/20/19
 Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-D_x**
 Results Reported on a Dry Weight Basis
 Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
TP-7-2.5 912126-01	39,000	26,000 ve	89
TP-7-7.5 912126-03	12,000	3,100 x	80
TP-7-10 912126-04	6,200	1,900 x	81
TP-7-15 912126-05	230	<250	75
TP-8-3.5 912126-06	78 x	570	84
TP-8-6 912126-07	600	1,500	86
TP-8-15 912126-09	<50	<250	84
TP-6-5 912126-10	520 x	1,600	73
TP-6-8 912126-11	1,300 x	3,900	84
TP-6-12 912126-12	<50	<250	74
Method Blank 09-3092 MB	<50	<250	81

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-8-3.5	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/23/19	Lab ID:	912126-06
Date Analyzed:	12/24/19	Data File:	912126-06.089
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.79
Barium	107
Cadmium	<1
Chromium	13.3 J
Lead	12.0
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-8-3.5	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/23/19	Lab ID:	912126-06
Date Analyzed:	12/23/19	Data File:	912126-06.179
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Chromium	13.9
----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/24/19	Lab ID:	I9-828 mb
Date Analyzed:	12/24/19	Data File:	I9-828 mb.073
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-7-7.5	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-03 1/25
Date Analyzed:	12/20/19	Data File:	122016.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	126 d	31	163
Benzo(a)anthracene-d12	143 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	1.7
Fluorene	4.6
Phenanthrene	5.1
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	0.36
Benz(a)anthracene	0.10
Chrysene	0.23
Benzo(a)pyrene	<0.05 J
Benzo(b)fluoranthene	<0.05 J
Benzo(k)fluoranthene	<0.05 J
Indeno(1,2,3-cd)pyrene	<0.05 J
Dibenz(a,h)anthracene	<0.05 J
Benzo(g,h,i)perylene	<0.05 J

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-7-7.5	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-03 1/250
Date Analyzed:	12/24/19	Data File:	122337.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	130 d	31	163
Benzo(a)anthracene-d12	120 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	1.6
Fluorene	4.4
Phenanthrene	5.3
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	<0.5
Benz(a)anthracene	<0.5
Chrysene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	TP-7-15	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-05 1/5
Date Analyzed:	12/20/19	Data File:	122011.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	106	31	163
Benzo(a)anthracene-d12	132	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	0.013
Phenanthrene	0.041
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	09-3070 mb2 1/5
Date Analyzed:	12/20/19	Data File:	122007.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	163
Benzo(a)anthracene-d12	115	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-7-7.5	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-03
Date Analyzed:	12/20/19	Data File:	122025.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	62	145
Toluene-d8	104	55	145
4-Bromofluorobenzene	101	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-7-15	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-05
Date Analyzed:	12/20/19	Data File:	122026.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	62	145
Toluene-d8	104	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	0.14
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	0.27
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	0.15
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-8-6	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-07
Date Analyzed:	12/20/19	Data File:	122027.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	145
Toluene-d8	104	55	145
4-Bromofluorobenzene	97	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	0.51 lc	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-8-15	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-09
Date Analyzed:	12/20/19	Data File:	122038.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	109	50	150
4-Bromofluorobenzene	107	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	0.54 lc ca	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-6-8	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-11
Date Analyzed:	12/20/19	Data File:	122039.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	108	50	150
4-Bromofluorobenzene	109	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	1.1 lc ca	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	09-3078 mb
Date Analyzed:	12/20/19	Data File:	122012.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	104	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	TP-7-7.5	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-03 1/60
Date Analyzed:	12/20/19	Data File:	122025.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	56	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.2
Aroclor 1232	<0.2
Aroclor 1016	<0.2
Aroclor 1242	<0.2
Aroclor 1248	<0.2
Aroclor 1254	<0.2
Aroclor 1260	<0.2
Aroclor 1262	<0.2
Aroclor 1268	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	TP-6-8	Client:	Hart Crowser
Date Received:	12/06/19	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	912126-11 1/60
Date Analyzed:	12/20/19	Data File:	122026.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	63	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.2
Aroclor 1232	<0.2
Aroclor 1016	<0.2
Aroclor 1242	<0.2
Aroclor 1248	<0.2
Aroclor 1254	<0.2
Aroclor 1260	<0.2
Aroclor 1262	<0.2
Aroclor 1268	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos 19499-00, F&BI 912126
Date Extracted:	12/20/19	Lab ID:	09-3074 mb3 1/6
Date Analyzed:	12/20/19	Data File:	122022.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	85	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx**

Laboratory Code: 912358-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	11	12	9

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	80	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912361-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	86	92	64-133	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	98	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912404-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	1.51	85	94	75-125	10
Barium	mg/kg (ppm)	50	29.8	98	108	75-125	10
Cadmium	mg/kg (ppm)	10	<1	92	102	75-125	10
Chromium	mg/kg (ppm)	50	11.4	77	83	75-125	7
Lead	mg/kg (ppm)	50	3.29	93	102	75-125	9
Mercury	mg/kg (ppm)	5	<1	94	108	75-125	14
Selenium	mg/kg (ppm)	5	<1	92	104	75-125	12
Silver	mg/kg (ppm)	10	<1	94	104	75-125	10

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	100	80-120
Barium	mg/kg (ppm)	50	109	80-120
Cadmium	mg/kg (ppm)	10	108	80-120
Chromium	mg/kg (ppm)	50	105	80-120
Lead	mg/kg (ppm)	50	113	80-120
Mercury	mg/kg (ppm)	5	80	80-120
Selenium	mg/kg (ppm)	5	111	80-120
Silver	mg/kg (ppm)	10	114	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912123-13 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	75	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	75	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	75	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	80	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	78	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	78	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	85	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	80	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	84	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	79	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	81	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	71	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	76	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	78	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	73	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	69	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCS/D	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	83	85	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	84	84	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	84	86	54-123	2
Fluorene	mg/kg (ppm)	0.17	88	88	56-127	0
Phenanthrene	mg/kg (ppm)	0.17	85	86	55-122	1
Anthracene	mg/kg (ppm)	0.17	85	86	50-120	1
Fluoranthene	mg/kg (ppm)	0.17	91	90	54-129	1
Pyrene	mg/kg (ppm)	0.17	87	91	53-127	4
Benz(a)anthracene	mg/kg (ppm)	0.17	90	91	51-115	1
Chrysene	mg/kg (ppm)	0.17	86	90	55-129	5
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	83	81	56-123	2
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	74	79	54-131	7
Benzo(a)pyrene	mg/kg (ppm)	0.17	75	75	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	79	84	49-148	6
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	77	85	50-141	10
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	73	83	52-131	13

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912312-21 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	34	32	10-56	6
Chloromethane	mg/kg (ppm)	2.5	<0.5	66	62	10-90	6
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	60	55	10-91	9
Bromomethane	mg/kg (ppm)	2.5	<0.5	70	80	10-110	13
Chloroethane	mg/kg (ppm)	2.5	<0.5	72	61	10-101	17
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	55	48	10-95	14
Acetone	mg/kg (ppm)	12.5	<0.5	104	135	11-141	26 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	62	61	22-107	2
Hexane	mg/kg (ppm)	2.5	<0.25	58	58	10-95	0
Methylene chloride	mg/kg (ppm)	2.5	<0.5	82	90	14-128	9
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	86	90	17-134	5
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	80	80	13-112	0
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	94	96	23-115	2
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	56	50	18-117	11
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	85	87	25-120	2
Chloroform	mg/kg (ppm)	2.5	<0.05	92	95	29-117	3
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	117	137 vo	20-133	16
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	109	114	22-124	4
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	84	80	27-112	5
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	95	96	26-107	1
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	80	77	28-126	4
Benzene	mg/kg (ppm)	2.5	<0.03	92	94	26-114	2
Trichloroethene	mg/kg (ppm)	2.5	<0.02	106	110	30-112	4
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	106	106	31-119	0
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	101	102	31-131	1
Dibromomethane	mg/kg (ppm)	2.5	<0.05	96	95	27-124	1
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	117	115	16-147	2
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	95	98	28-137	3
Toluene	mg/kg (ppm)	2.5	<0.05	91	92	34-112	1
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	89	95	30-136	7
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	103	105	32-126	2
2-Hexanone	mg/kg (ppm)	12.5	<0.5	124	126	17-147	2
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	100	104	29-125	4
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	82	83	25-114	1
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	86	89	32-143	3
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	99	100	32-126	1
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	89	92	37-113	3
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	92	94	34-115	2
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	88	84	35-126	5
m,p-Xylene	mg/kg (ppm)	5	<0.1	89	90	25-125	1
o-Xylene	mg/kg (ppm)	2.5	<0.05	90	90	27-126	0
Styrene	mg/kg (ppm)	2.5	<0.05	93	95	39-121	2
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	91	89	34-123	2
Bromoform	mg/kg (ppm)	2.5	<0.05	87	89	18-155	2
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	95	96	31-120	1
Bromobenzene	mg/kg (ppm)	2.5	<0.05	90	93	40-115	3
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	93	92	24-130	1
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	93	91	27-148	2
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	113	114	33-123	1
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	95	96	39-110	1
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	94	95	39-111	1
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	96	94	36-116	2
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	92	92	35-116	0
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	95	93	33-118	2
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	92	90	32-119	2
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	89	91	38-111	2
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	90	90	39-109	0
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	91	91	40-111	0
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	113 vo	104	44-112	8
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	95	89	31-121	7
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	93	83	24-128	11
Naphthalene	mg/kg (ppm)	2.5	<0.05	111	99	24-139	11
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	104	93	35-117	11

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	54	10-76
Chloromethane	mg/kg (ppm)	2.5	76	34-98
Vinyl chloride	mg/kg (ppm)	2.5	71	42-107
Bromomethane	mg/kg (ppm)	2.5	97	46-113
Chloroethane	mg/kg (ppm)	2.5	71	47-115
Trichlorofluoromethane	mg/kg (ppm)	2.5	57	53-112
Acetone	mg/kg (ppm)	12.5	119	39-147
1,1-Dichloroethene	mg/kg (ppm)	2.5	69	65-110
Hexane	mg/kg (ppm)	2.5	90	55-107
Methylene chloride	mg/kg (ppm)	2.5	97	50-127
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	89	72-122
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	85	71-113
1,1-Dichloroethane	mg/kg (ppm)	2.5	97	74-109
2,2-Dichloropropane	mg/kg (ppm)	2.5	73	63-145
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	87	73-110
Chloroform	mg/kg (ppm)	2.5	93	76-110
2-Butanone (MEK)	mg/kg (ppm)	12.5	115	60-121
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	106	73-111
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	83	72-116
1,1-Dichloropropene	mg/kg (ppm)	2.5	94	72-112
Carbon tetrachloride	mg/kg (ppm)	2.5	80	67-123
Benzene	mg/kg (ppm)	2.5	90	72-106
Trichloroethene	mg/kg (ppm)	2.5	89	72-107
1,2-Dichloropropane	mg/kg (ppm)	2.5	97	74-115
Bromodichloromethane	mg/kg (ppm)	2.5	94	75-126
Dibromomethane	mg/kg (ppm)	2.5	89	76-116
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	99	80-128
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	94	71-138
Toluene	mg/kg (ppm)	2.5	87	74-111
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	89	73-124
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	94	76-118
2-Hexanone	mg/kg (ppm)	12.5	105	67-123
1,3-Dichloropropane	mg/kg (ppm)	2.5	92	75-118
Tetrachloroethene	mg/kg (ppm)	2.5	81	73-111
Dibromochloromethane	mg/kg (ppm)	2.5	82	64-152
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	91	77-117
Chlorobenzene	mg/kg (ppm)	2.5	84	76-109
Ethylbenzene	mg/kg (ppm)	2.5	88	75-112
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	83	75-129
m,p-Xylene	mg/kg (ppm)	5	87	77-115
o-Xylene	mg/kg (ppm)	2.5	86	76-115
Styrene	mg/kg (ppm)	2.5	88	76-119
Isopropylbenzene	mg/kg (ppm)	2.5	86	76-120
Bromoform	mg/kg (ppm)	2.5	83	50-174
n-Propylbenzene	mg/kg (ppm)	2.5	91	77-115
Bromobenzene	mg/kg (ppm)	2.5	86	76-112
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	86	77-121
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	99	74-121
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	97	73-117
2-Chlorotoluene	mg/kg (ppm)	2.5	89	75-113
4-Chlorotoluene	mg/kg (ppm)	2.5	88	77-115
tert-Butylbenzene	mg/kg (ppm)	2.5	86	77-123
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	86	77-119
sec-Butylbenzene	mg/kg (ppm)	2.5	87	78-120
p-Isopropyltoluene	mg/kg (ppm)	2.5	85	77-120
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	84	76-112
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	83	74-109
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	84	75-114
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	97	68-122
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	85	75-122
Hexachlorobutadiene	mg/kg (ppm)	2.5	83	74-130
Naphthalene	mg/kg (ppm)	2.5	88	73-122
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	86	75-117

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/06/19

Project: Kosmos 19499-00, F&BI 912126

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912340-01 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	68	30-123
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	67	26-131

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	93	89	55-137	4
Aroclor 1260	mg/kg (ppm)	0.25	93	92	51-150	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

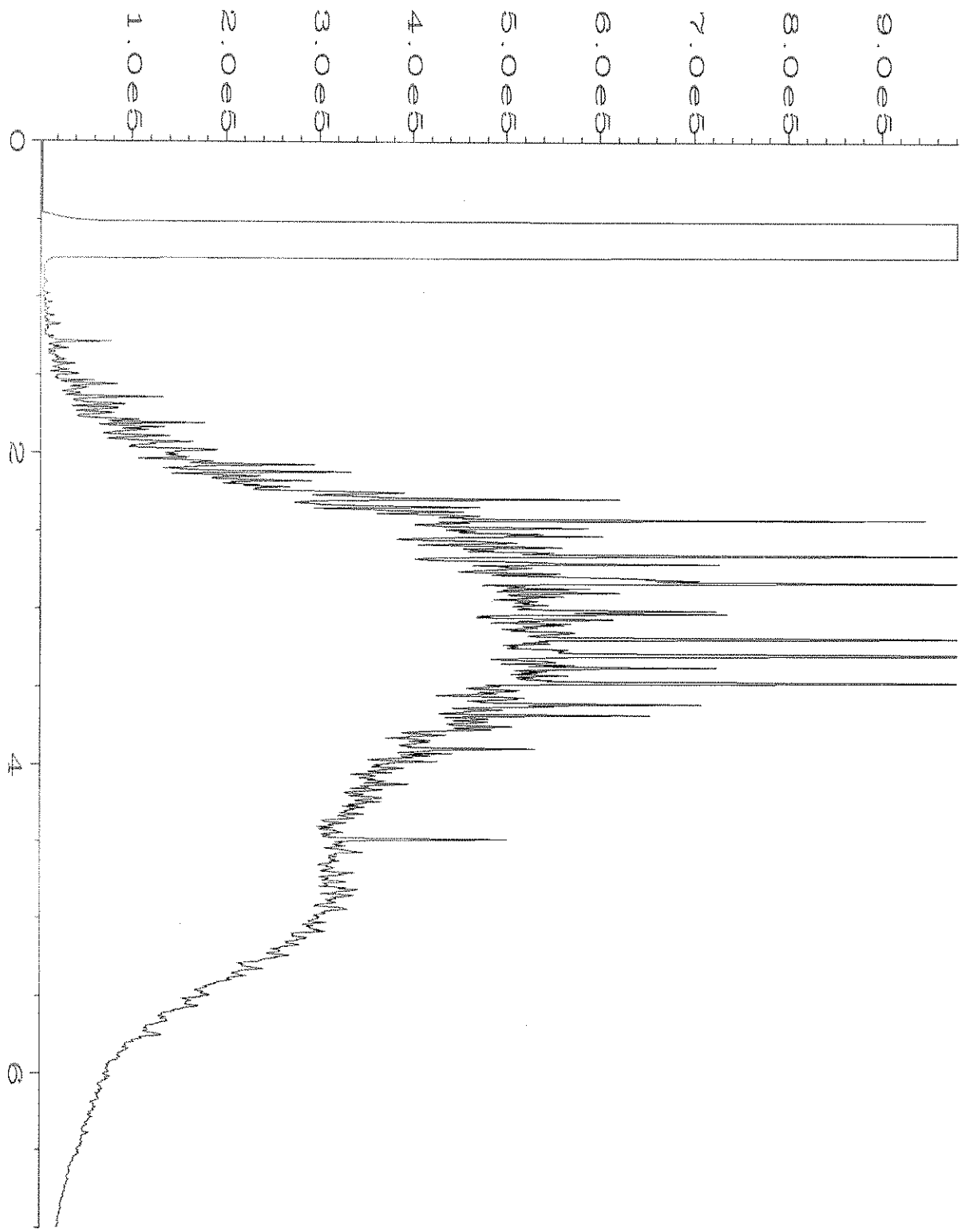
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

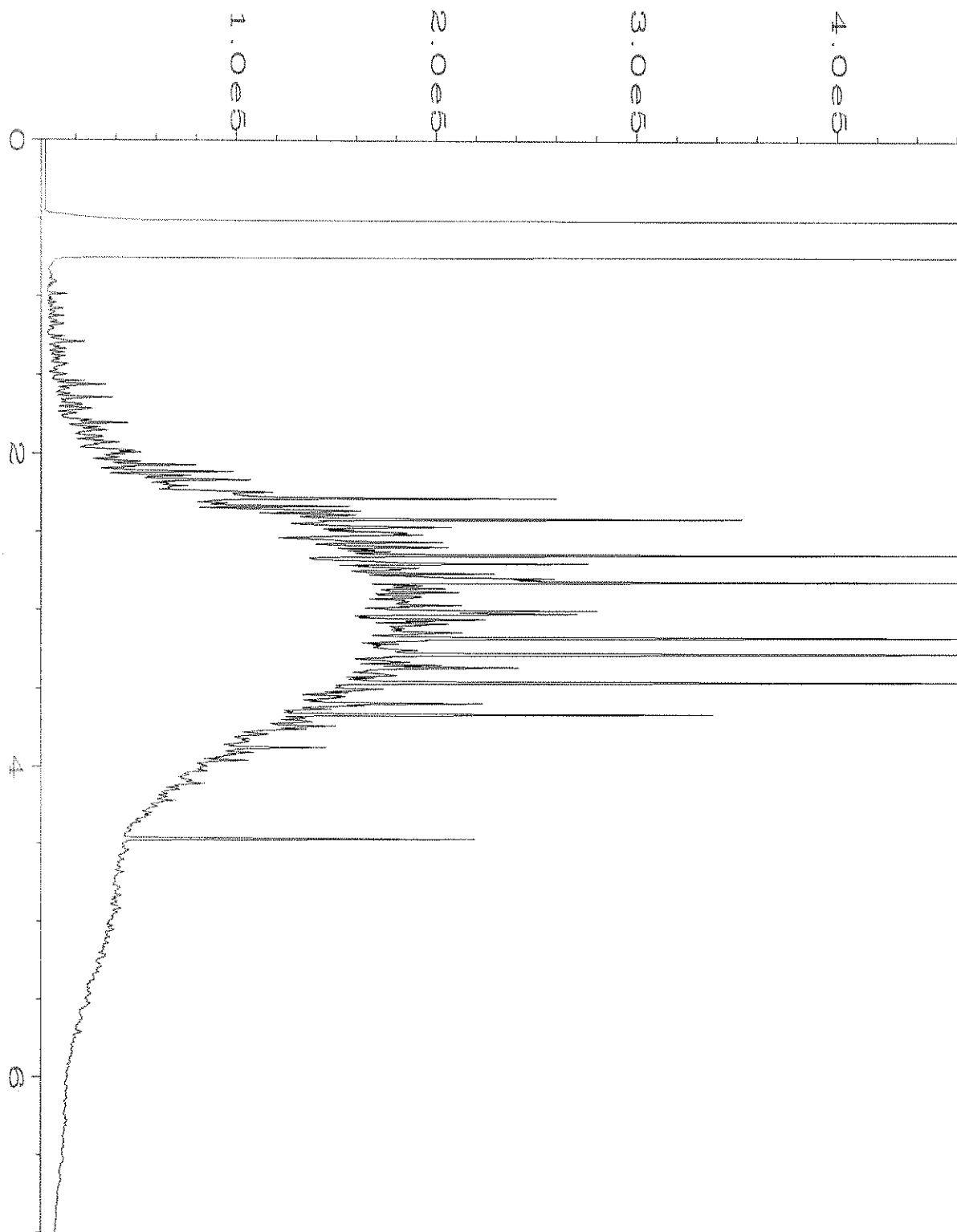
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

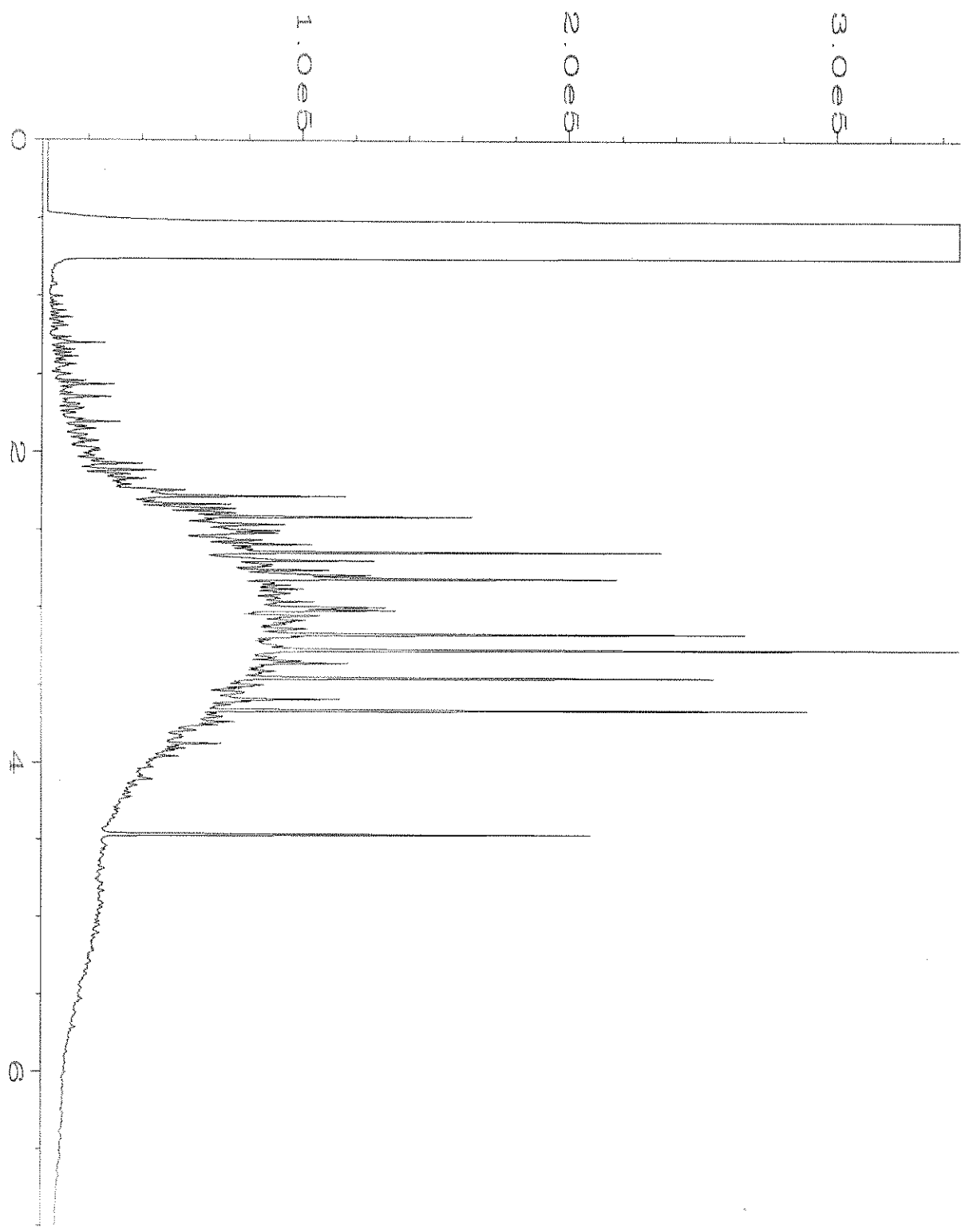
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



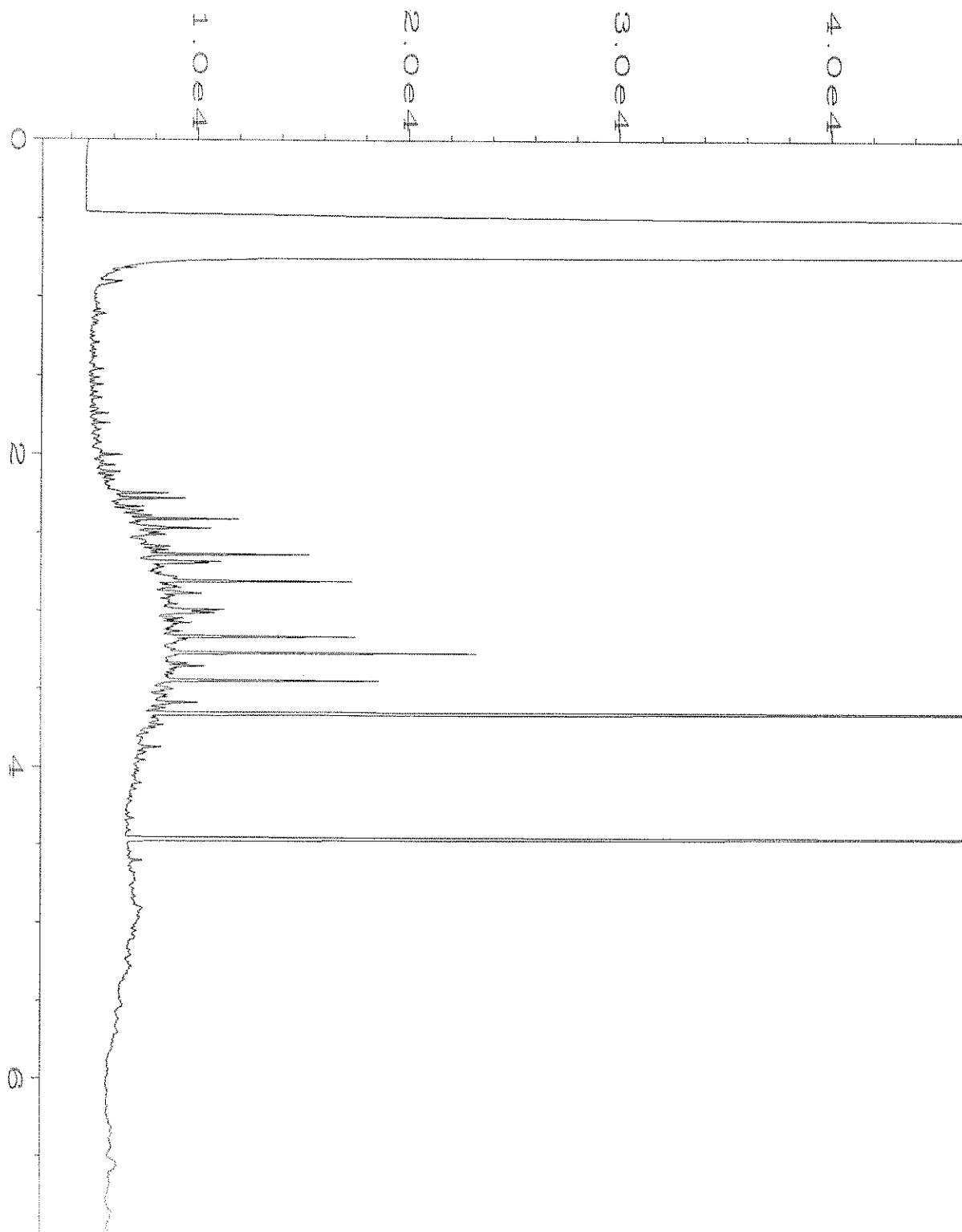
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\015F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 15
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-01	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 12:24 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:53 AM		



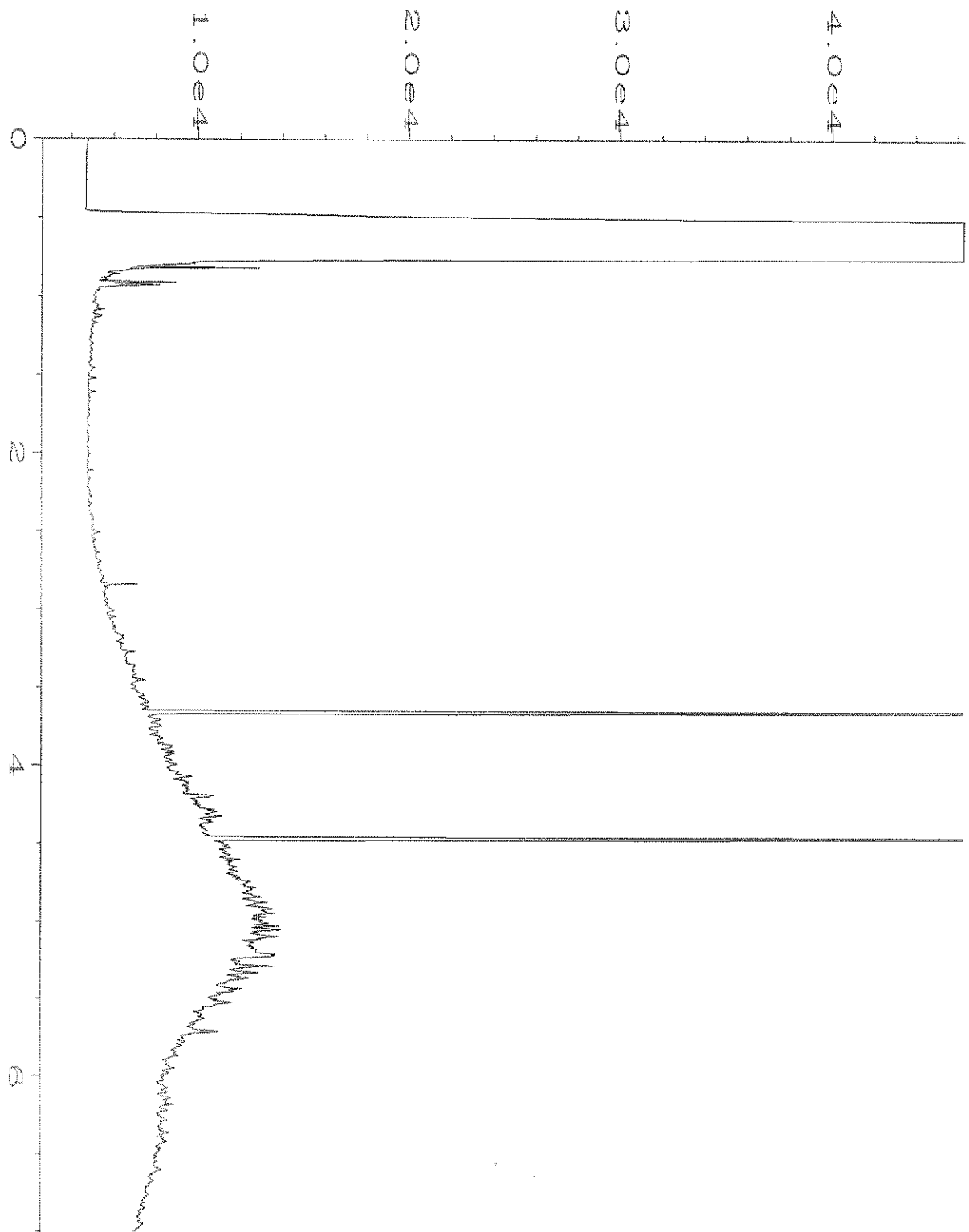
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\016F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 16
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-03	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 12:35 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:53 AM		



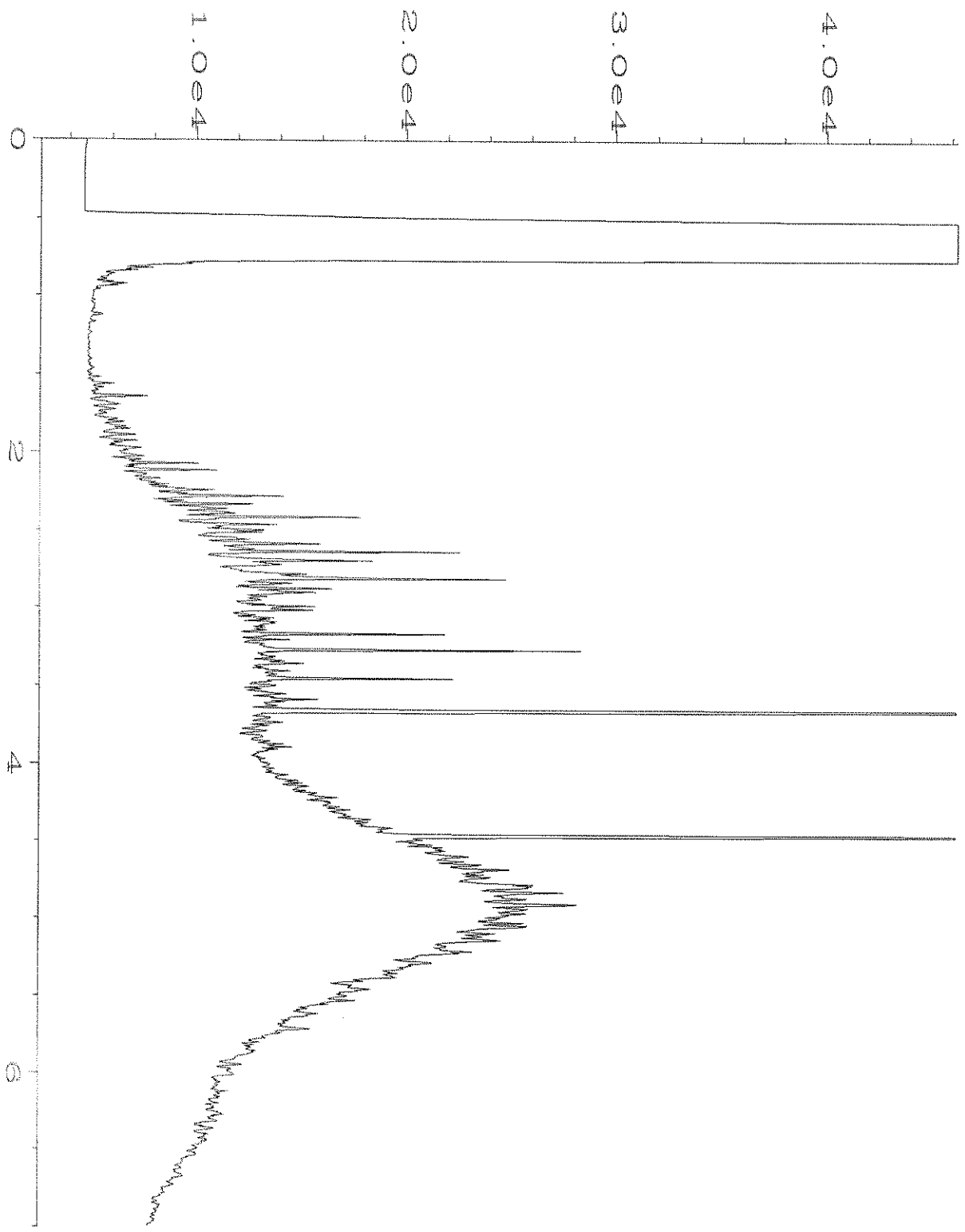
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\017F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 17
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-04	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 12:46 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:54 AM		



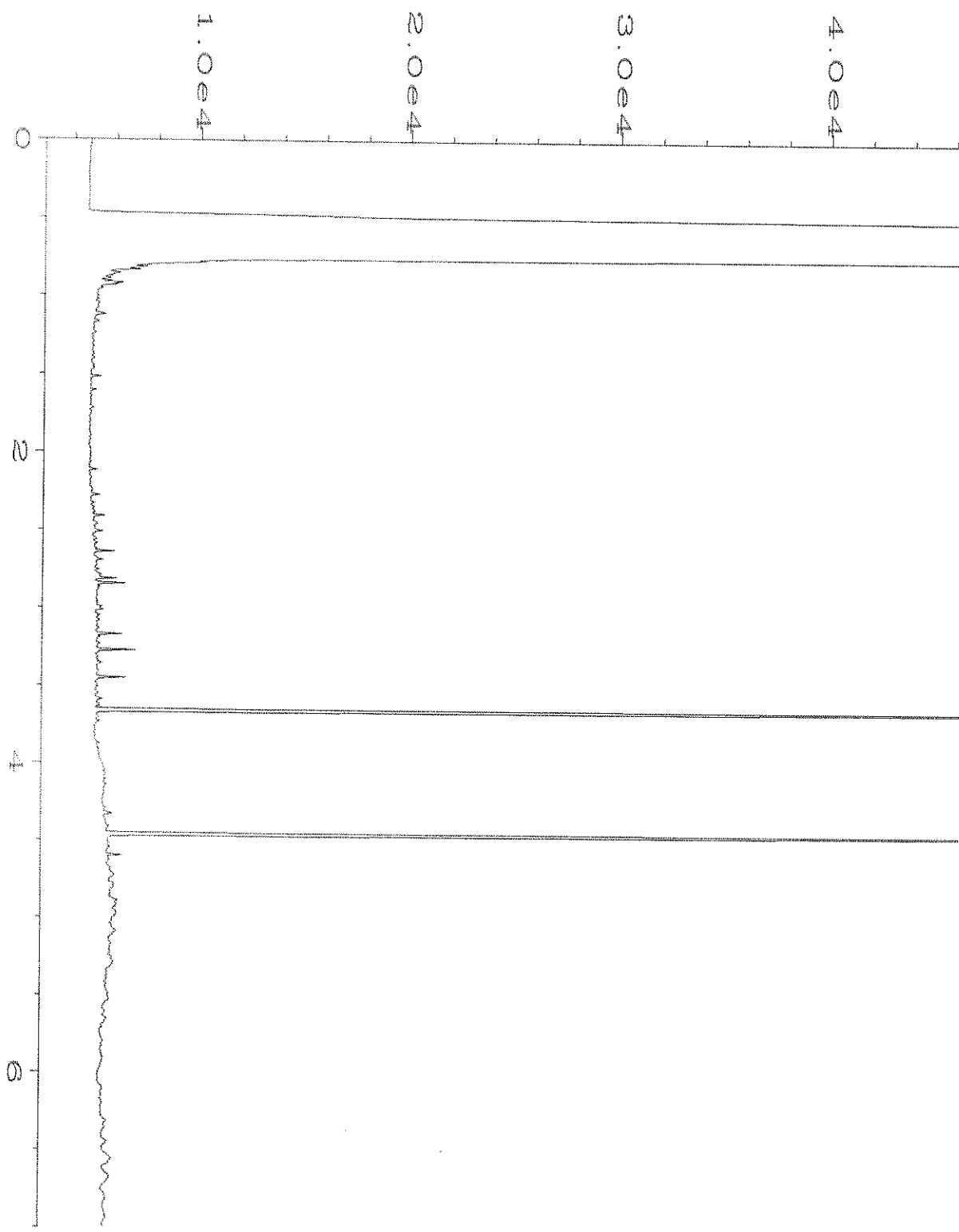
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\018F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 18
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-05	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 12:57 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:54 AM		



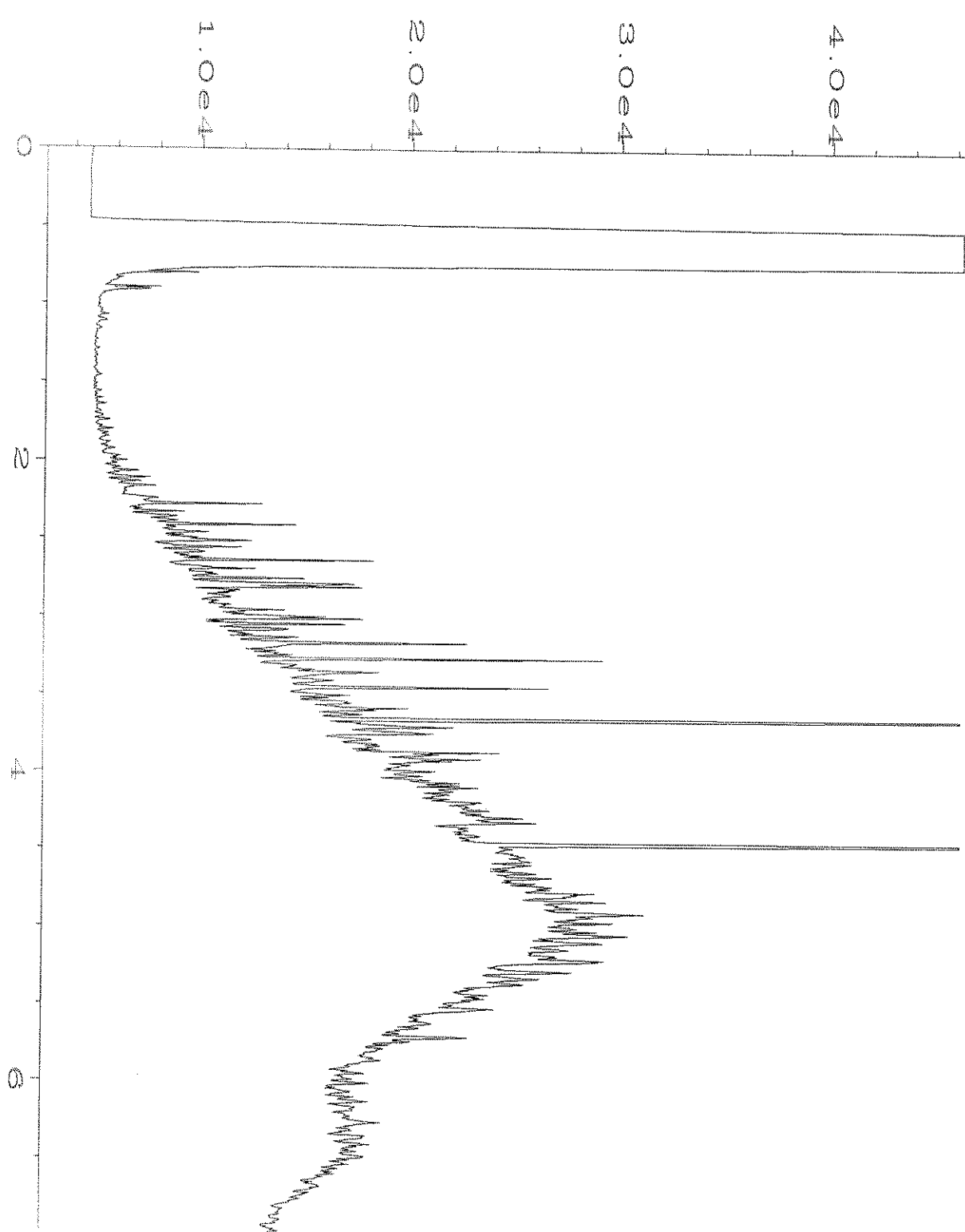
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\019F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 19
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-06	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:08 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:54 AM		



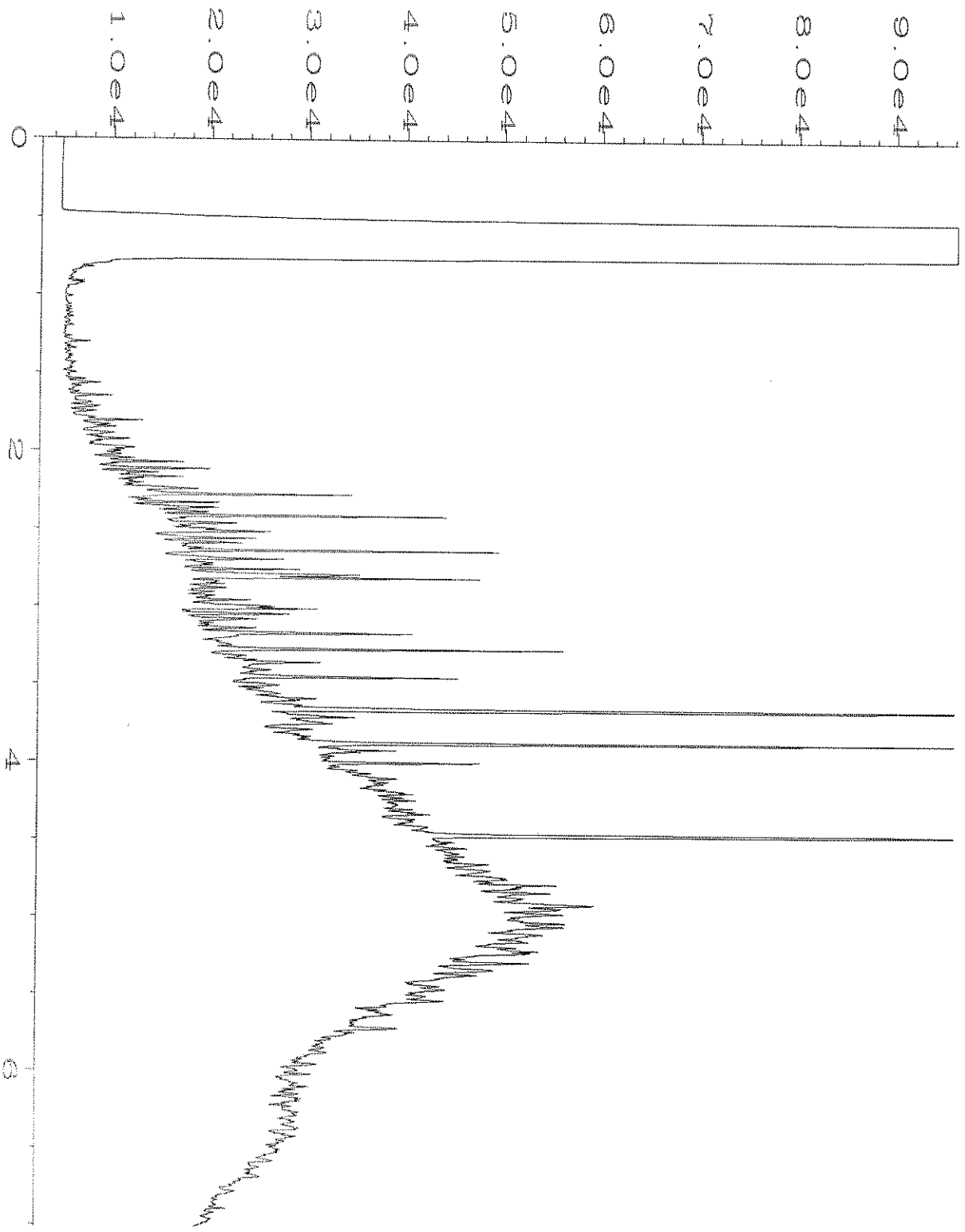
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\020F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 20
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-07	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:19 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:54 AM		



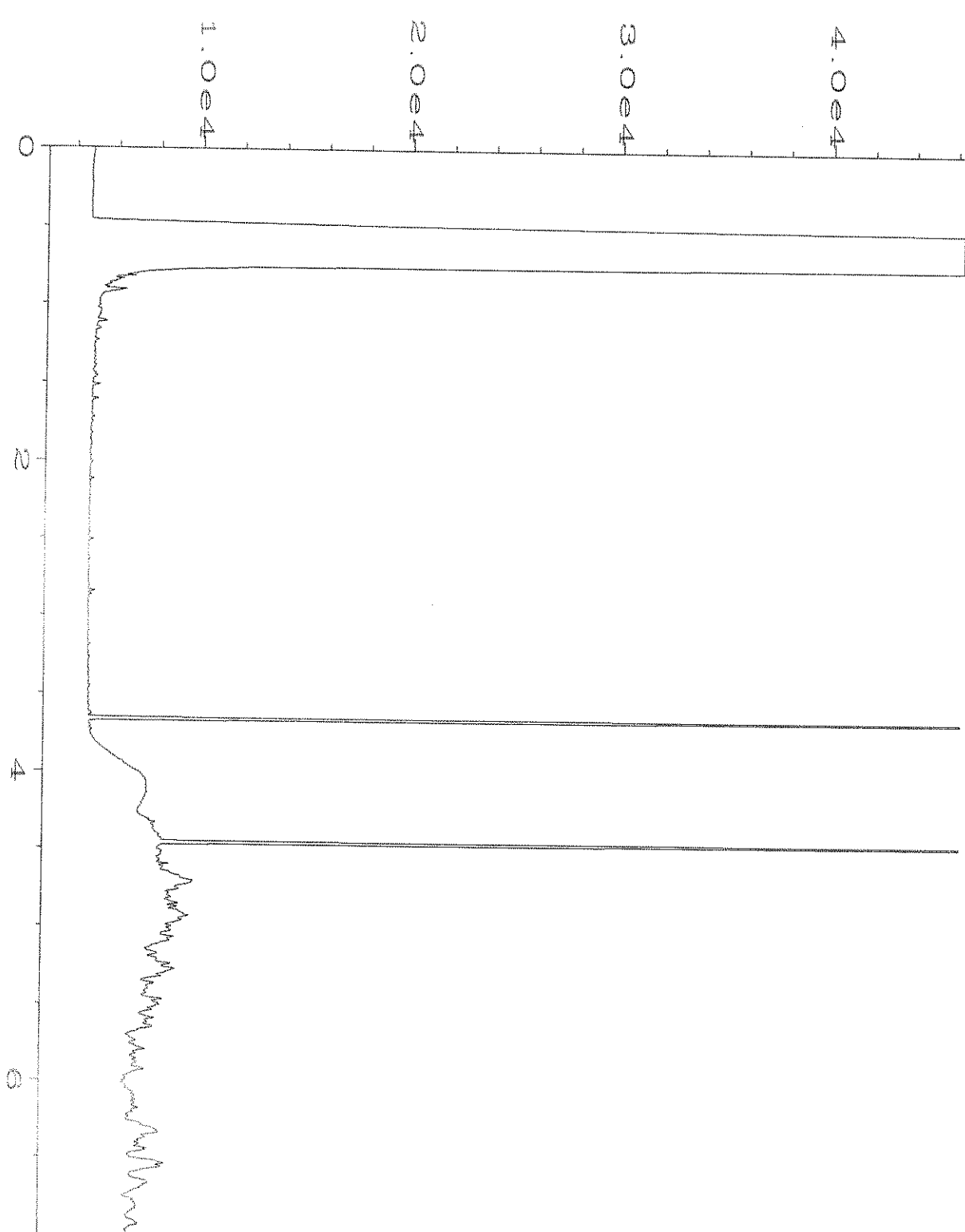
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\021F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 21
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-09	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:30 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:54 AM		



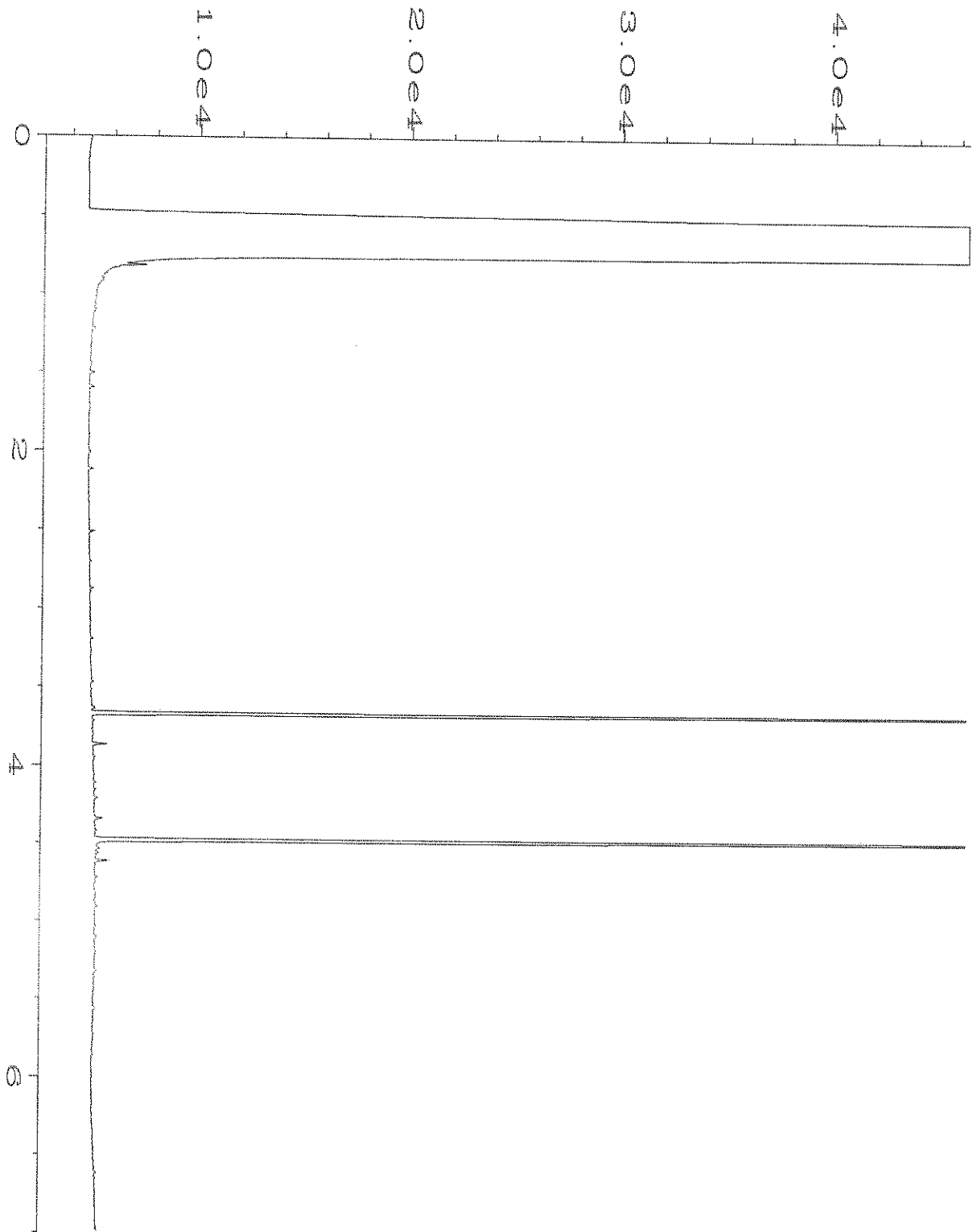
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\022F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 22
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-10	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:41 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:54 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-20-19\023F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 23
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-11	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:51 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:55 AM		



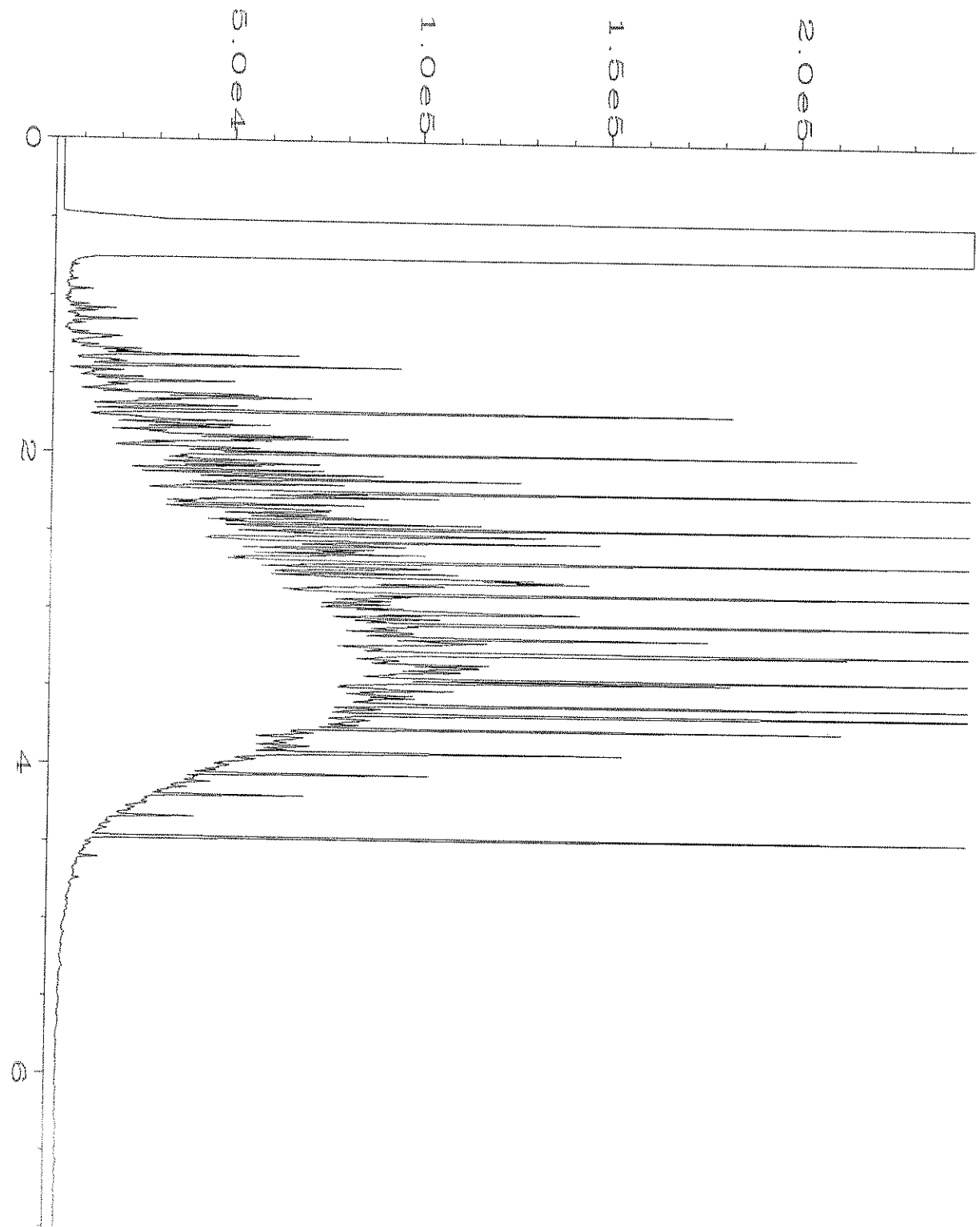
Data File Name	: C:\HPCHEM\6\DATA\12-20-19\024F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 24
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912126-12	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 02:02 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:55 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-20-19\006F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 6
Instrument	: GC6	Injection Number	: 1
Sample Name	: 09-3092 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 10:16 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 09:51 AM		

Top
and
Bottom

100
800
1000



Data File Name : C:\HPCHEM\6\DATA\12-20-19\005F0701.D
Operator : TL
Instrument : GC6
Sample Name : 1000 Dx 58-146C
Run Time Bar Code:
Acquired on : 20 Dec 19 02:37 PM
Report Created on: 23 Dec 19 09:51 AM
Page Number : 1
Vial Number : 5
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

912126

SAMPLE CHAIN OF CUSTODY

ME 12-06-19

Page # 1 of 1 703 154

Report To Angie Goodwin

Company Hart-Crowser

Address 3131 Elliott Ave

City, State, ZIP Seattle, WA 98119

Phone Email angie.goodwin@hart-crowser.com

SAMPLERS (signature)

PROJECT NAME

KOSMOS

PO #

19499-00

REMARKS

INVOICE TO

Project specific RI? Yes / No

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	ECBs EPA 8082	Notes
TP-7-2.5	01AE	12/6/19	935	soil	5	X							*Hold for analysis
TP-7-5	02		940	soil	5								
TP-7-7.5	03		945	soil	5	X	X		X	X	X		
TP-7-10	04		955	soil	5	X	X		X	X	X		X Added on 12/19/19 by [signature]
TP-7-15	05		1010	soil	5	X	X		X	X	X		
TP-8-3.5	06		1229	soil	5	X						X	
TP-8-6	07		1236	soil	5	X	X		X				
TP-8-10	08		1245	soil	5								
TP-8-15	09		1257	soil	5	X	X		X				
TP-6-5	10		1135	soil	5	X							

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Relinquished by: [signature]

Received by: [signature]

Jolie Higgins

Hart-Crowser

12/6/19 1856

Relinquished by:

PRISMA TESTS

#31

Received by:

Samples received at 3 PC

Friedman & Bryna, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

912126

SAMPLE CHAIN OF CUSTODY

ME 12-06-19

2 of 2 US4

SAMPLERS (signature)

PROJECT NAME

KOSMOS

PO #

19499-00

REMARKS

INVOICE TO

TURNAROUND TIME

Standard turnaround

RUSH
Rush charges authorized by:

SAMPLE DISPOSAL

Archive samples
 Other

Default: Dispose after 30 days

Report To Angie Goodwin

Company Hart Crowser

Address 3131 Elliott Ave

City, State, ZIP Seattle, WA 98119

Phone _____ Email angie.goodwin@hartcrowser.com

Project specific RI's? - Yes / No

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
TP-6-8	11 A.E.	12/6/19	1148	Soil	5	X	X			X	X	X		
TP-6-12	12 A.1	12/6/19	1205	Soil	5	X								

SIGNATURE

Relinquished by: Paul Higgins
Received by: [Signature]

PRINT NAME

Relinquished by: Paul Higgins
Received by: BISSETT ADDRESS

COMPANY

Relinquished by: Hart Crowser
Received by: #1

DATE

Relinquished by: 12/6/19
Received by: ↓

TIME

Relinquished by: 1856
Received by: ↓

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-3039
Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 30, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin :

Included are the results from the testing of material submitted on December 9, 2019 from the Kosmos, F&BI 912147 project. There are 17 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1230R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 9, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912147 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912147 -01	TP-10-5
912147 -02	TP-10-10
912147 -03	TP-10-15
912147 -04	TP-10-18
912147 -05	TP-11-5
912147 -06	TP-11-12
912147 -07	TP-11-15
912147 -08	TP-11-16.5
912147 -09	TP-12-2.5
912147 -10	TP-12-4

A 6020B internal standard failed the acceptance criteria for samples TP-10-5 and TP-12-2.5. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

Methylene chloride was detected in the 8260C analysis of samples TP-10-5 and TP-12-2.5. The data were flagged as due to laboratory contamination. In addition, the matrix spike and matrix spike duplicate failed the relative percent difference for acetone and 2-butanone. The analytes were not detected in the samples therefore the data were acceptable.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/09/19
Project: Kosmos, F&BI 912147
Date Extracted: 12/20/19
Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	Surrogate (% Recovery) (Limit 58-139)
TP-10-5 912147-01	<5	90
TP-12-2.5 912147-09	<5	89
Method Blank 09-2936 MB	<5	94

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
 Date Received: 12/09/19
 Project: Kosmos, F&BI 912147
 Date Extracted: 12/20/19
 Date Analyzed: 12/20/19 and 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis
 Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
TP-10-5 912147-01	<50	<250	80
TP-10-15 912147-03	<50	<250	80
TP-10-18 912147-04	<50	<250	81
TP-11-5 912147-05	<50	<250	80
TP-11-16.5 912147-08	<50	<250	79
TP-12-2.5 912147-09	340 x	2,100	85
TP-12-4 912147-10	<50	<250	80
Method Blank 09-3091 MB	<50	<250	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-10-5	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912147
Date Extracted:	12/20/19	Lab ID:	912147-01
Date Analyzed:	12/20/19	Data File:	912147-01.093
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.53
Barium	72.7
Cadmium	<1
Chromium	12.9 J
Lead	6.15
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-10-5	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912147
Date Extracted:	12/19/19	Lab ID:	912147-01 x5
Date Analyzed:	12/23/19	Data File:	912147-01 x5.136
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Chromium	16.7
----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-12-2.5	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912147
Date Extracted:	12/20/19	Lab ID:	912147-09
Date Analyzed:	12/20/19	Data File:	912147-09.094
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.73
Barium	82.4
Cadmium	1.33
Chromium	11.4 J
Lead	85.2
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	TP-12-2.5	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912147
Date Extracted:	12/19/19	Lab ID:	912147-09 x5
Date Analyzed:	12/23/19	Data File:	912147-09 x5.137
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
----------	------------------------------

Chromium	14.3
----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912147
Date Extracted:	12/20/19	Lab ID:	I9-819 mb2
Date Analyzed:	12/20/19	Data File:	I9-819 mb2.036
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-10-5	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912147
Date Extracted:	12/23/19	Lab ID:	912147-01
Date Analyzed:	12/23/19	Data File:	122326.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	0.96 lc	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	TP-12-2.5	Client:	Hart Crowser
Date Received:	12/09/19	Project:	Kosmos, F&BI 912147
Date Extracted:	12/23/19	Lab ID:	912147-09
Date Analyzed:	12/23/19	Data File:	122327.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	0.71 lc	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912147
Date Extracted:	12/23/19	Lab ID:	09-3082 mb
Date Analyzed:	12/23/19	Data File:	122311.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	93	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912147

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 912147-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	90	61-153

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912147

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912360-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	69	90	88	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	88	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912147

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912286-05 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	5.41	84	90	75-125	7
Barium	mg/kg (ppm)	50	91.1	108	114	75-125	5
Cadmium	mg/kg (ppm)	10	8.16	71 b	36 b	75-125	65 b
Chromium	mg/kg (ppm)	50	48.1	107	101	75-125	6
Lead	mg/kg (ppm)	50	13.6	101	92	75-125	9
Mercury	mg/kg (ppm)	5	<5	94	102	75-125	8
Selenium	mg/kg (ppm)	5	<5	82	80	75-125	2
Silver	mg/kg (ppm)	10	<5	89	89	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	89	80-120
Barium	mg/kg (ppm)	50	99	80-120
Cadmium	mg/kg (ppm)	10	98	80-120
Chromium	mg/kg (ppm)	50	91	80-120
Lead	mg/kg (ppm)	50	105	80-120
Mercury	mg/kg (ppm)	5	98	80-120
Selenium	mg/kg (ppm)	5	99	80-120
Silver	mg/kg (ppm)	10	97	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912147

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912147-01912147-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	21	23	10-56	9
Chloromethane	mg/kg (ppm)	2.5	<0.5	45	46	10-90	2
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	39	39	10-91	0
Bromomethane	mg/kg (ppm)	2.5	<0.5	53	61	10-110	14
Chloroethane	mg/kg (ppm)	2.5	<0.5	50	50	10-101	0
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	36	36	10-95	0
Acetone	mg/kg (ppm)	12.5	<0.5	81	114	11-141	34 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	42	46	22-107	9
Hexane	mg/kg (ppm)	2.5	<0.25	37	41	10-95	10
Methylene chloride	mg/kg (ppm)	2.5	0.80	60 b	61 b	14-128	2 b
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	76	78	17-134	3
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	64	66	13-112	3
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	75	79	23-115	5
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	63	61	18-117	3
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	73	74	25-120	1
Chloroform	mg/kg (ppm)	2.5	<0.05	78	82	29-117	5
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	97	122	20-133	23 vo
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	88	97	22-124	10
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	67	68	27-112	1
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	72	77	26-107	7
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	64	64	28-126	0
Benzene	mg/kg (ppm)	2.5	<0.03	74	80	26-114	8
Trichloroethene	mg/kg (ppm)	2.5	<0.02	74	81	30-112	9
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	83	92	31-119	10
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	84	92	31-131	9
Dibromomethane	mg/kg (ppm)	2.5	<0.05	75	83	27-124	10
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	92	100	16-147	8
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	83	94	28-137	12
Toluene	mg/kg (ppm)	2.5	<0.05	74	79	34-112	7
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	77	89	30-136	14
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	83	91	32-126	9
2-Hexanone	mg/kg (ppm)	12.5	<0.5	96	110	17-147	14
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	80	89	29-125	11
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	68	72	25-114	6
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	75	79	32-143	5
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	78	86	32-126	10
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	75	82	37-113	9
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	77	82	34-115	6
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	76	78	35-126	3
m,p-Xylene	mg/kg (ppm)	5	<0.1	76	80	25-125	5
o-Xylene	mg/kg (ppm)	2.5	<0.05	77	80	27-126	4
Styrene	mg/kg (ppm)	2.5	<0.05	80	84	39-121	5
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	77	80	34-123	4
Bromoform	mg/kg (ppm)	2.5	<0.05	80	82	18-155	2
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	77	88	31-120	13
Bromobenzene	mg/kg (ppm)	2.5	<0.05	74	82	40-115	10
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	76	84	24-130	10
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	89	98	27-148	10
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	86	96	33-123	11
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	78	86	39-110	10
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	76	87	39-111	13
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	76	85	36-116	11
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	76	83	35-116	9
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	78	84	33-118	7
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	76	82	32-119	8
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	74	83	38-111	11
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	75	82	39-109	9
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	76	82	40-111	8
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	87	92	44-112	6
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	76	82	31-121	8
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	78	80	24-128	3
Naphthalene	mg/kg (ppm)	2.5	<0.05	79	82	24-139	4
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	78	82	35-117	5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/09/19

Project: Kosmos, F&BI 912147

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	61	10-146
Chloromethane	mg/kg (ppm)	2.5	79	27-133
Vinyl chloride	mg/kg (ppm)	2.5	82	22-139
Bromomethane	mg/kg (ppm)	2.5	90	38-114
Chloroethane	mg/kg (ppm)	2.5	104	9-163
Trichlorofluoromethane	mg/kg (ppm)	2.5	99	10-196
Acetone	mg/kg (ppm)	12.5	98	52-141
1,1-Dichloroethene	mg/kg (ppm)	2.5	108	47-128
Hexane	mg/kg (ppm)	2.5	120	43-142
Methylene chloride	mg/kg (ppm)	2.5	113	42-132
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	103	60-123
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	113	67-129
1,1-Dichloroethane	mg/kg (ppm)	2.5	111	68-115
2,2-Dichloropropane	mg/kg (ppm)	2.5	109	52-170
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	114	72-127
Chloroform	mg/kg (ppm)	2.5	109	66-120
2-Butanone (MEK)	mg/kg (ppm)	12.5	110	72-127
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	116	56-135
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	111	62-131
1,1-Dichloropropene	mg/kg (ppm)	2.5	112	69-128
Carbon tetrachloride	mg/kg (ppm)	2.5	115	60-139
Benzene	mg/kg (ppm)	2.5	114	68-114
Trichloroethene	mg/kg (ppm)	2.5	110	64-117
1,2-Dichloropropane	mg/kg (ppm)	2.5	118	72-127
Bromodichloromethane	mg/kg (ppm)	2.5	117	72-130
Dibromomethane	mg/kg (ppm)	2.5	115	70-120
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	118	45-145
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	128	75-136
Toluene	mg/kg (ppm)	2.5	105	66-126
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	117	72-132
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	106	75-113
2-Hexanone	mg/kg (ppm)	12.5	102	33-152
1,3-Dichloropropene	mg/kg (ppm)	2.5	108	72-130
Tetrachloroethene	mg/kg (ppm)	2.5	108	72-114
Dibromochloromethane	mg/kg (ppm)	2.5	115	74-125
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	106	74-132
Chlorobenzene	mg/kg (ppm)	2.5	104	76-111
Ethylbenzene	mg/kg (ppm)	2.5	106	64-123
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	69-135
m,p-Xylene	mg/kg (ppm)	5	106	78-122
o-Xylene	mg/kg (ppm)	2.5	102	77-124
Styrene	mg/kg (ppm)	2.5	104	74-126
Isopropylbenzene	mg/kg (ppm)	2.5	101	76-127
Bromoform	mg/kg (ppm)	2.5	118	56-132
n-Propylbenzene	mg/kg (ppm)	2.5	108	74-124
Bromobenzene	mg/kg (ppm)	2.5	108	72-122
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	107	76-126
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	56-143
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	106	61-137
2-Chlorotoluene	mg/kg (ppm)	2.5	106	74-121
4-Chlorotoluene	mg/kg (ppm)	2.5	107	75-122
tert-Butylbenzene	mg/kg (ppm)	2.5	107	73-130
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	104	76-125
sec-Butylbenzene	mg/kg (ppm)	2.5	103	71-130
p-Isopropyltoluene	mg/kg (ppm)	2.5	101	70-132
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	103	75-121
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	102	74-117
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	100	76-121
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	96	58-138
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	97	64-135
Hexachlorobutadiene	mg/kg (ppm)	2.5	94	50-153
Naphthalene	mg/kg (ppm)	2.5	92	63-140
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	93	63-138

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

912147

SAMPLE CHAIN OF CUSTODY

ME 12/9/19

152/103

Report To Angie Goodwin
Company Hart House

Address _____

City, State, ZIP _____

Phone _____ Email ANGIE.GOODWIN@HARTHOUSE.COM

SAMPLERS (signature) John E. Keegan
 PROJECT NAME KOSMOS
 PO # _____
 REMARKS _____
 INVOICE TO _____

Project specific RLS? - Yes / No
 Yes No

Page # _____ of _____
 TURNOURND TIME
 Standard turnaround
 RUSH
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082			
TP-10-5	01A-E	12/9/19	855	SOIL	5	X	X			X					
TP-10-10	02		905			X									*see
TP-10-15	03		920			X									Angie for analysis
TP-10-18	04		930			X									
TP-11-5	05		1000			X									
TP-11-12	06		1005			X									X added by
TP-11-15	07		1020			X									ASG on 12/11/19
TP-11-10.5	08		1030			X									
TP-12-7.5	09		121130			X									
TP-12-4	10		1140			X									

SIGNATURE		PRINT NAME		COMPANY		DATE		TIME	
<u>John E. Keegan</u>		<u>John E. Keegan</u>		<u>AL</u>		<u>12/9/19</u>		<u>1850</u>	
Received by: <u>ASG</u>		<u>BRAD TADDESE</u>		<u>FBI</u>		<u>↓</u>		<u>↓</u>	
Relinquished by: _____		Relinquished by: _____		Samples received at: <u>200</u>					

Friedman & Bryna, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
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December 30, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 11, 2019 from the Kosmos, F&BI 912193 project. There are 14 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1230R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 11, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912193 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912193 -01	B-10-5
912193 -02	B-10-10
912193 -03	B-10-15
912193 -04	B-10-20
912193 -05	B-10-25
912193 -06	B-10-30
912193 -07	B-10-35
912193 -08	B-10-40
912193 -09	B-3-5
912193 -10	B-3-15
912193 -11	B-3-20
912193 -12	B-3-25
912193 -13	B-3-30
912193 -14	B-3-35
912193 -15	B-3-40
912193 -16	B-8-5
912193 -17	B-8-10
912193 -18	B-8-15
912193 -19	B-8-20
912193 -20	B-8-25
912193 -21	B-8-30
912193 -22	B-8-35
912193 -23	B-8-40

Several compounds in the 8260C laboratory control sample exceeded the acceptance criteria. The analytes were not detected in the sample, therefore the data were acceptable.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/11/19
Project: Kosmos, F&BI 912193
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
B-8-10 912193-17	<5	88
Method Blank 09-2938 MB	<5	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/11/19
Project: Kosmos, F&BI 912193
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**
Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
B-3-15 912193-10	<0.02	<0.02	<0.02	<0.06	<5	89
B-3-20 912193-11	<0.02	<0.02	<0.02	<0.06	<5	89
B-3-35 912193-14	<0.02	<0.02	<0.02	<0.06	<5	89
Method Blank 09-2938 MB	<0.02	<0.02	<0.02	<0.06	<5	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/11/19
Project: Kosmos, F&BI 912193
Date Extracted: 12/20/19
Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
B-10-30 912193-06	<50	<250	86
B-10-35 912193-07	<50	<250	78
B-3-15 912193-10	<50	<250	78
B-3-20 912193-11	<50	<250	79
B-3-35 912193-14	<50	<250	79
B-8-5 912193-16	<50	<250	79
B-8-10 912193-17	<50	<250	79
Method Blank 09-3069 MB2	<50	<250	80

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-3-15	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912193
Date Extracted:	12/20/19	Lab ID:	912193-10 1/5
Date Analyzed:	12/20/19	Data File:	122008.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	163
Benzo(a)anthracene-d12	115	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912193
Date Extracted:	12/20/19	Lab ID:	09-3070 mb2 1/5
Date Analyzed:	12/20/19	Data File:	122007.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	163
Benzo(a)anthracene-d12	115	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-8-10	Client:	Hart Crowser
Date Received:	12/11/19	Project:	Kosmos, F&BI 912193
Date Extracted:	12/23/19	Lab ID:	912193-17
Date Analyzed:	12/23/19	Data File:	122317.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	95	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912193
Date Extracted:	12/23/19	Lab ID:	09-3083 mb
Date Analyzed:	12/23/19	Data File:	122312.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	94	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912193

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912193-10 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	90	69-120
Toluene	mg/kg (ppm)	0.5	88	70-117
Ethylbenzene	mg/kg (ppm)	0.5	86	65-123
Xylenes	mg/kg (ppm)	1.5	87	66-120
Gasoline	mg/kg (ppm)	20	95	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912193

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912286-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	86	88	73-135	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	88	74-139

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912193

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912123-13 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	75	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	75	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	75	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	80	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	78	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	78	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	85	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	80	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	84	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	79	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	81	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	71	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	76	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	78	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	73	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	69	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCS/D	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	83	85	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	84	84	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	84	86	54-123	2
Fluorene	mg/kg (ppm)	0.17	88	88	56-127	0
Phenanthrene	mg/kg (ppm)	0.17	85	86	55-122	1
Anthracene	mg/kg (ppm)	0.17	85	86	50-120	1
Fluoranthene	mg/kg (ppm)	0.17	91	90	54-129	1
Pyrene	mg/kg (ppm)	0.17	87	91	53-127	4
Benz(a)anthracene	mg/kg (ppm)	0.17	90	91	51-115	1
Chrysene	mg/kg (ppm)	0.17	86	90	55-129	5
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	83	81	56-123	2
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	74	79	54-131	7
Benzo(a)pyrene	mg/kg (ppm)	0.17	75	75	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	79	84	49-148	6
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	77	85	50-141	10
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	73	83	52-131	13

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912193

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912317-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	46	38	10-142	19
Chloromethane	mg/kg (ppm)	2.5	<0.5	79	69	10-126	14
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	79	70	10-138	12
Bromomethane	mg/kg (ppm)	2.5	<0.5	91	86	10-163	6
Chloroethane	mg/kg (ppm)	2.5	<0.5	103	92	10-176	11
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	93	88	10-176	6
Acetone	mg/kg (ppm)	12.5	<0.5	120	112	10-163	7
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	111	106	10-160	5
Hexane	mg/kg (ppm)	2.5	<0.25	94	90	10-137	4
Methylene chloride	mg/kg (ppm)	2.5	0.52	109 b	107 b	10-156	2 b
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	123	115	21-145	7
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	117	117	14-137	0
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	116	114	19-140	2
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	120	112	10-158	7
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	123	121	25-135	2
Chloroform	mg/kg (ppm)	2.5	<0.05	116	113	21-145	3
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	111	95	19-147	16
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	117	107	12-160	9
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	121	114	10-156	6
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	113	106	17-140	6
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	122	114	9-164	7
Benzene	mg/kg (ppm)	2.5	<0.03	117	108	29-129	8
Trichloroethene	mg/kg (ppm)	2.5	<0.02	115	105	21-139	9
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	117	107	30-135	9
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	118	108	23-155	9
Dibromomethane	mg/kg (ppm)	2.5	<0.05	114	105	23-145	8
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	116	104	24-155	11
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	122	110	28-144	10
Toluene	mg/kg (ppm)	2.5	<0.05	99	90	35-130	10
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	100	88	26-149	13
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	93	86	10-205	8
2-Hexanone	mg/kg (ppm)	12.5	<0.5	94	85	15-166	10
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	94	84	31-137	11
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	102	94	20-133	8
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	103	94	28-150	9
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	93	83	28-142	11
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	98	91	32-129	7
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	101	94	32-137	7
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	109	99	31-143	10
m,p-Xylene	mg/kg (ppm)	5	<0.1	101	95	34-136	6
o-Xylene	mg/kg (ppm)	2.5	<0.05	104	96	33-134	8
Styrene	mg/kg (ppm)	2.5	<0.05	99	92	35-137	7
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	105	96	31-142	9
Bromoform	mg/kg (ppm)	2.5	<0.05	108	97	21-156	11
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	99	91	23-146	8
Bromobenzene	mg/kg (ppm)	2.5	<0.05	96	88	34-130	9
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	104	93	18-149	11
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	94	85	28-140	10
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	92	86	25-144	7
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	99	91	31-134	8
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	97	89	31-136	9
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	104	90	30-137	14
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	101	92	10-182	9
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	101	90	23-145	12
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	100	90	21-149	11
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	97	91	30-131	6
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	96	88	29-129	9
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	100	92	31-132	8
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	96	87	11-161	10
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	106	95	22-142	11
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	104	94	10-142	10
Naphthalene	mg/kg (ppm)	2.5	<0.05	100	91	14-157	9
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	100	92	20-144	8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/11/19

Project: Kosmos, F&BI 912193

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	91	10-146
Chloromethane	mg/kg (ppm)	2.5	106	27-133
Vinyl chloride	mg/kg (ppm)	2.5	110	22-139
Bromomethane	mg/kg (ppm)	2.5	117 vo	38-114
Chloroethane	mg/kg (ppm)	2.5	129	9-163
Trichlorofluoromethane	mg/kg (ppm)	2.5	119	10-196
Acetone	mg/kg (ppm)	12.5	113	52-141
1,1-Dichloroethene	mg/kg (ppm)	2.5	129 vo	47-128
Hexane	mg/kg (ppm)	2.5	112	43-142
Methylene chloride	mg/kg (ppm)	2.5	130	42-132
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	129 vo	60-123
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	128	67-129
1,1-Dichloroethane	mg/kg (ppm)	2.5	121 vo	68-115
2,2-Dichloropropane	mg/kg (ppm)	2.5	129	52-170
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	126	72-127
Chloroform	mg/kg (ppm)	2.5	117	66-120
2-Butanone (MEK)	mg/kg (ppm)	12.5	93	72-127
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	109	56-135
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	128	62-131
1,1-Dichloropropene	mg/kg (ppm)	2.5	112	69-128
Carbon tetrachloride	mg/kg (ppm)	2.5	130	60-139
Benzene	mg/kg (ppm)	2.5	114	68-114
Trichloroethene	mg/kg (ppm)	2.5	107	64-117
1,2-Dichloropropane	mg/kg (ppm)	2.5	110	72-127
Bromodichloromethane	mg/kg (ppm)	2.5	110	72-130
Dibromomethane	mg/kg (ppm)	2.5	106	70-120
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	109	45-145
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	110	75-136
Toluene	mg/kg (ppm)	2.5	99	66-126
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	96	72-132
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	91	75-113
2-Hexanone	mg/kg (ppm)	12.5	91	33-152
1,3-Dichloropropane	mg/kg (ppm)	2.5	90	72-130
Tetrachloroethene	mg/kg (ppm)	2.5	102	72-114
Dibromochloromethane	mg/kg (ppm)	2.5	103	74-125
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	90	74-132
Chlorobenzene	mg/kg (ppm)	2.5	99	76-111
Ethylbenzene	mg/kg (ppm)	2.5	104	64-123
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	115	69-135
m,p-Xylene	mg/kg (ppm)	5	104	78-122
o-Xylene	mg/kg (ppm)	2.5	107	77-124
Styrene	mg/kg (ppm)	2.5	99	74-126
Isopropylbenzene	mg/kg (ppm)	2.5	109	76-127
Bromoform	mg/kg (ppm)	2.5	110	56-132
n-Propylbenzene	mg/kg (ppm)	2.5	98	74-124
Bromobenzene	mg/kg (ppm)	2.5	93	72-122
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	104	76-126
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	93	56-143
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	91	61-137
2-Chlorotoluene	mg/kg (ppm)	2.5	100	74-121
4-Chlorotoluene	mg/kg (ppm)	2.5	95	75-122
tert-Butylbenzene	mg/kg (ppm)	2.5	99	73-130
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	101	76-125
sec-Butylbenzene	mg/kg (ppm)	2.5	99	71-130
p-Isopropyltoluene	mg/kg (ppm)	2.5	99	70-132
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	97	75-121
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	95	74-117
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	102	76-121
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	102	58-138
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	110	64-135
Hexachlorobutadiene	mg/kg (ppm)	2.5	107	50-153
Naphthalene	mg/kg (ppm)	2.5	108	63-140
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	107	63-138

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

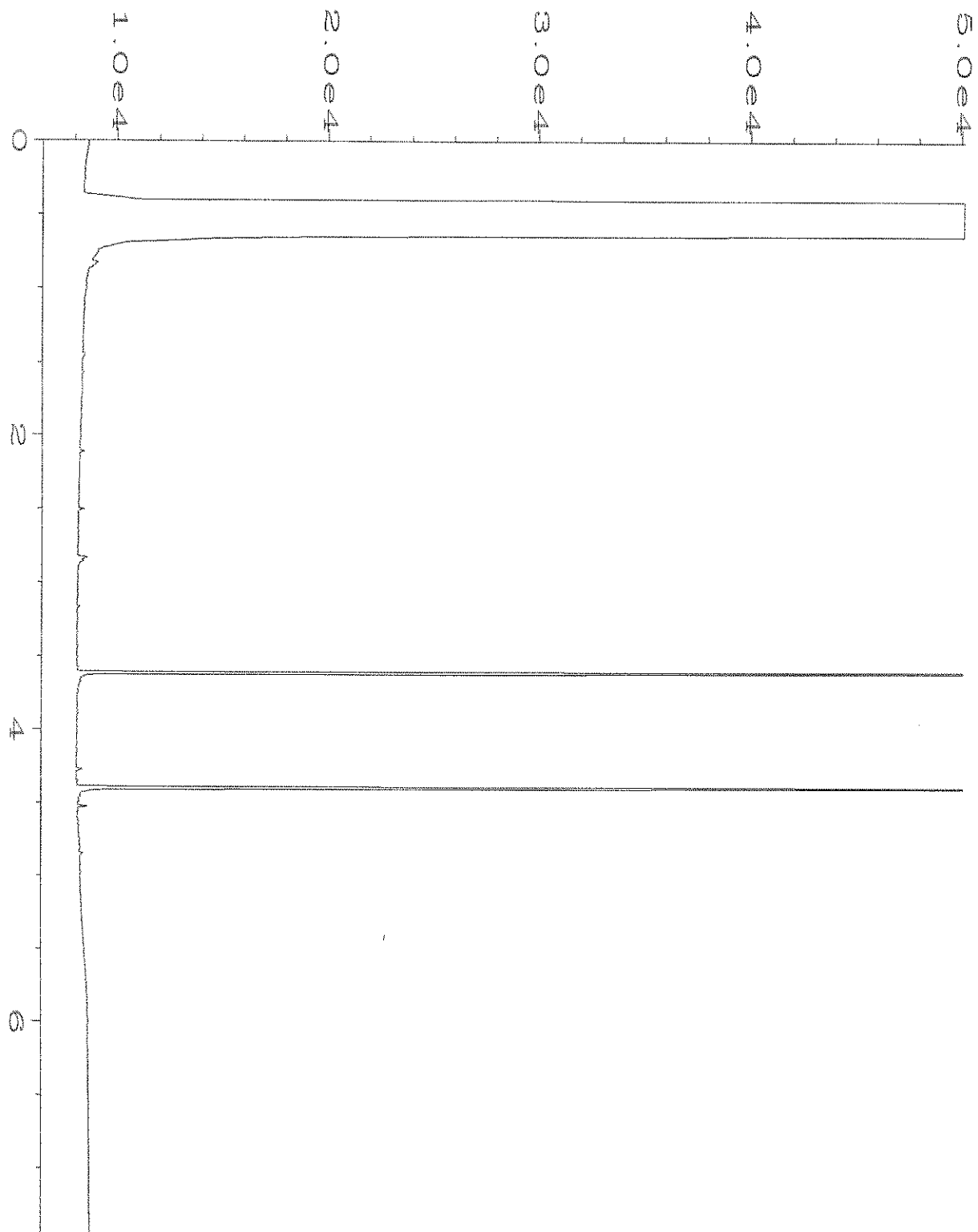
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

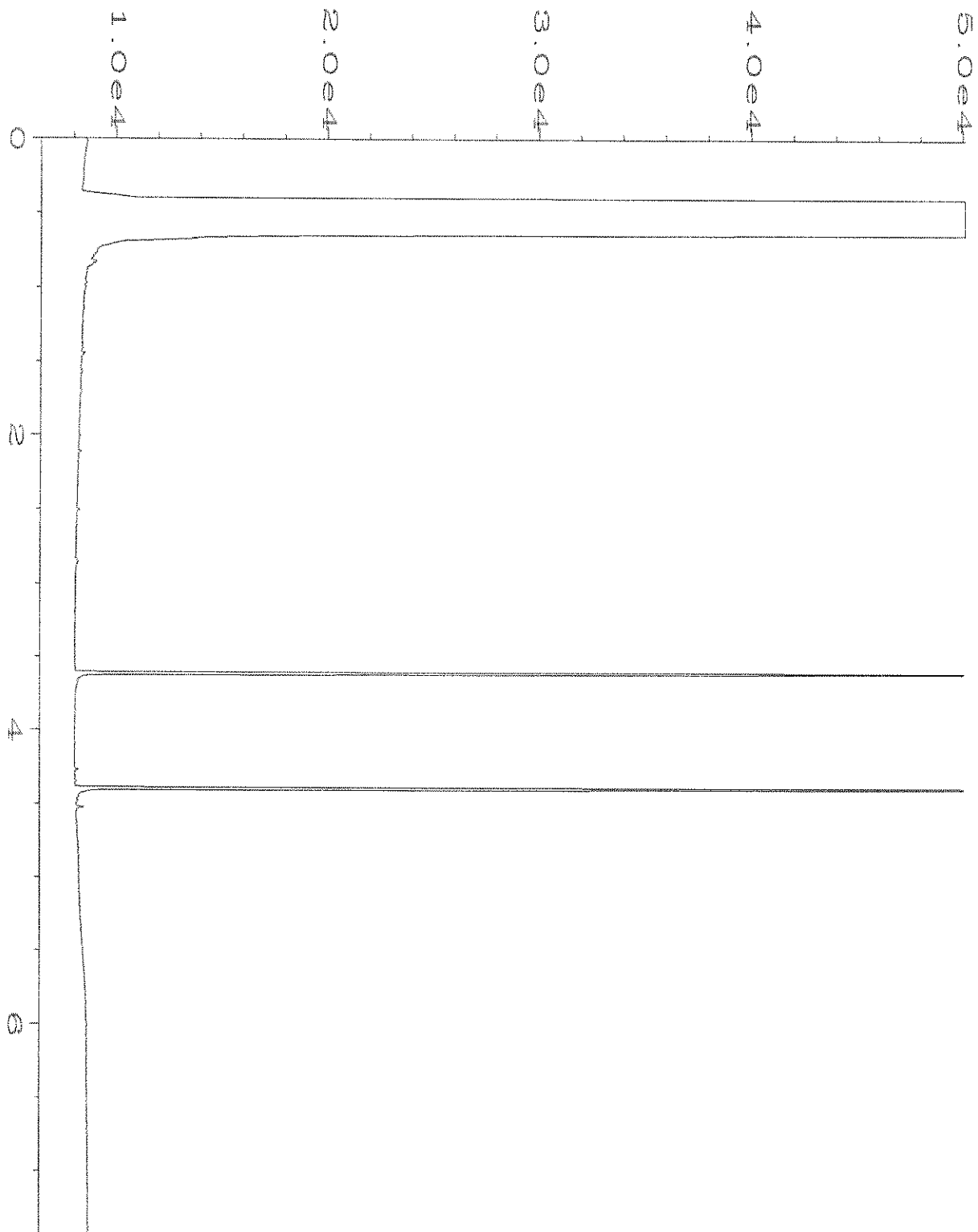
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

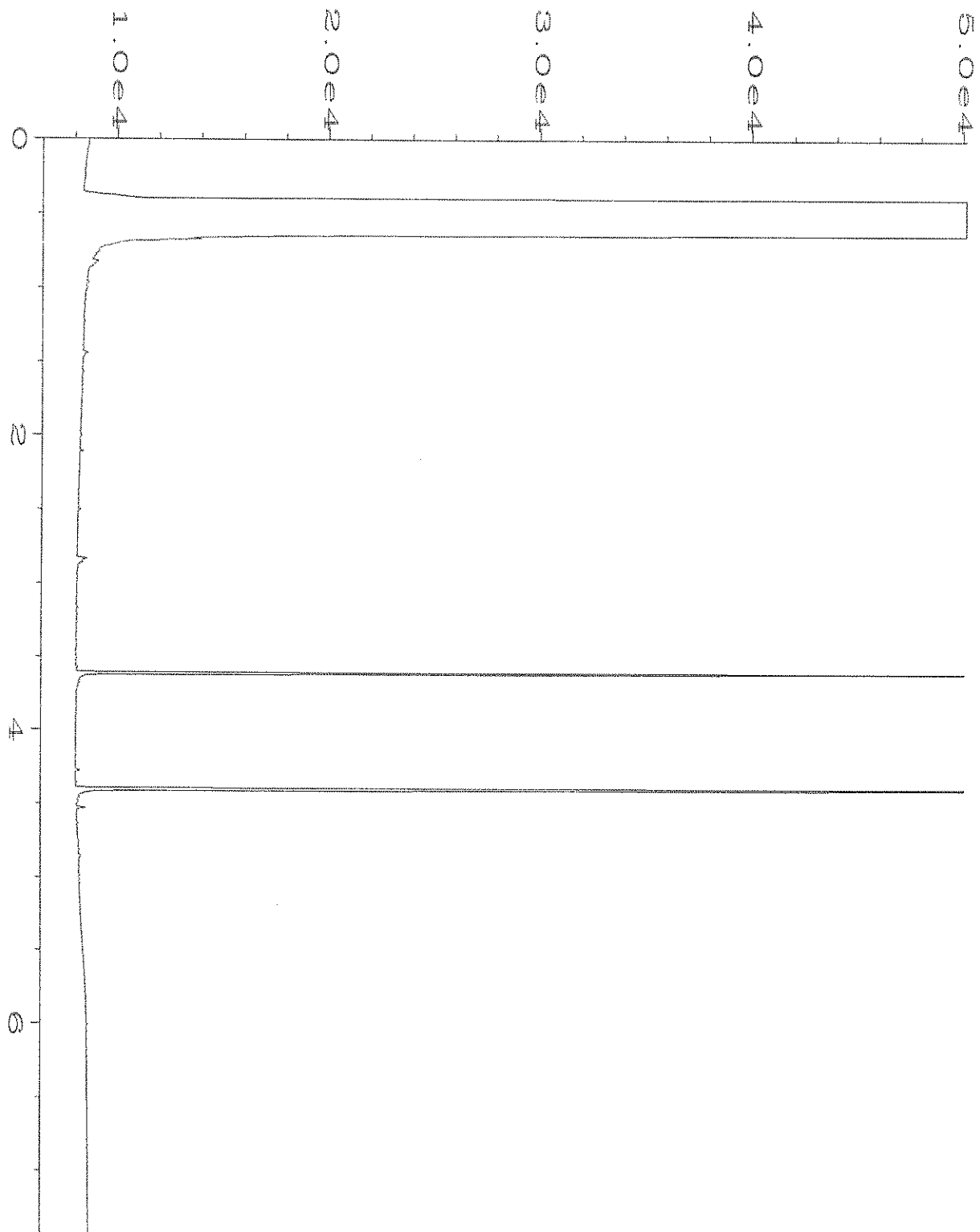
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



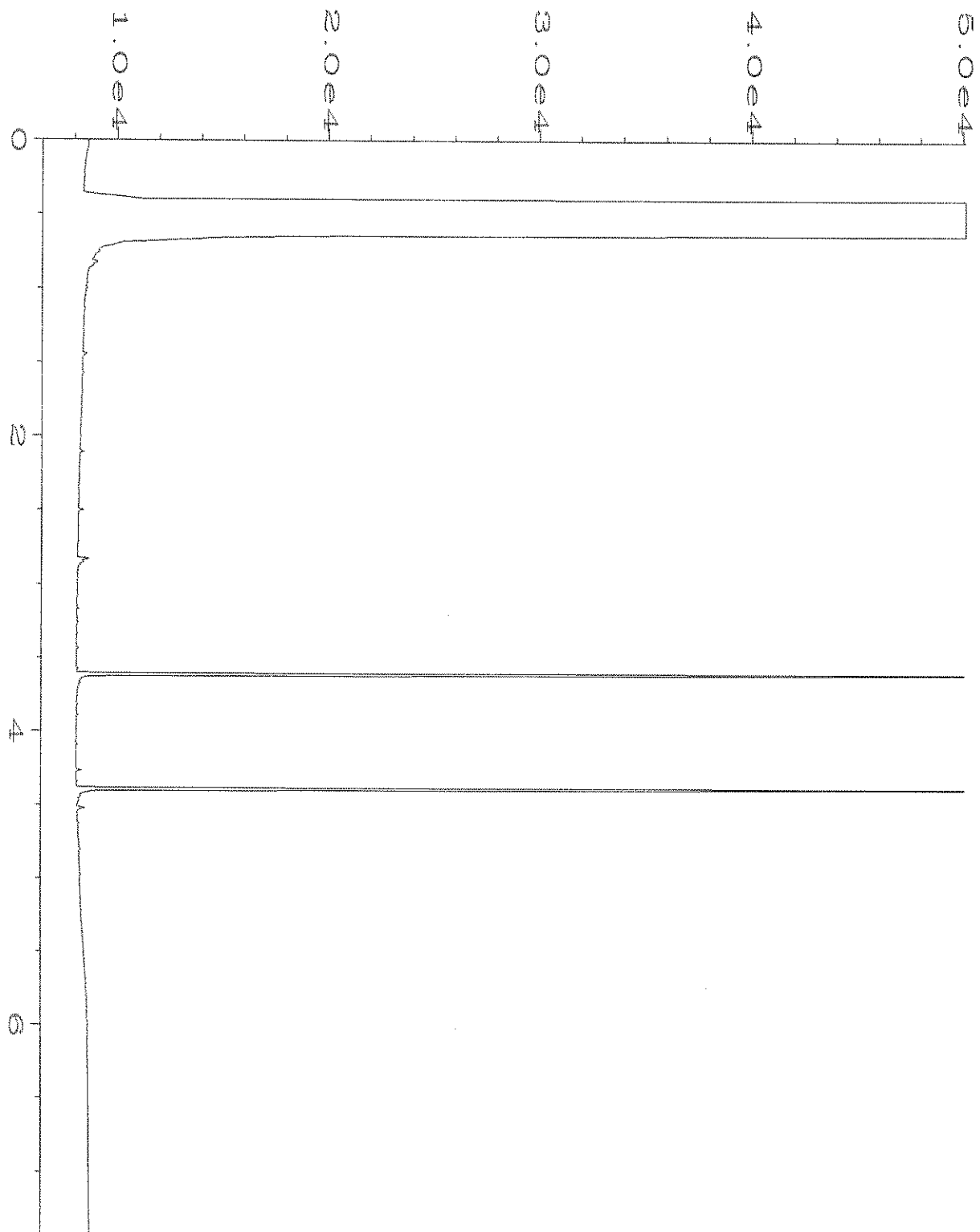
Data File Name	: C:\HPCHEM\1\DATA\12-20-19\014F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 14
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-06	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:09 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



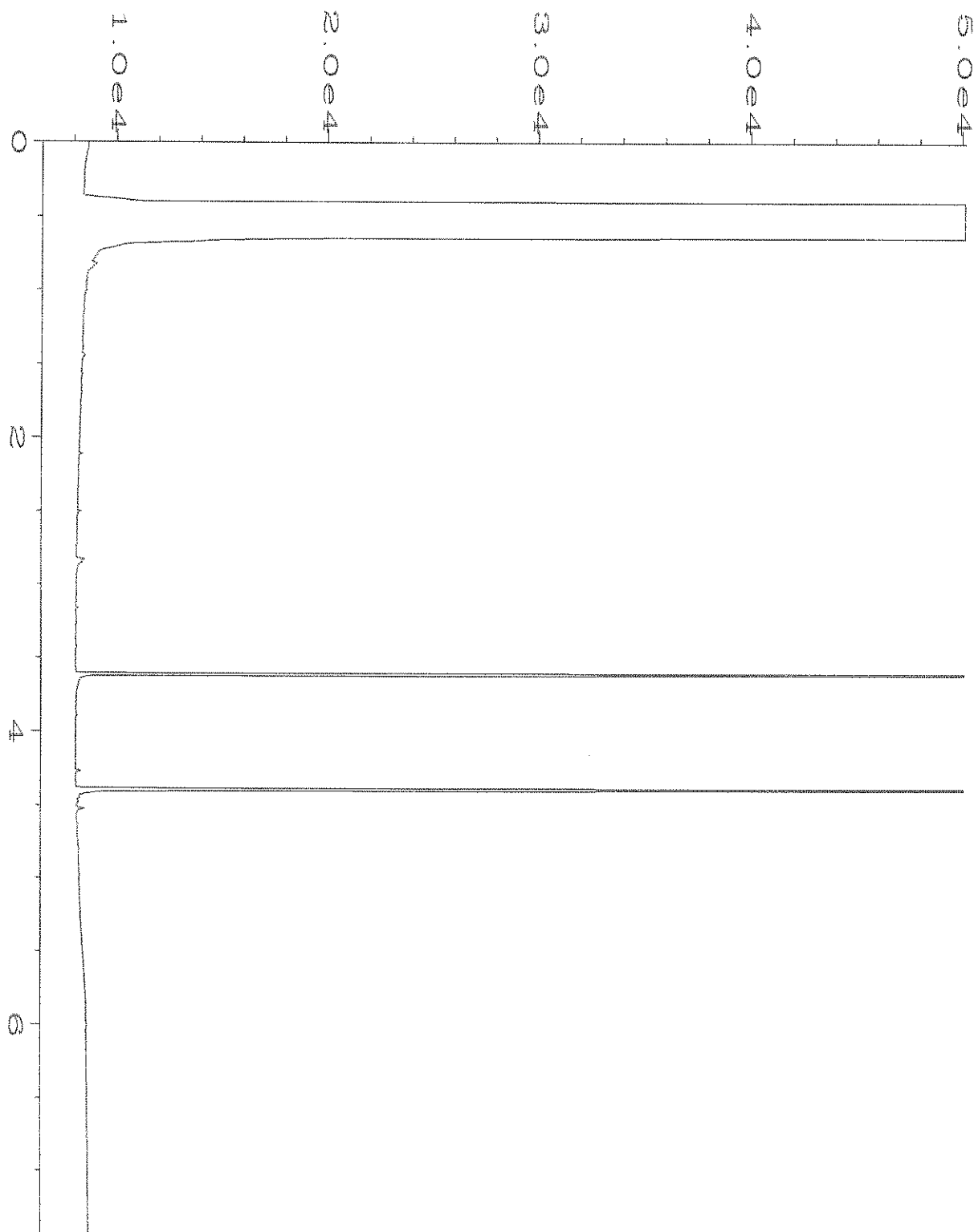
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Operator	: TL	Vial Number	: 15
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-07	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:20 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



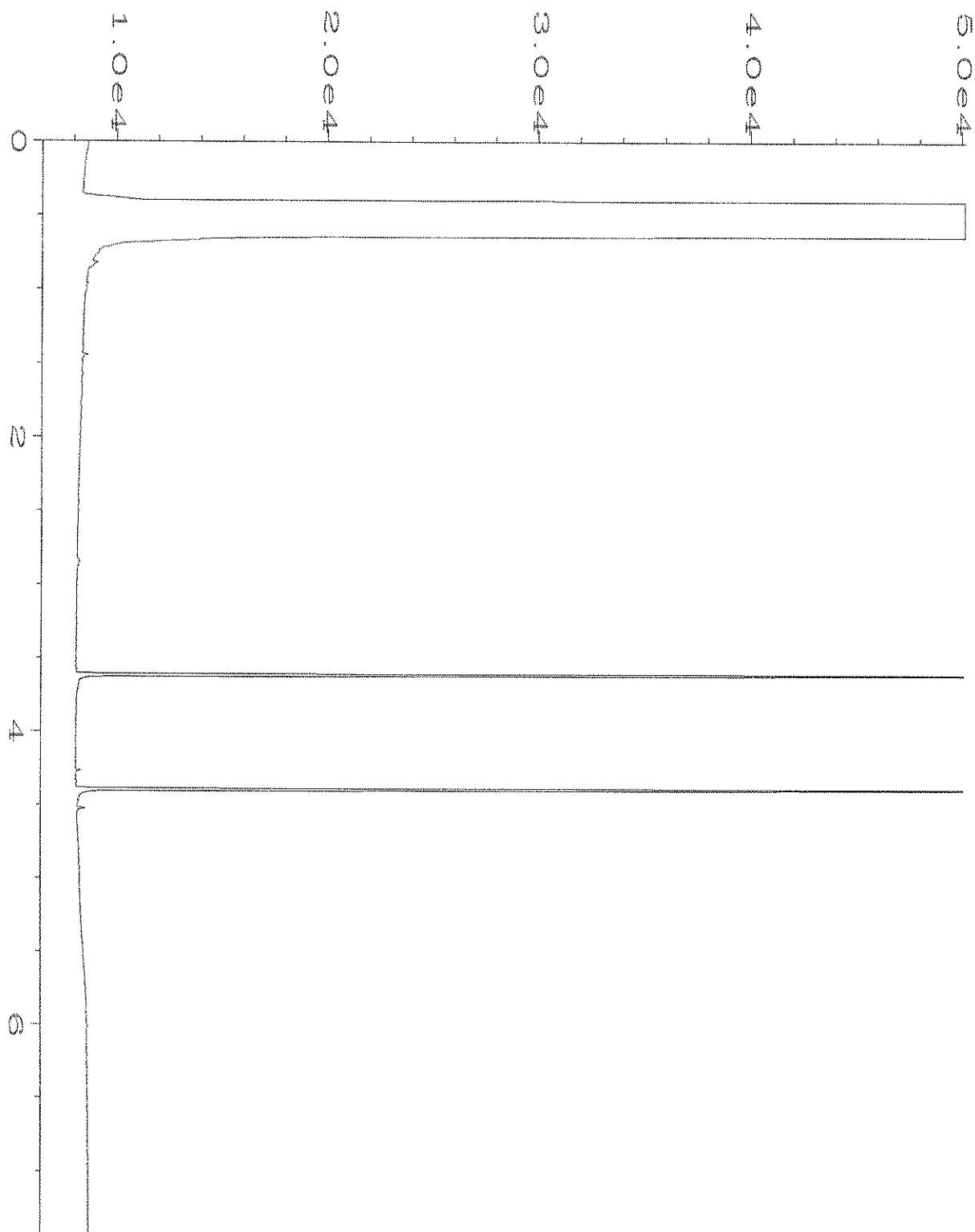
Data File Name	: C:\HPCHEM\1\DATA\12-20-19\016F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 16
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-10	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:32 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



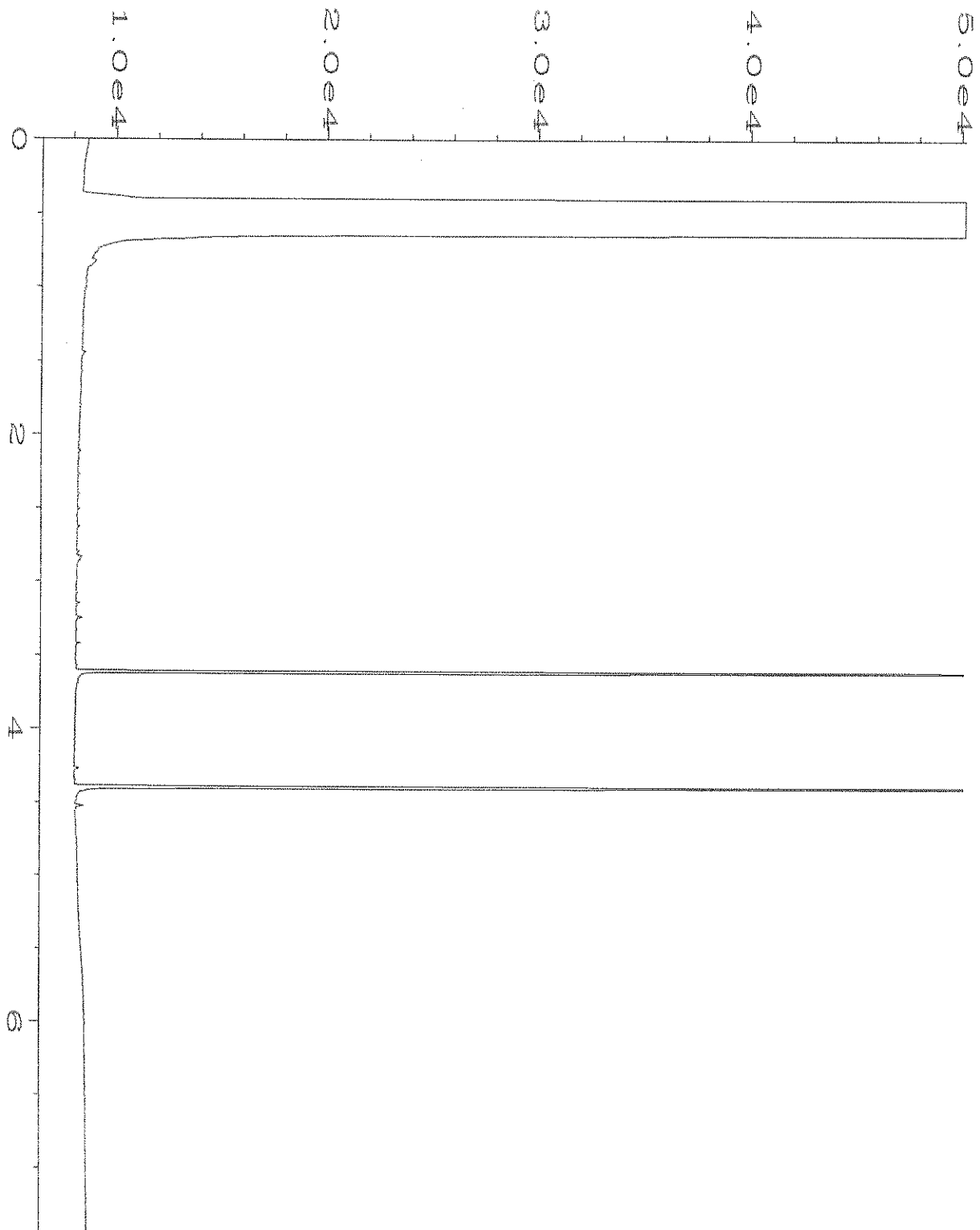
Data File Name	: C:\HPCHEM\1\DATA\12-20-19\017F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 17
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-11	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:44 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



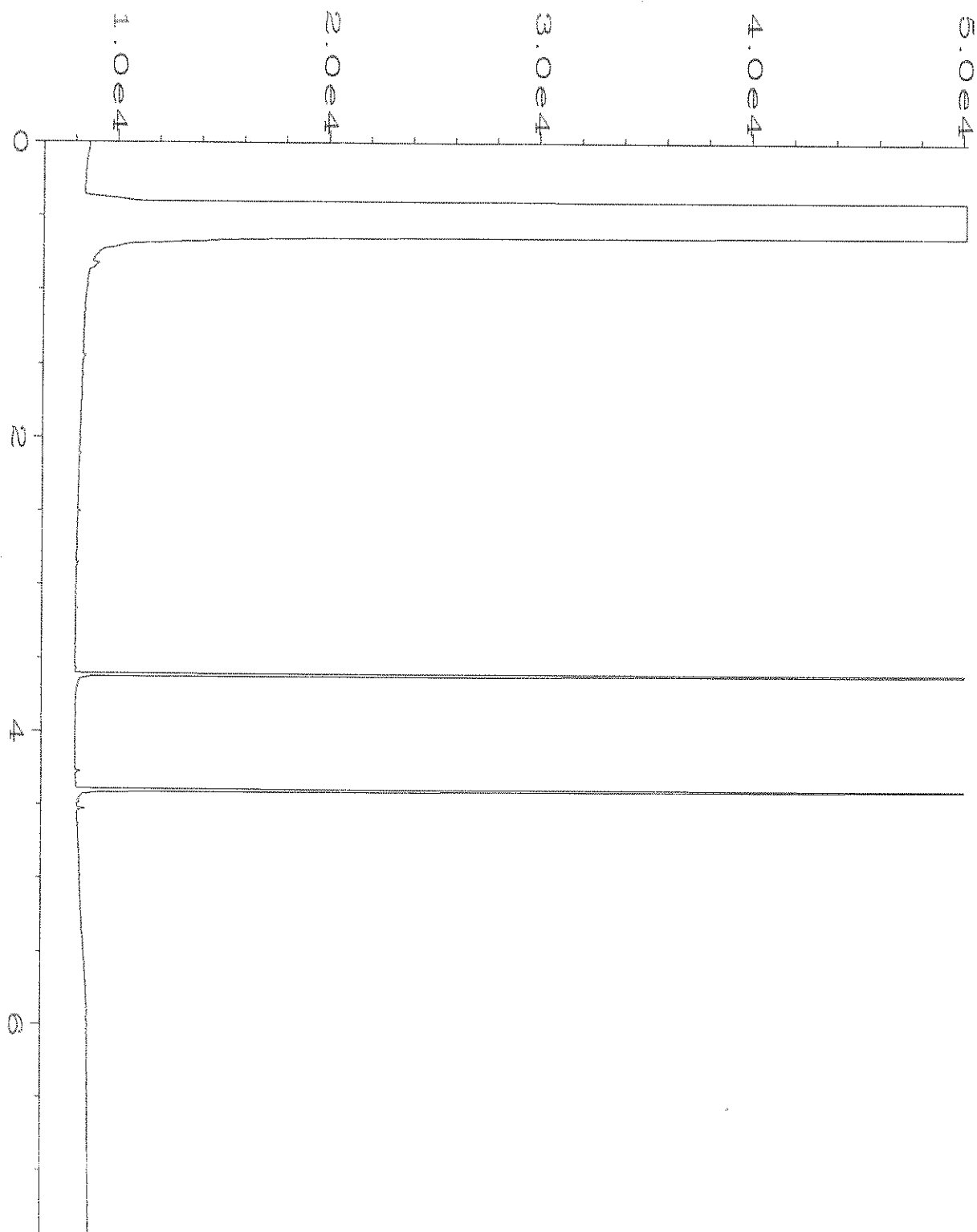
Data File Name	: C:\HPCHEM\1\DATA\12-20-19\018F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 18
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-14	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 01:55 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:15 AM		



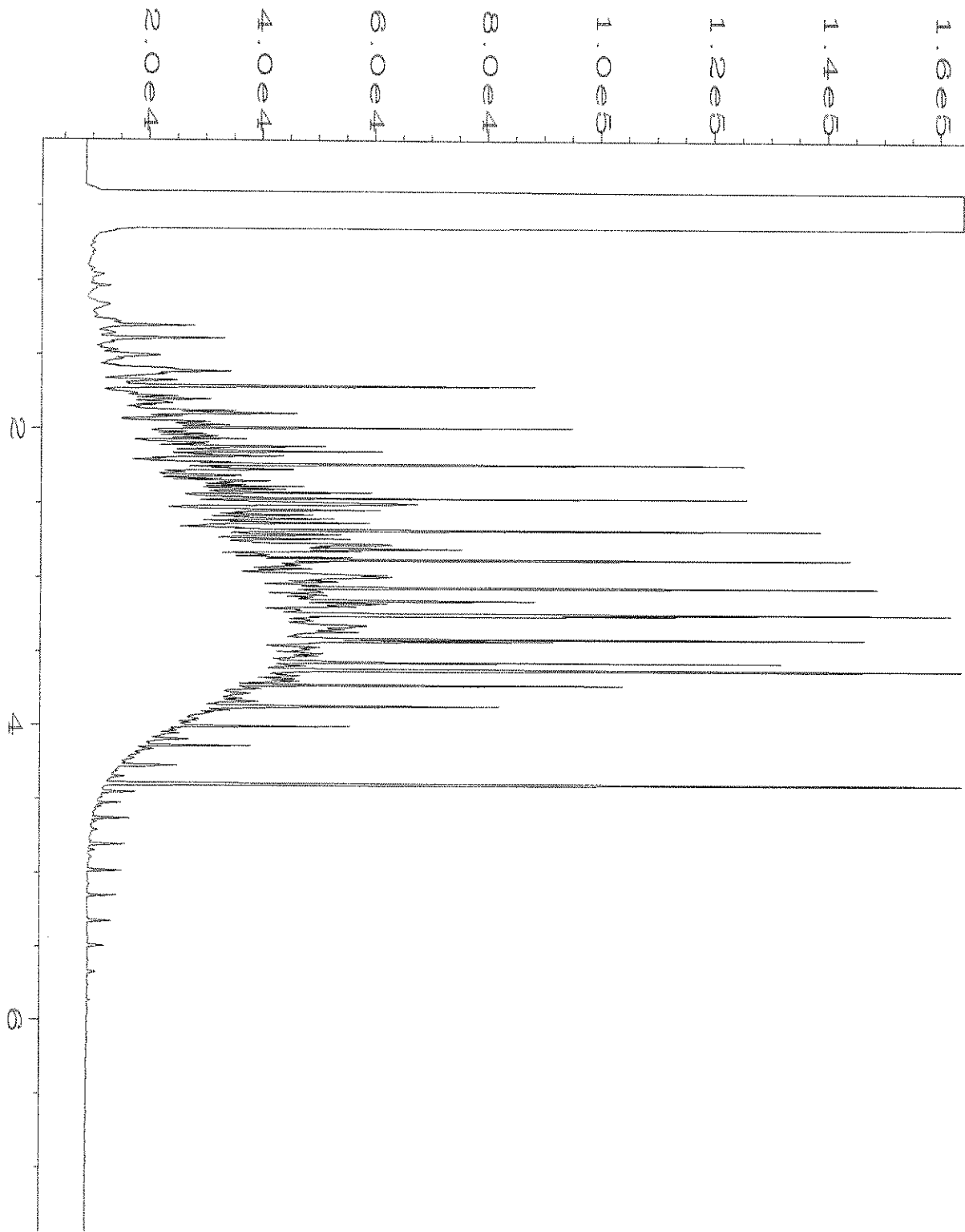
Data File Name	: C:\HPCHEM\1\DATA\12-20-19\019F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 19
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-16	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 02:06 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:15 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-20-19\020F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 20
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912193-17	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 02:18 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:15 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-20-19\013F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 13
Instrument	: GC1	Injection Number	: 1
Sample Name	: 09-3069 mb2	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 12:57 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-20-19\003F0201.D	Page Number	: 1
Operator	: TL	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 Dx 58-146B	Sequence Line	: 2
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 05:54 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:13 AM		

912193

SAMPLE CHAIN OF CUSTODY ME 12/11/19

Page # 1 of 3

Report To Angie Goodwin

Company HC

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLERS (signature) Michelle Higgins

PROJECT NAME Cosmos

PO # _____

REMARKS _____

INVOICE TO _____

Project specific RIs? - Yes / No _____

ANALYSES REQUESTED

Standard turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Notes
B-10-5	01A-E	12/10	1005	Soil	5								* Angie for analysis
B-10-10	02		1000		1								
B-10-15	03		1015		1								
B-10-20	04		1025		1								
B-10-25	05		1035		1								X Added on 12/19/19 by AS
B-10-30	06		1040		1	X							
B-10-35	07					X							
B-10-40	08					X							
B-3-5	09		1415		1	X							
B-3-15	10		1425		1	X	X	X			X		

SIGNATURE _____ PRINT NAME _____ COMPANY _____ DATE _____ TIME _____

Relinquished by: Michelle Higgins Volie Higgins HC 12/11 1540

Received by: Michelle Higgins HC 12/11 1540

Relinquished by: _____ Received by: _____

Received by: _____ Samples received at: _____

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SAMPLE CHAIN OF CUSTODY ME 12/11/19

9/18/19

Page # 2 of 3

009/V52

Report No 11111
 Company HAFT CEASER
 Address _____
 City, State, ZIP _____
 Phone _____ Email _____

SAMPLERS (signature) _____
 PROJECT NAME KOSMOS PO # _____
 REMARKS _____ INVOICE TO _____
 Project specific PLS? - Yes / No

TURNAROUND TIME
 Standard turnaround
 RUSH
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
B-3-20	11AE		1430	Soil S	5	X	X	X						
B-3-25	R1		1450		1									
B-3-30	R3		1455		1									
B-3-35	R4		1515		1	X	X	X						
B-3-40	R5		1525		1	X	X	X						
B-8-5	R6		1150		1	X	X	X						
B-8-10	R2		1200		1	X	X	X						
B-8-15	R8		1210		1									
B-8-20	R9		1220		1									
B-8- 25 25	R6		1235		1									

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 235-8282

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Received by: <u>[Signature]</u>	<u>[Signature]</u>	<u>Jolie Higgins</u>	<u>HC</u>	<u>12/11/19</u>	<u>1540</u>		
Relinquished by: <u>[Signature]</u>	<u>[Signature]</u>	<u>Eric Fox</u>	<u>FCF</u>	<u>12/11/19</u>	<u>1540</u>		
Received by:							
Relinquished by:							
Received by:							
Relinquished by:							

Samples received at 4 °C

SAMPLE CHAIN OF CUSTODY ME 12/11/19

912193

Page # 2 of 3
copy of 3

Report To _____

Company HART GROSSER

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLERS (signature)		PROJECT NAME	PO #
<u>Losmos</u>			
REMARKS		INVOICE TO	
Project specific RIs? - Yes / No			

TURNAROUND TIME

Standard turnaround

RUSH

Rush charges authorized by: _____

SAMPLE DISPOSAL

Archive samples

Other _____

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082			
B-8-30	21AE		12	Soil	5										
B-8-35	221			↓											
B-8-40	23			↓											

Friedman & Bryco, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Relinquished by: <u>[Signature]</u>		Jolie Higgins		HC		12/11	1540
Received by: <u>[Signature]</u>		Eric Brown		FCB		12/11	1840
Relinquished by:							
Received by:							

Samples received at 4:00

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 30, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 12, 2019 from the Kosmos, F&BI 912214 project. There are 20 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1230R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 12, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912214 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912214 -01	B-9-W
912214 -02	B-6-W
912214 -03	B-7-W

A 6020B internal standard failed the acceptance criteria for sample B-6-W. The sample was diluted and reanalyzed with acceptable results. Both data sets were reported.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912214
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
B-9-W 912214-01	<100	88
B-6-W 912214-02	<100	89
B-7-W 912214-03	<100	85
Method Blank 09-2937 MB	<100	93

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912214
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
B-9-W 912214-01 1/1.4	<70	<350	78
B-6-W 912214-02	<50	<250	83
B-7-W 912214-03	<50	<250	89
Method Blank 09-3103 MB	<50	<250	83

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	B-6-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/20/19	Lab ID:	912214-02
Date Analyzed:	12/20/19	Data File:	912214-02.134
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	11.6
Barium	242
Cadmium	<1
Chromium	18.4 J
Lead	8.69
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	B-6-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/20/19	Lab ID:	912214-02 x10
Date Analyzed:	12/23/19	Data File:	912214-02 x10.131
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Chromium	40.8
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912214
Date Extracted:	12/20/19	Lab ID:	I9-817 mb2
Date Analyzed:	12/20/19	Data File:	I9-817 mb2.132
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-9-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	912214-01 1/2
Date Analyzed:	12/24/19	Data File:	122407.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	73	31	160
Benzo(a)anthracene-d12	70	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.4
Acenaphthylene	<0.04
Acenaphthene	<0.04
Fluorene	<0.04
Phenanthrene	0.072
Anthracene	<0.04
Fluoranthene	<0.04
Pyrene	0.043
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04
Benzo(g,h,i)perylene	<0.04

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-6-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	912214-02 1/2
Date Analyzed:	12/24/19	Data File:	122408.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	75	31	160
Benzo(a)anthracene-d12	61	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.4
Acenaphthylene	<0.04
Acenaphthene	<0.04
Fluorene	<0.04
Phenanthrene	0.19
Anthracene	<0.04
Fluoranthene	0.18
Pyrene	0.23
Benz(a)anthracene	<0.04
Chrysene	0.047
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04
Benzo(g,h,i)perylene	<0.04

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-7-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	912214-03 1/2
Date Analyzed:	12/24/19	Data File:	122409.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	81	31	160
Benzo(a)anthracene-d12	78	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.4
Acenaphthylene	<0.04
Acenaphthene	<0.04
Fluorene	<0.04
Phenanthrene	<0.04
Anthracene	<0.04
Fluoranthene	<0.04
Pyrene	<0.04
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04
Benzo(g,h,i)perylene	<0.04

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	09-3099 mb
Date Analyzed:	12/23/19	Data File:	122322.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	82	31	160
Benzo(a)anthracene-d12	90	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.2
Acenaphthylene	<0.02
Acenaphthene	<0.02
Fluorene	<0.02
Phenanthrene	<0.02
Anthracene	<0.02
Fluoranthene	<0.02
Pyrene	<0.02
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02
Benzo(g,h,i)perylene	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-9-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	912214-01
Date Analyzed:	12/26/19	Data File:	122634.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-6-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	912214-02
Date Analyzed:	12/23/19	Data File:	122319.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	103	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-7-W	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	912214-03
Date Analyzed:	12/23/19	Data File:	122320.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	108	50	150
4-Bromofluorobenzene	105	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912214
Date Extracted:	12/23/19	Lab ID:	09-3081 mb
Date Analyzed:	12/23/19	Data File:	122314.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	104	63	127
4-Bromofluorobenzene	93	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912214

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx**

Laboratory Code: 912380-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	93	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912214

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-Dx**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	112	63-142	15

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912214

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912329-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<1	95	94	75-125	1
Barium	ug/L (ppb)	50	5.68	99	97	75-125	2
Cadmium	ug/L (ppb)	5	<1	97	95	75-125	2
Chromium	ug/L (ppb)	20	<1	100	98	75-125	2
Lead	ug/L (ppb)	10	<1	98	96	75-125	2
Mercury	ug/L (ppb)	5	<1	92	91	75-125	1
Selenium	ug/L (ppb)	5	<1	91	92	75-125	1
Silver	ug/L (ppb)	5	<1	92	89	75-125	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	97	80-120
Barium	ug/L (ppb)	50	99	80-120
Cadmium	ug/L (ppb)	5	99	80-120
Chromium	ug/L (ppb)	20	103	80-120
Lead	ug/L (ppb)	10	99	80-120
Mercury	ug/L (ppb)	5	95	80-120
Selenium	ug/L (ppb)	5	94	80-120
Silver	ug/L (ppb)	5	96	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912214

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	1	82	80	57-114	2
Acenaphthylene	ug/L (ppb)	1	84	83	65-119	1
Acenaphthene	ug/L (ppb)	1	84	84	66-118	0
Fluorene	ug/L (ppb)	1	83	82	64-125	1
Phenanthrene	ug/L (ppb)	1	86	85	67-120	1
Anthracene	ug/L (ppb)	1	84	83	65-122	1
Fluoranthene	ug/L (ppb)	1	83	84	65-127	1
Pyrene	ug/L (ppb)	1	88	88	62-130	0
Benz(a)anthracene	ug/L (ppb)	1	90	89	60-118	1
Chrysene	ug/L (ppb)	1	89	89	66-125	0
Benzo(b)fluoranthene	ug/L (ppb)	1	73	73	55-135	0
Benzo(k)fluoranthene	ug/L (ppb)	1	75	75	62-125	0
Benzo(a)pyrene	ug/L (ppb)	1	73	73	58-127	0
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	71	72	36-142	1
Dibenz(a,h)anthracene	ug/L (ppb)	1	68	69	37-133	1
Benzo(g,h,i)perylene	ug/L (ppb)	1	69	70	34-135	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912214

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	50	122	140	25-158	14
Chloromethane	ug/L (ppb)	50	122	127	45-156	4
Vinyl chloride	ug/L (ppb)	50	116	123	50-154	6
Bromomethane	ug/L (ppb)	50	127	137	55-143	8
Chloroethane	ug/L (ppb)	50	121	129	58-146	6
Trichlorofluoromethane	ug/L (ppb)	250	117	123	50-150	5
Acetone	ug/L (ppb)	250	99	98	53-131	1
1,1-Dichloroethene	ug/L (ppb)	50	118	121	67-136	3
Hexane	ug/L (ppb)	50	109	108	57-137	1
Methylene chloride	ug/L (ppb)	50	118	122	39-148	3
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	118	121	64-147	3
trans-1,2-Dichloroethene	ug/L (ppb)	50	116	117	68-128	1
1,1-Dichloroethane	ug/L (ppb)	50	114	116	79-121	2
2,2-Dichloropropane	ug/L (ppb)	50	105	112	55-143	6
cis-1,2-Dichloroethene	ug/L (ppb)	50	116	119	80-123	3
Chloroform	ug/L (ppb)	50	111	113	80-121	2
2-Butanone (MEK)	ug/L (ppb)	250	106	107	57-149	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	114	117	73-132	3
1,1,1-Trichloroethane	ug/L (ppb)	50	117	121	81-125	3
1,1-Dichloropropene	ug/L (ppb)	50	112	114	77-129	2
Carbon tetrachloride	ug/L (ppb)	50	120	124	75-158	3
Benzene	ug/L (ppb)	50	114	117	69-134	3
Trichloroethene	ug/L (ppb)	50	109	112	79-113	3
1,2-Dichloropropane	ug/L (ppb)	50	114	117	77-123	3
Bromodichloromethane	ug/L (ppb)	50	115	119	81-133	3
Dibromomethane	ug/L (ppb)	50	112	113	82-125	1
4-Methyl-2-pentanone	ug/L (ppb)	250	114	116	65-138	2
cis-1,3-Dichloropropene	ug/L (ppb)	50	123	125	82-132	2
Toluene	ug/L (ppb)	50	99	102	72-122	3
trans-1,3-Dichloropropene	ug/L (ppb)	50	109	111	80-136	2
1,1,2-Trichloroethane	ug/L (ppb)	50	100	101	75-124	1
2-Hexanone	ug/L (ppb)	250	98	101	60-136	3
1,3-Dichloropropane	ug/L (ppb)	50	101	104	76-126	3
Tetrachloroethene	ug/L (ppb)	50	99	103	76-121	4
Dibromochloromethane	ug/L (ppb)	50	110	113	84-133	3
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	101	103	82-115	2
Chlorobenzene	ug/L (ppb)	50	100	104	83-114	4
Ethylbenzene	ug/L (ppb)	50	102	106	77-124	4
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	107	112	84-127	5
m,p-Xylene	ug/L (ppb)	100	101	104	81-112	3
o-Xylene	ug/L (ppb)	50	101	105	81-121	4
Styrene	ug/L (ppb)	50	101	106	84-119	5
Isopropylbenzene	ug/L (ppb)	50	101	106	80-117	5
Bromoform	ug/L (ppb)	50	117	120	74-136	3
n-Propylbenzene	ug/L (ppb)	50	98	101	74-126	3
Bromobenzene	ug/L (ppb)	50	100	102	80-121	2
1,3,5-Trimethylbenzene	ug/L (ppb)	50	101	104	78-123	3
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	100	102	66-126	2
1,2,3-Trichloropropane	ug/L (ppb)	50	98	100	67-124	2
2-Chlorotoluene	ug/L (ppb)	50	99	102	77-127	3
4-Chlorotoluene	ug/L (ppb)	50	99	102	78-128	3
tert-Butylbenzene	ug/L (ppb)	50	101	105	80-123	4
1,2,4-Trimethylbenzene	ug/L (ppb)	50	99	103	79-122	4
sec-Butylbenzene	ug/L (ppb)	50	98	102	80-116	4
p-Isopropyltoluene	ug/L (ppb)	50	97	101	81-123	4
1,3-Dichlorobenzene	ug/L (ppb)	50	99	102	83-113	3
1,4-Dichlorobenzene	ug/L (ppb)	50	97	100	83-107	3
1,2-Dichlorobenzene	ug/L (ppb)	50	100	104	84-112	4
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	100	107	57-141	7
1,2,4-Trichlorobenzene	ug/L (ppb)	50	101	106	72-130	5
Hexachlorobutadiene	ug/L (ppb)	50	94	98	53-141	4
Naphthalene	ug/L (ppb)	50	102	107	64-133	5
1,2,3-Trichlorobenzene	ug/L (ppb)	50	100	106	65-136	6

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

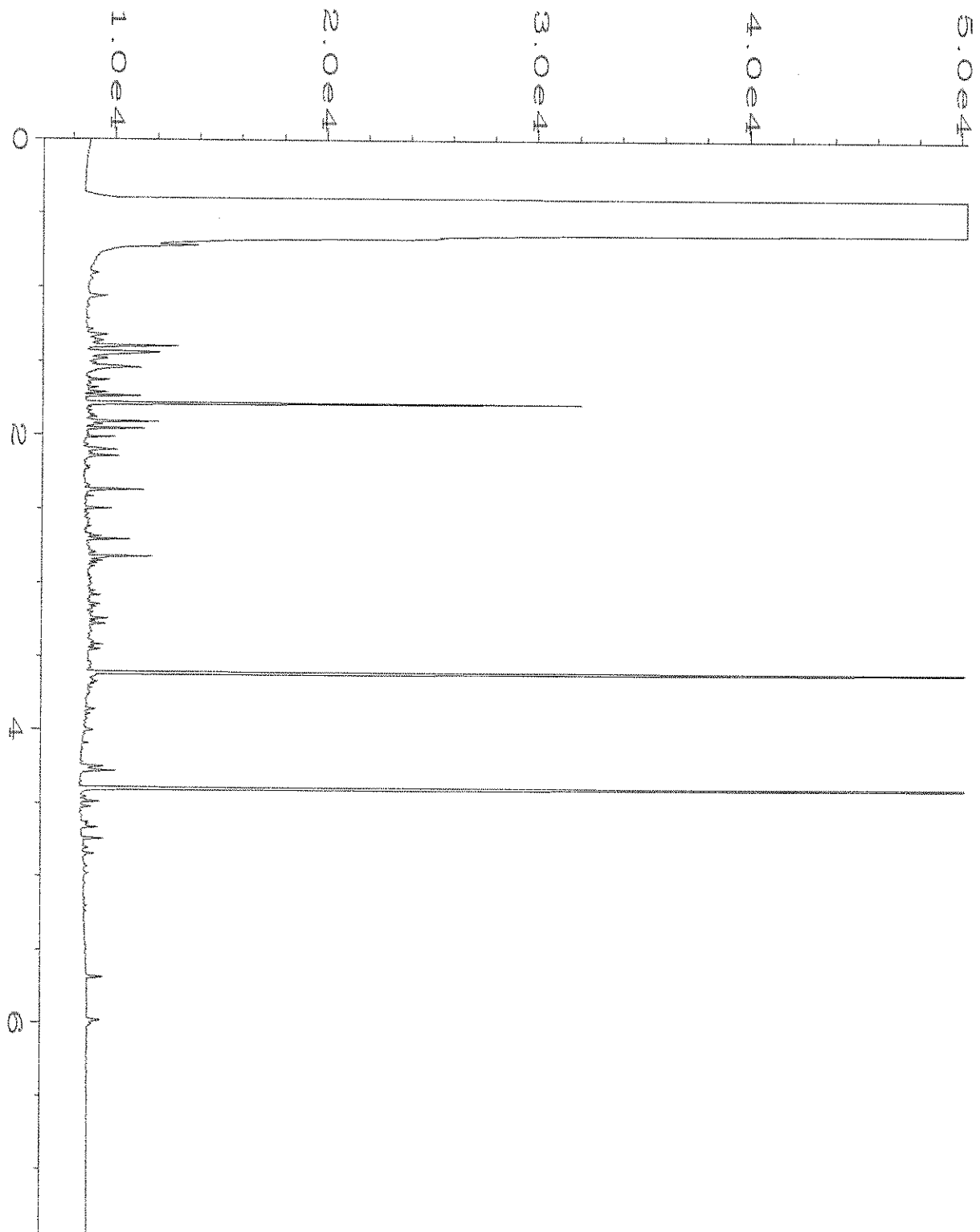
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

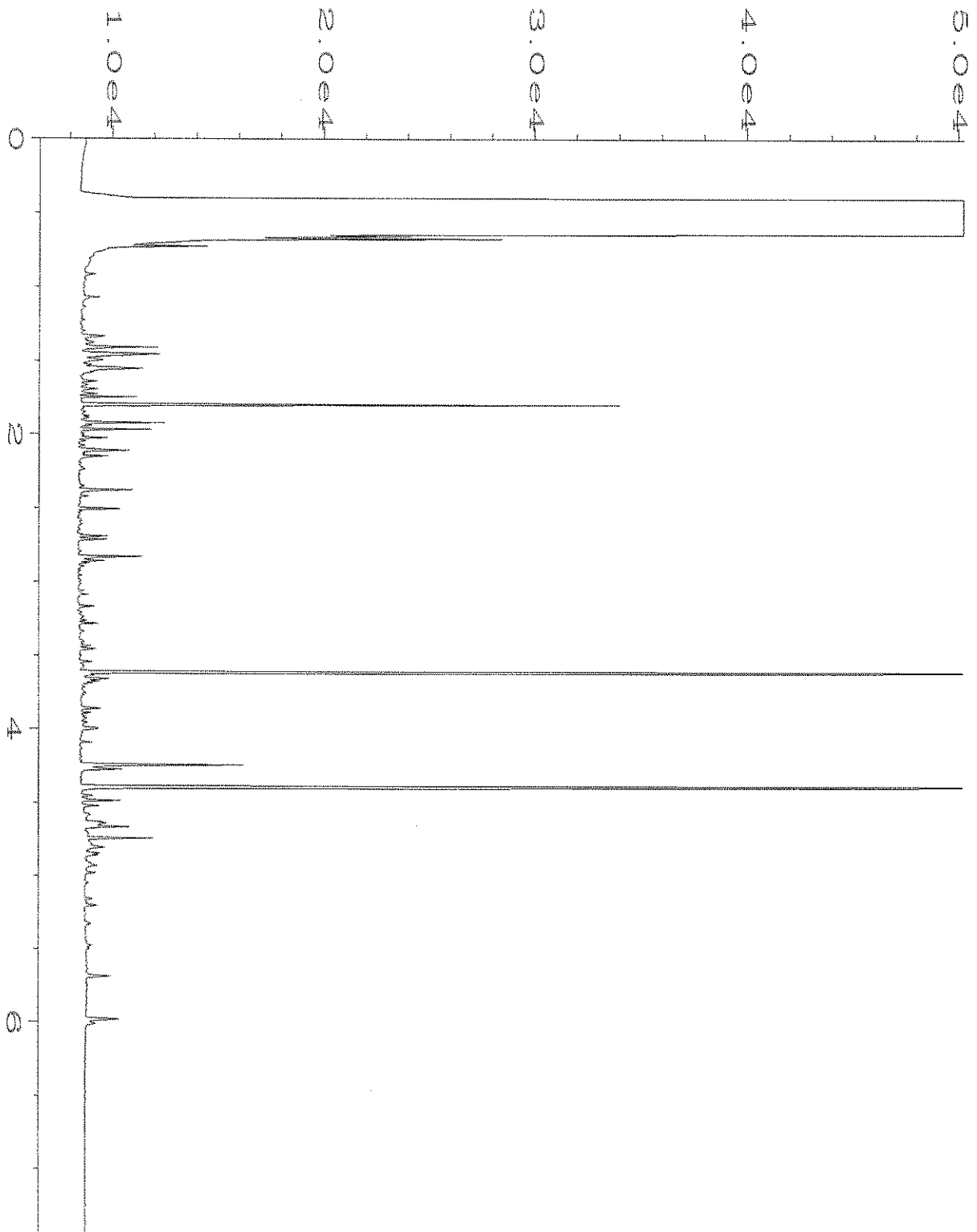
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

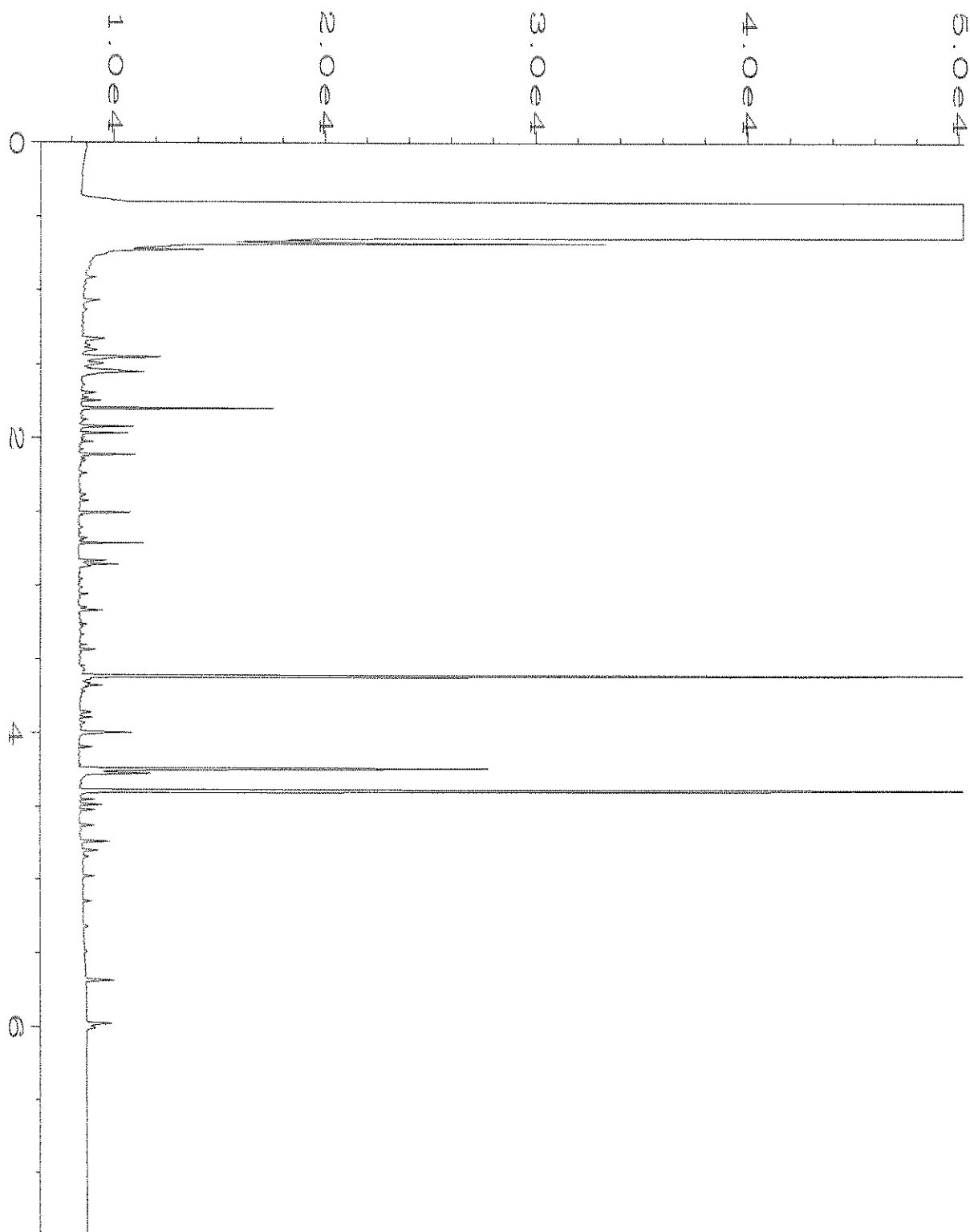
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



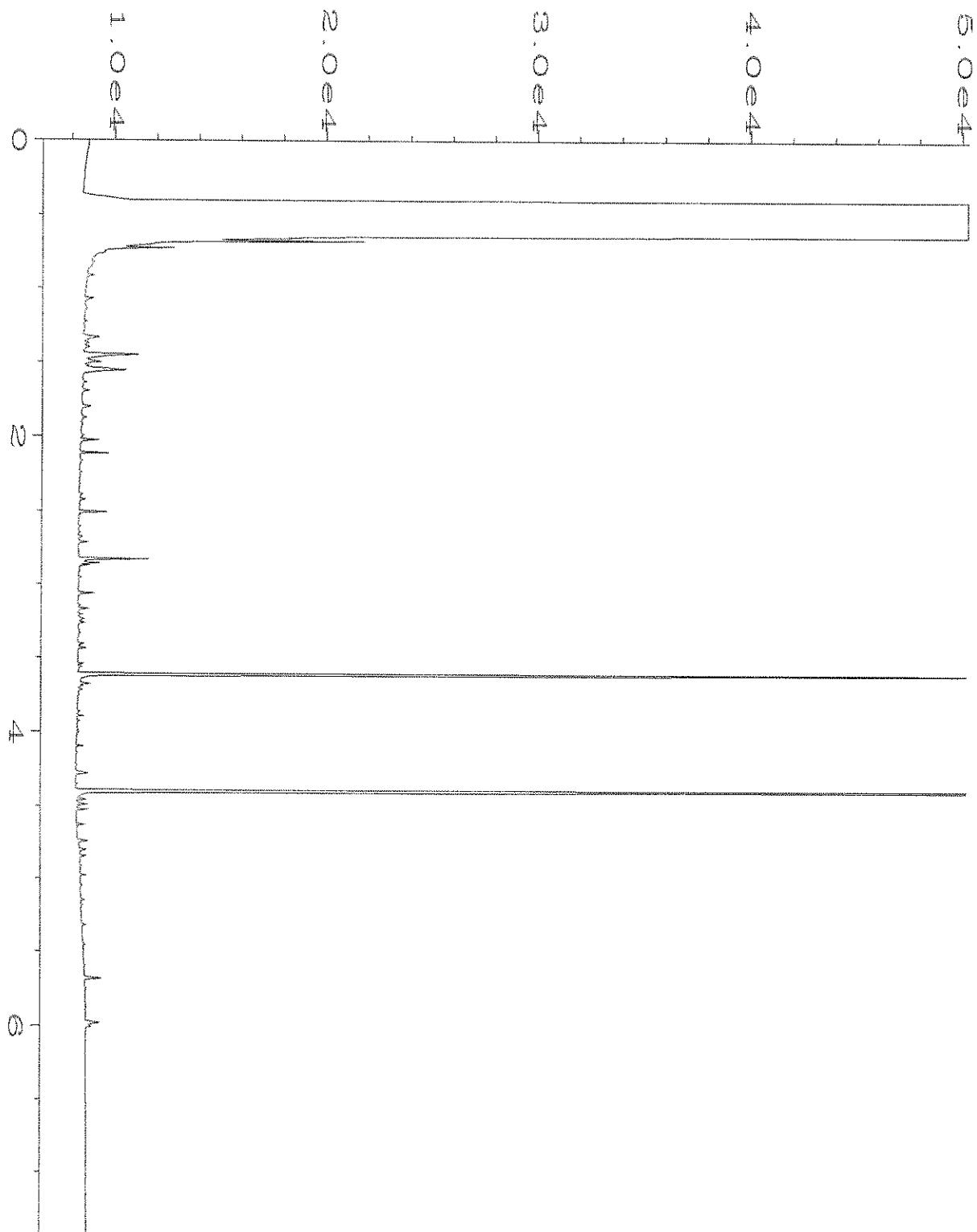
Data File Name	: C:\HPCHEM\1\DATA\12-23-19\032F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 32
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912214-01	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 02:02 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 08:52 AM		



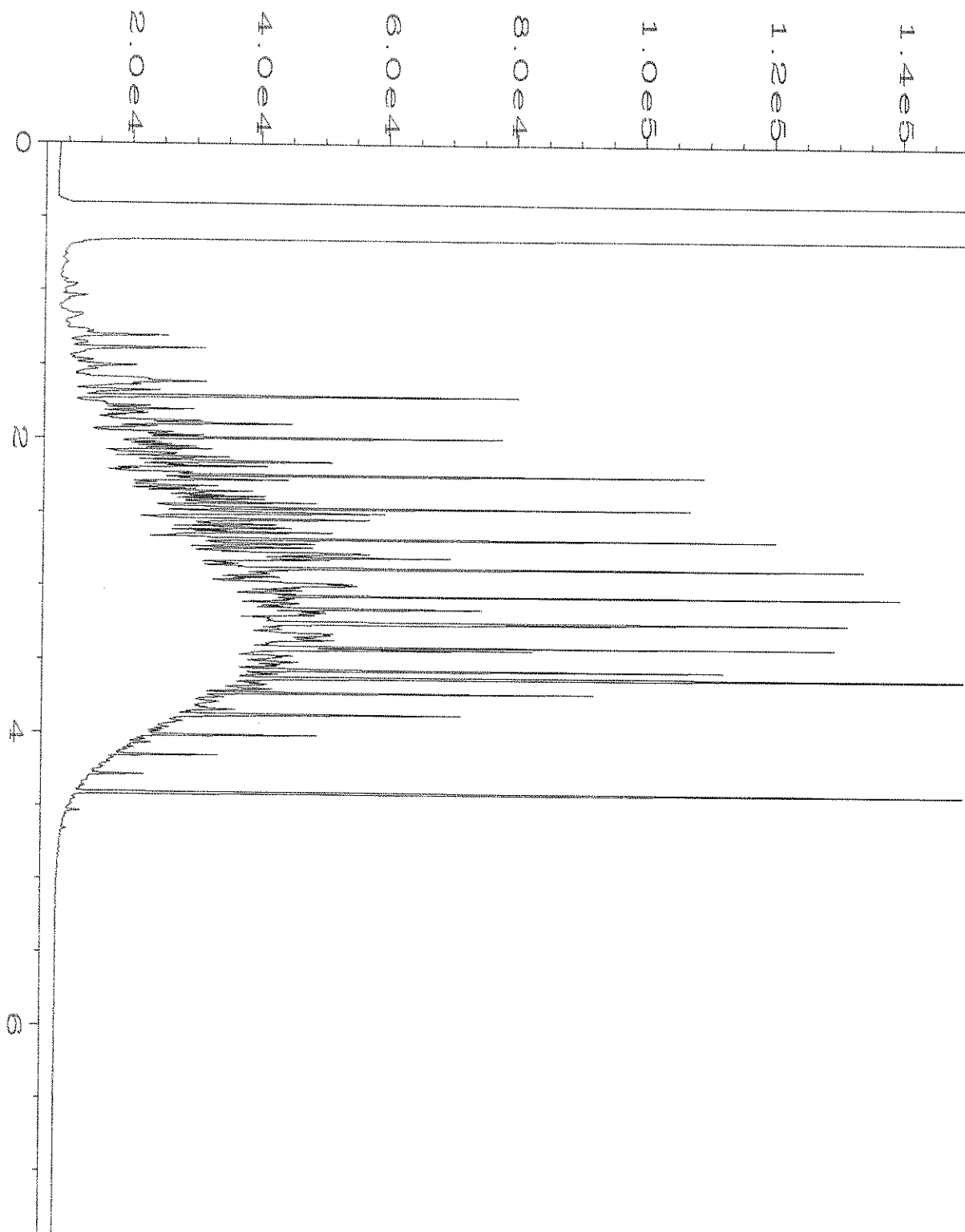
Data File Name	: C:\HPCHEM\1\DATA\12-23-19\033F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 33
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912214-02	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 02:11 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 08:52 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-23-19\034F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 34
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912214-03	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 02:22 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 08:52 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-23-19\031F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 31
Instrument	: GC1	Injection Number	: 1
Sample Name	: 09-3103 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 01:40 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 08:52 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-23-19\003F0801.D	Page Number	: 1
Operator	: TL	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 Dx 58-146B	Sequence Line	: 8
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 06:15 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 08:53 AM		

SAMPLE CHAIN OF CUSTODY ME 12/12/19 WWS/ATJ/1005

412214

Report To Angie Goodwin

Company HART CREUSER

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLE # (signature) <u>10116</u>	PROJECT NAME <u>KOSMO5</u>	PO #	INVOICE TO	TURNAROUND TIME Standard turnaround RUSH Rush charges authorized by:
REMARKS				SAMPLE DISPOSAL Archive samples Other Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
B-4-W	01A-H	12/11	1745	Water	10	X	X	X	X	X	X	X	X	*See Angie
B-9-W	01A-H	12/12	1115	↓	↓	X	X	X	X	X	X	X	X	For Analysis
B-10-W	02A-J	12/12	1345	↓	↓	X	X	X	X	X	X	X	X	
B-7-W	03A-J	12/12	1605	↓	↓	X	X	X	X	X	X	X	X	
B-1-5		12/11	1415											X Added on 12/19/19 by [signature]
B-1-10		12/11	1420											
B-1-15		12/11	1440											
B-1-20		12/11	1435											
B-1-25		12/12	1445	↓	↓									Samples received at 4 °C
B-1-30		12/12	1458	↓	↓									

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>[Signature]</u>	<u>JOHN HIGGINS</u>	<u>HC</u>	<u>12/12</u>	<u>2030</u>
Relinquished by:				
Received by:	<u>Eric Powers</u>	<u>FAB</u>	<u>12/19</u>	<u>2030</u>

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 30, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 12, 2019 from the Kosmos, F&BI 912215 project. There are 28 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1230R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 12, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912215 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912215 -01	B-6-5
912215 -02	B-6-10
912215 -03	B-6-15
912215 -04	B-6-20
912215 -05	B-6-25
912215 -06	B-6-30
912215 -07	B-6-35
912215 -08	B-6-40
912215 -09	B-7-5
912215 -10	B-7-10
912215 -11	B-7-15
912215 -12	B-7-20
912215 -13	B-7-25
912215 -14	B-7-30
912215 -15	B-7-35
912215 -16	B-7-40
912215 -17	B-9-5
912215 -18	B-9-10
912215 -19	B-9-15
912215 -20	B-9-20
912215 -21	B-9-25
912215 -22	B-9-30
912215 -23	B-9-35
912215 -24	B-9-40
912215 -25	B-1-5
912215 -26	B-1-10
912215 -27	B-1-15
912215 -28	B-1-20
912215 -29	B-1-25
912215 -30	B-1-30
912215 -31	B-1-35
912215 -32	B-1-40
912215 -33	B-5-5
912215 -34	B-5-15
912215 -35	B-5-20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE (CONTINUED)

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912215 -36	B-5-25
912215 -37	B-5-30
912215 -38	B-5-35
912215 -39	B-5-40
912215 -40	B-4-5
912215 -41	B-4-15
912215 -42	B-4-20
912215 -43	B-4-25
912215 -44	B-4-30
912215 -45	B-4-35
912215 -46	B-4-40
912215 -47	B-4-45
912215 -48	B-4-50
912215 -49	B-2-5
912215 -50	B-2-10
912215 -51	B-2-15
912215 -52	B-2-20
912215 -53	B-2-25
912215 -54	B-2-30
912215 -55	B-2-35
912215 -56	B-2-40

The 8260C matrix spike and matrix spike duplicate failed the relative percent difference for acetone and 2-butanone. The analytes were not detected in the samples therefore the data were acceptable.

Methylene chloride was detected in sample B-5-5. The data were qualified as due to laboratory contamination.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912215
Date Extracted: 12/23/19
Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
B-6-5 912215-01 1/5	93	90
B-5-5 912215-33 1/5	82	91
B-4-15 912215-41	12	92
B-4-35 912215-45	7.3	85
B-2-5 912215-49	8.7	86
Method Blank 09-2938 MB	<5	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
 Date Received: 12/12/19
 Project: Kosmos, F&BI 912215
 Date Extracted: 12/23/19
 Date Analyzed: 12/23/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**
 Results Reported on a Dry Weight Basis
 Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
B-6-35 912215-07	<0.02	<0.02	<0.02	<0.06	<5	85
B-6-40 912215-08	<0.02	<0.02	<0.02	<0.06	<5	85
B-7-5 912215-09	<0.02	<0.02	<0.02	<0.06	<5	84
B-9-40 912215-24	<0.02	<0.02	<0.02	<0.06	<5	88
B-1-5 912215-25	<0.02	<0.02	<0.02	<0.06	<5	88
B-5-15 912215-34	<0.02	<0.02	<0.02	<0.06	<5	85
B-4-40 912215-46	<0.02	<0.02	<0.02	<0.06	<5	84
B-2-10 912215-50	<0.02	<0.02	<0.02	<0.06	<5	83
B-2-35 912215-55	<0.02	<0.02	<0.02	<0.06	<5	84
Method Blank 09-2938 MB	<0.02	<0.02	<0.02	<0.06	<5	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912215
Date Extracted: 12/23/19
Date Analyzed: 12/23/19 and 12/24/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
B-6-5 912215-01	2,000 x	5,600	81
B-6-35 912215-07	<50	<250	83
B-6-40 912215-08	<50	<250	84
B-7-5 912215-09	<50	<250	88
B-7-10 912215-10	<50	<250	74
B-9-5 912215-17	<50	<250	86
B-9-15 912215-19	<50	<250	84
B-9-25 912215-21	<50	<250	84
B-9-40 912215-24	<50	<250	84
B-1-5 912215-25	<50	<250	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912215
Date Extracted: 12/23/19
Date Analyzed: 12/23/19 and 12/24/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
B-1-10 912215-26	<50	<250	87
B-1-15 912215-27	<50	<250	86
B-1-35 912215-31	<50	<250	82
B-5-5 912215-33	730 x	2,800	82
B-5-15 912215-34	<50	<250	84
B-4-5 912215-40	<50	<250	84
B-4-15 912215-41	<50	<250	80
B-4-25 912215-43	<50	<250	86
B-4-35 912215-45	<50	<250	89
B-4-40 912215-46	<50	<250	85

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19
Date Received: 12/12/19
Project: Kosmos, F&BI 912215
Date Extracted: 12/23/19
Date Analyzed: 12/23/19 and 12/24/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
B-2-5 912215-49	<50	<250	85
B-2-10 912215-50	<50	<250	85
B-2-20 912215-52	<50	<250	88
B-2-35 912215-55	<50	<250	75
B-2-40 912215-56	<50	<250	86
Method Blank 09-3096 MB	<50	<250	80
Method Blank 09-3101 MB	<50	<250	75

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-6-5	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-01 1/250
Date Analyzed:	12/25/19	Data File:	122423.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	128 d	31	163
Benzo(a)anthracene-d12	69 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.5
Acenaphthylene	<0.5
Acenaphthene	<0.5
Fluorene	<0.5
Phenanthrene	<0.5
Anthracene	<0.5
Fluoranthene	<0.5
Pyrene	1.8
Benz(a)anthracene	<0.5
Chrysene	0.97
Benzo(a)pyrene	0.56
Benzo(b)fluoranthene	<0.5
Benzo(k)fluoranthene	<0.5
Indeno(1,2,3-cd)pyrene	<0.5
Dibenz(a,h)anthracene	<0.5
Benzo(g,h,i)perylene	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-6-35	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-07 1/5
Date Analyzed:	12/24/19	Data File:	122411.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	74	31	163
Benzo(a)anthracene-d12	81	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-1-10	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-26 1/5
Date Analyzed:	12/24/19	Data File:	122413.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	74	31	163
Benzo(a)anthracene-d12	84	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-1-15	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-27 1/5
Date Analyzed:	12/24/19	Data File:	122414.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	69	31	163
Benzo(a)anthracene-d12	80	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-4-15	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-41 1/5
Date Analyzed:	12/24/19	Data File:	122415.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	72	31	163
Benzo(a)anthracene-d12	81	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-4-35	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-45 1/5
Date Analyzed:	12/24/19	Data File:	122416.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	72	31	163
Benzo(a)anthracene-d12	81	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-2-20	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-52 1/5
Date Analyzed:	12/24/19	Data File:	122417.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	73	31	163
Benzo(a)anthracene-d12	80	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	09-3100 mb 1/5
Date Analyzed:	12/23/19	Data File:	122321.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	75	31	163
Benzo(a)anthracene-d12	88	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-6-5	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-01
Date Analyzed:	12/23/19	Data File:	122318.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	93	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-5-5	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-33
Date Analyzed:	12/26/19	Data File:	122617.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	62	145
Toluene-d8	97	55	145
4-Bromofluorobenzene	95	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	0.51 lc	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-4-15	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-41
Date Analyzed:	12/23/19	Data File:	122320.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	62	145
Toluene-d8	107	55	145
4-Bromofluorobenzene	97	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-4-35	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-45
Date Analyzed:	12/23/19	Data File:	122321.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	62	145
Toluene-d8	106	55	145
4-Bromofluorobenzene	96	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-2-5	Client:	Hart Crowser
Date Received:	12/12/19	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	912215-49
Date Analyzed:	12/23/19	Data File:	122323.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	62	145
Toluene-d8	108	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912215
Date Extracted:	12/23/19	Lab ID:	09-3082 mb
Date Analyzed:	12/23/19	Data File:	122311.D
Matrix:	Soil	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	93	65	139

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912215

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 912193-10 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	90	69-120
Toluene	mg/kg (ppm)	0.5	88	70-117
Ethylbenzene	mg/kg (ppm)	0.5	86	65-123
Xylenes	mg/kg (ppm)	1.5	87	66-120
Gasoline	mg/kg (ppm)	20	95	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912215

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912400-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	90	90	63-146	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	88	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912215

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912215-07 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	200	85	83	64-133	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	98	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912215

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912215-07 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	74	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	77	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	76	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	79	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	76	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	73	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	77	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	89	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	78	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	78	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	68	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	68	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	64	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	52	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	55	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	45	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	82	80	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	84	83	54-121	1
Acenaphthene	mg/kg (ppm)	0.17	84	84	54-123	0
Fluorene	mg/kg (ppm)	0.17	83	82	56-127	1
Phenanthrene	mg/kg (ppm)	0.17	86	85	55-122	1
Anthracene	mg/kg (ppm)	0.17	84	83	50-120	1
Fluoranthene	mg/kg (ppm)	0.17	83	84	54-129	1
Pyrene	mg/kg (ppm)	0.17	88	88	53-127	0
Benz(a)anthracene	mg/kg (ppm)	0.17	90	89	51-115	1
Chrysene	mg/kg (ppm)	0.17	89	89	55-129	0
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	73	73	56-123	0
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	75	75	54-131	0
Benzo(a)pyrene	mg/kg (ppm)	0.17	73	73	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	71	72	49-148	1
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	68	69	50-141	1
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	69	70	52-131	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912215

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912147-01912147-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	21	23	10-56	9
Chloromethane	mg/kg (ppm)	2.5	<0.5	45	46	10-90	2
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	39	39	10-91	0
Bromomethane	mg/kg (ppm)	2.5	<0.5	53	61	10-110	14
Chloroethane	mg/kg (ppm)	2.5	<0.5	50	50	10-101	0
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	36	36	10-95	0
Acetone	mg/kg (ppm)	12.5	<0.5	81	114	11-141	34 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	42	46	22-107	9
Hexane	mg/kg (ppm)	2.5	<0.25	37	41	10-95	10
Methylene chloride	mg/kg (ppm)	2.5	0.80	60 b	61 b	14-128	2 b
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	76	78	17-134	3
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	64	66	13-112	3
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	75	79	23-115	5
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	63	61	18-117	3
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	73	74	25-120	1
Chloroform	mg/kg (ppm)	2.5	<0.05	78	82	29-117	5
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	97	122	20-133	23 vo
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	88	97	22-124	10
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	67	68	27-112	1
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	72	77	26-107	7
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	64	64	28-126	0
Benzene	mg/kg (ppm)	2.5	<0.03	74	80	26-114	8
Trichloroethene	mg/kg (ppm)	2.5	<0.02	74	81	30-112	9
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	83	92	31-119	10
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	84	92	31-131	9
Dibromomethane	mg/kg (ppm)	2.5	<0.05	75	83	27-124	10
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	92	100	16-147	8
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	83	94	28-137	12
Toluene	mg/kg (ppm)	2.5	<0.05	74	79	34-112	7
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	77	89	30-136	14
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	83	91	32-126	9
2-Hexanone	mg/kg (ppm)	12.5	<0.5	96	110	17-147	14
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	80	89	29-125	11
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	68	72	25-114	6
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	75	79	32-143	5
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	78	86	32-126	10
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	75	82	37-113	9
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	77	82	34-115	6
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	76	78	35-126	3
m,p-Xylene	mg/kg (ppm)	5	<0.1	76	80	25-125	5
o-Xylene	mg/kg (ppm)	2.5	<0.05	77	80	27-126	4
Styrene	mg/kg (ppm)	2.5	<0.05	80	84	39-121	5
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	77	80	34-123	4
Bromoform	mg/kg (ppm)	2.5	<0.05	80	82	18-155	2
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	77	88	31-120	13
Bromobenzene	mg/kg (ppm)	2.5	<0.05	74	82	40-115	10
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	76	84	24-130	10
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	89	98	27-148	10
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	86	96	33-123	11
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	78	86	39-110	10
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	76	87	39-111	13
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	76	85	36-116	11
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	76	83	35-116	9
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	78	84	33-118	7
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	76	82	32-119	8
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	74	83	38-111	11
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	75	82	39-109	9
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	76	82	40-111	8
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	87	92	44-112	6
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	76	82	31-121	8
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	78	80	24-128	3
Naphthalene	mg/kg (ppm)	2.5	<0.05	79	82	24-139	4
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	78	82	35-117	5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/30/19

Date Received: 12/12/19

Project: Kosmos, F&BI 912215

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	61	10-146
Chloromethane	mg/kg (ppm)	2.5	79	27-133
Vinyl chloride	mg/kg (ppm)	2.5	82	22-139
Bromomethane	mg/kg (ppm)	2.5	90	38-114
Chloroethane	mg/kg (ppm)	2.5	104	9-163
Trichlorofluoromethane	mg/kg (ppm)	2.5	99	10-196
Acetone	mg/kg (ppm)	12.5	98	52-141
1,1-Dichloroethene	mg/kg (ppm)	2.5	108	47-128
Hexane	mg/kg (ppm)	2.5	120	43-142
Methylene chloride	mg/kg (ppm)	2.5	113	42-132
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	103	60-123
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	113	67-129
1,1-Dichloroethane	mg/kg (ppm)	2.5	111	68-115
2,2-Dichloropropane	mg/kg (ppm)	2.5	109	52-170
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	114	72-127
Chloroform	mg/kg (ppm)	2.5	109	66-120
2-Butanone (MEK)	mg/kg (ppm)	12.5	110	72-127
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	116	56-135
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	111	62-131
1,1-Dichloropropene	mg/kg (ppm)	2.5	112	69-128
Carbon tetrachloride	mg/kg (ppm)	2.5	115	60-139
Benzene	mg/kg (ppm)	2.5	114	68-114
Trichloroethene	mg/kg (ppm)	2.5	110	64-117
1,2-Dichloropropane	mg/kg (ppm)	2.5	118	72-127
Bromodichloromethane	mg/kg (ppm)	2.5	117	72-130
Dibromomethane	mg/kg (ppm)	2.5	115	70-120
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	118	45-145
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	128	75-136
Toluene	mg/kg (ppm)	2.5	105	66-126
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	117	72-132
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	106	75-113
2-Hexanone	mg/kg (ppm)	12.5	102	33-152
1,3-Dichloropropene	mg/kg (ppm)	2.5	108	72-130
Tetrachloroethene	mg/kg (ppm)	2.5	108	72-114
Dibromochloromethane	mg/kg (ppm)	2.5	115	74-125
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	106	74-132
Chlorobenzene	mg/kg (ppm)	2.5	104	76-111
Ethylbenzene	mg/kg (ppm)	2.5	106	64-123
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	69-135
m,p-Xylene	mg/kg (ppm)	5	106	78-122
o-Xylene	mg/kg (ppm)	2.5	102	77-124
Styrene	mg/kg (ppm)	2.5	104	74-126
Isopropylbenzene	mg/kg (ppm)	2.5	101	76-127
Bromoform	mg/kg (ppm)	2.5	118	56-132
n-Propylbenzene	mg/kg (ppm)	2.5	108	74-124
Bromobenzene	mg/kg (ppm)	2.5	108	72-122
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	107	76-126
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	105	56-143
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	106	61-137
2-Chlorotoluene	mg/kg (ppm)	2.5	106	74-121
4-Chlorotoluene	mg/kg (ppm)	2.5	107	75-122
tert-Butylbenzene	mg/kg (ppm)	2.5	107	73-130
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	104	76-125
sec-Butylbenzene	mg/kg (ppm)	2.5	103	71-130
p-Isopropyltoluene	mg/kg (ppm)	2.5	101	70-132
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	103	75-121
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	102	74-117
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	100	76-121
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	96	58-138
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	97	64-135
Hexachlorobutadiene	mg/kg (ppm)	2.5	94	50-153
Naphthalene	mg/kg (ppm)	2.5	92	63-140
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	93	63-138

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

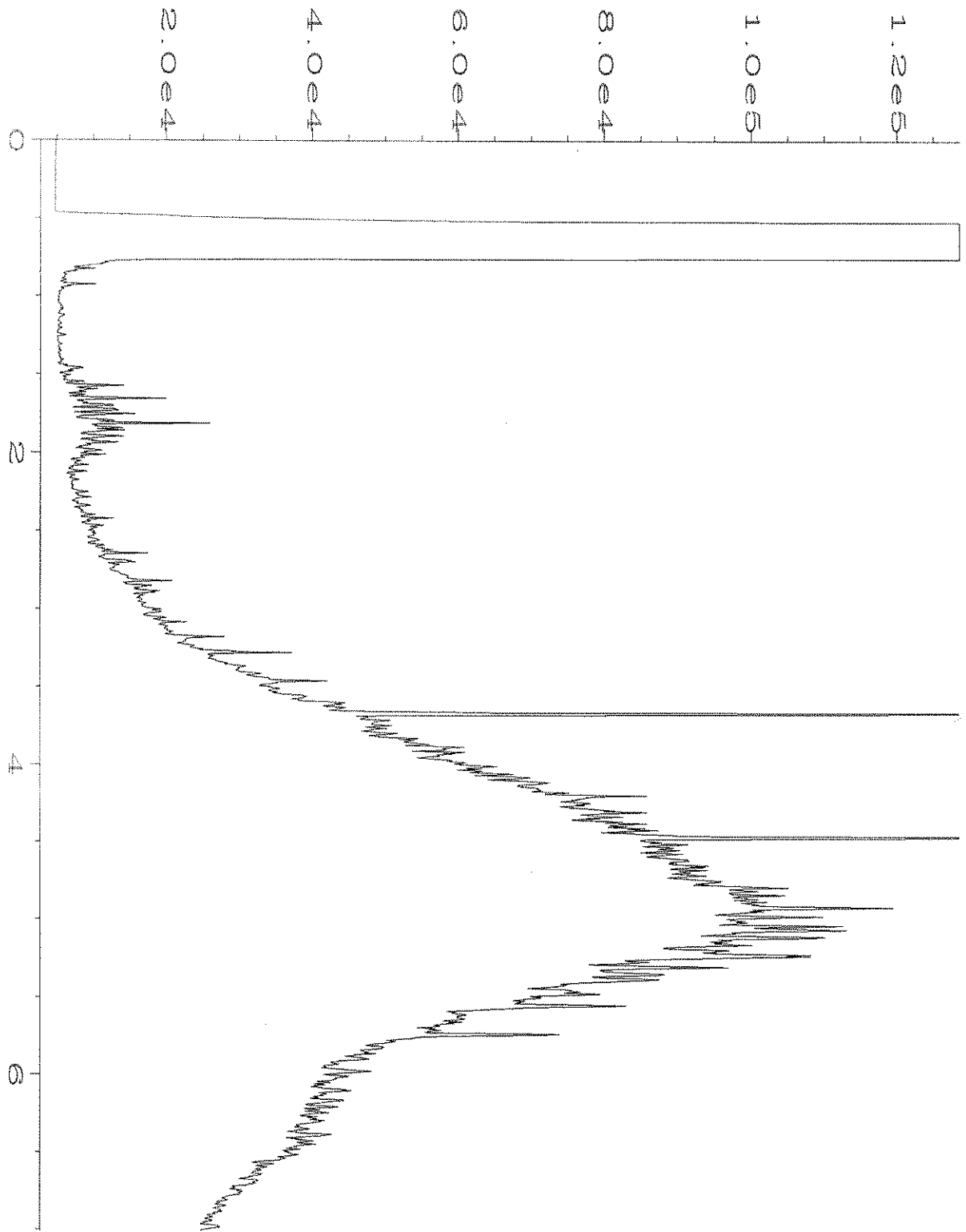
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

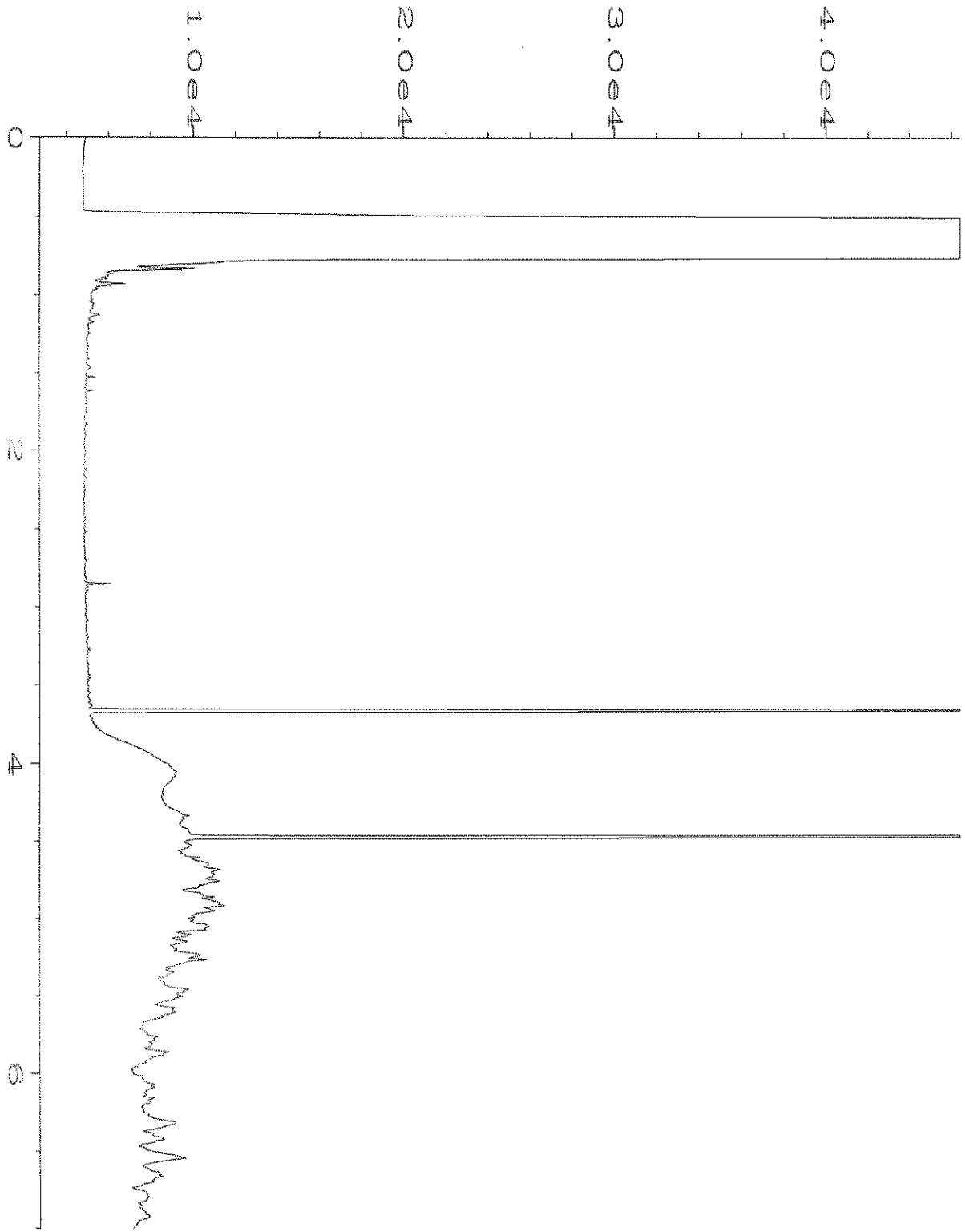
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

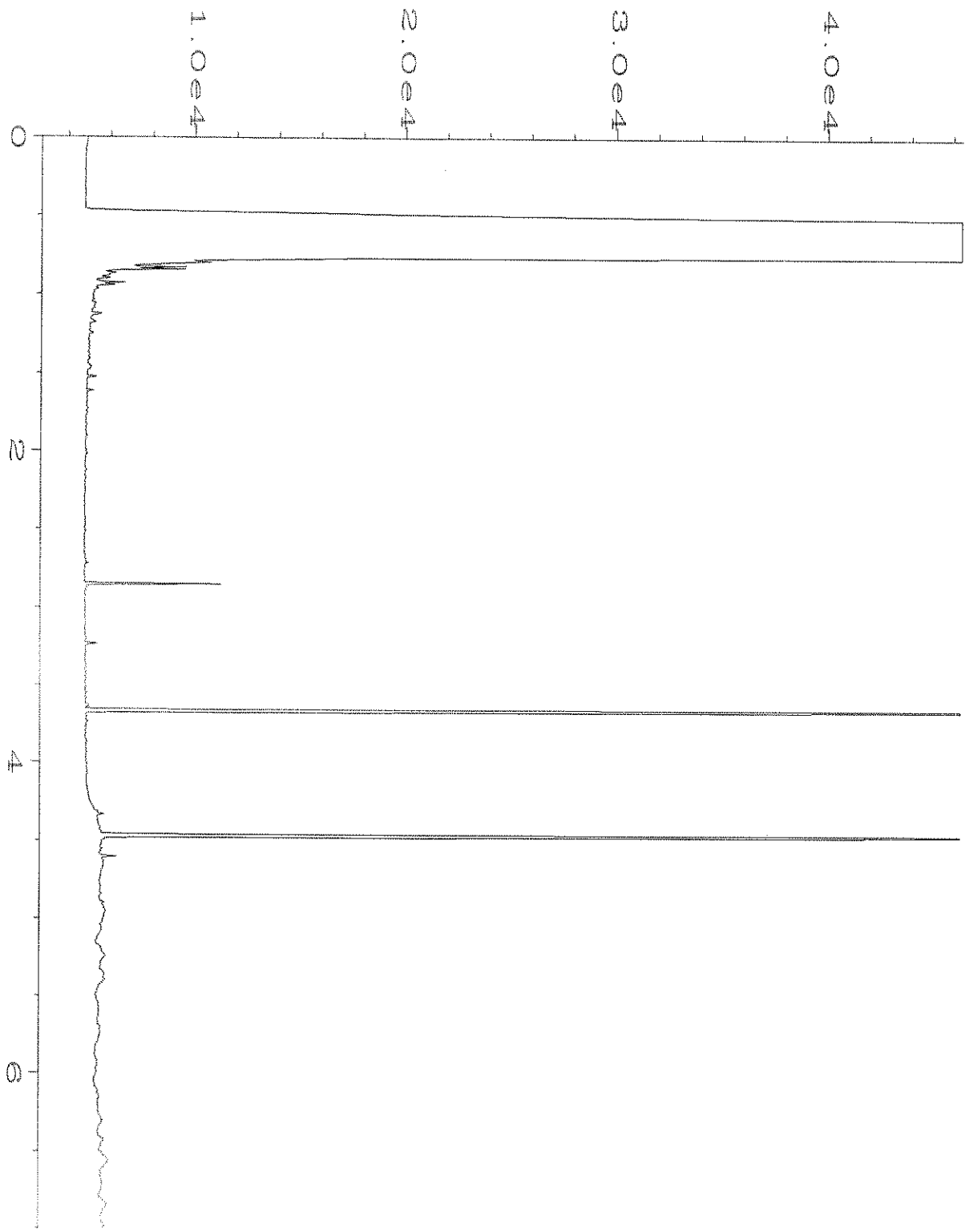
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\013F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 13
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-01	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 12:37 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:40 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\014F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 14
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-07	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 12:48 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:40 AM		

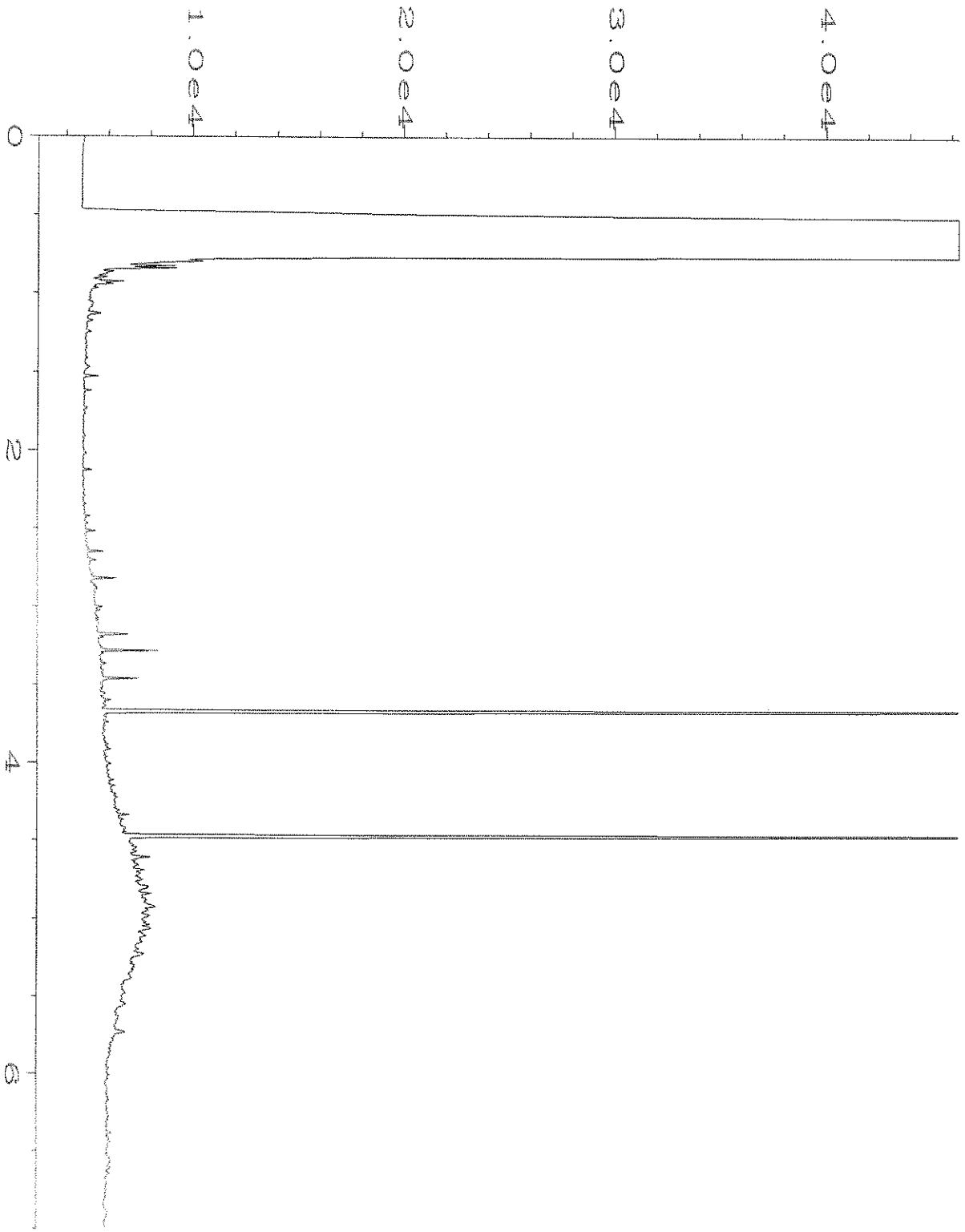


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Operator	: TL	Vial Number	: 15
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-08	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 12:59 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:40 AM		

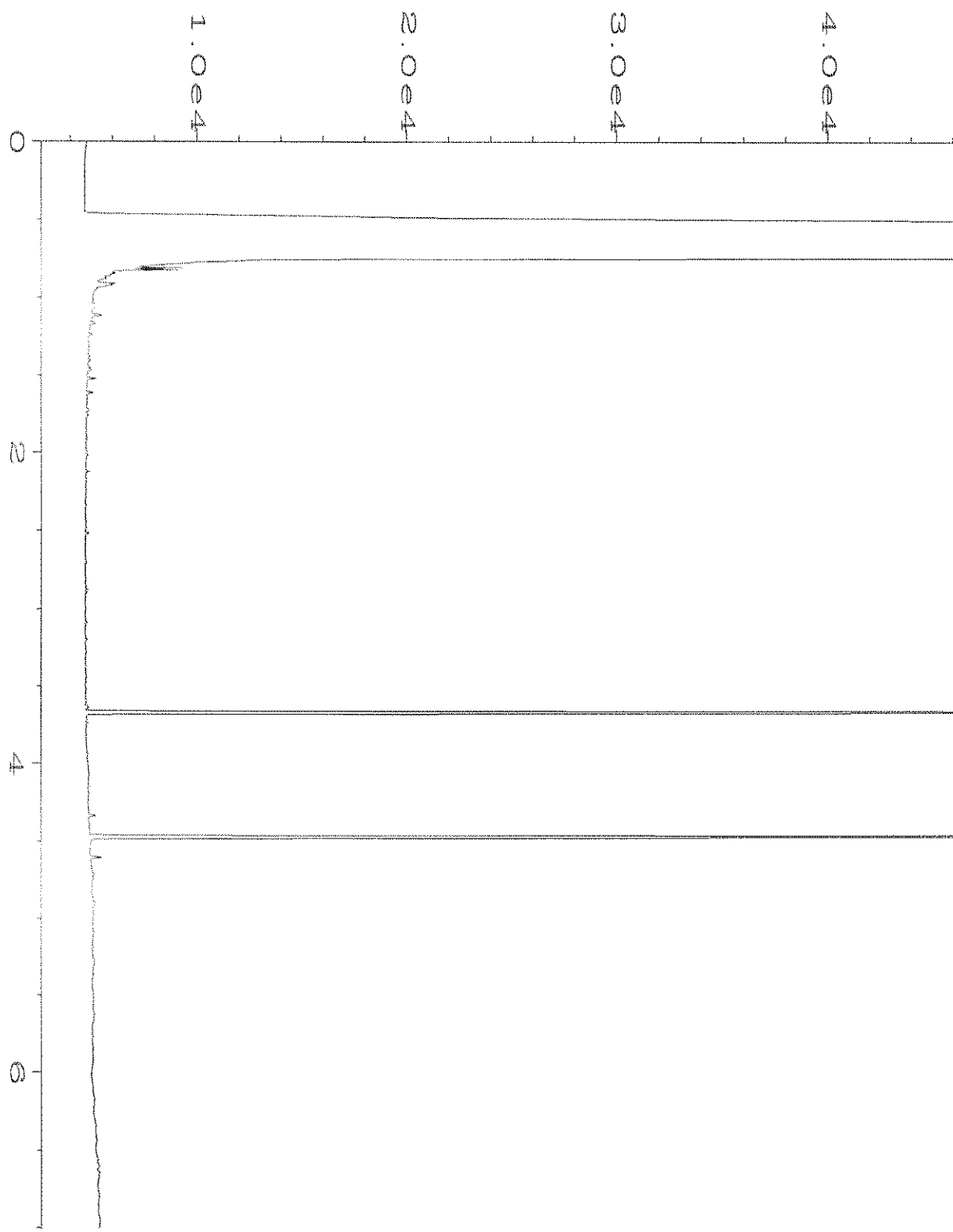
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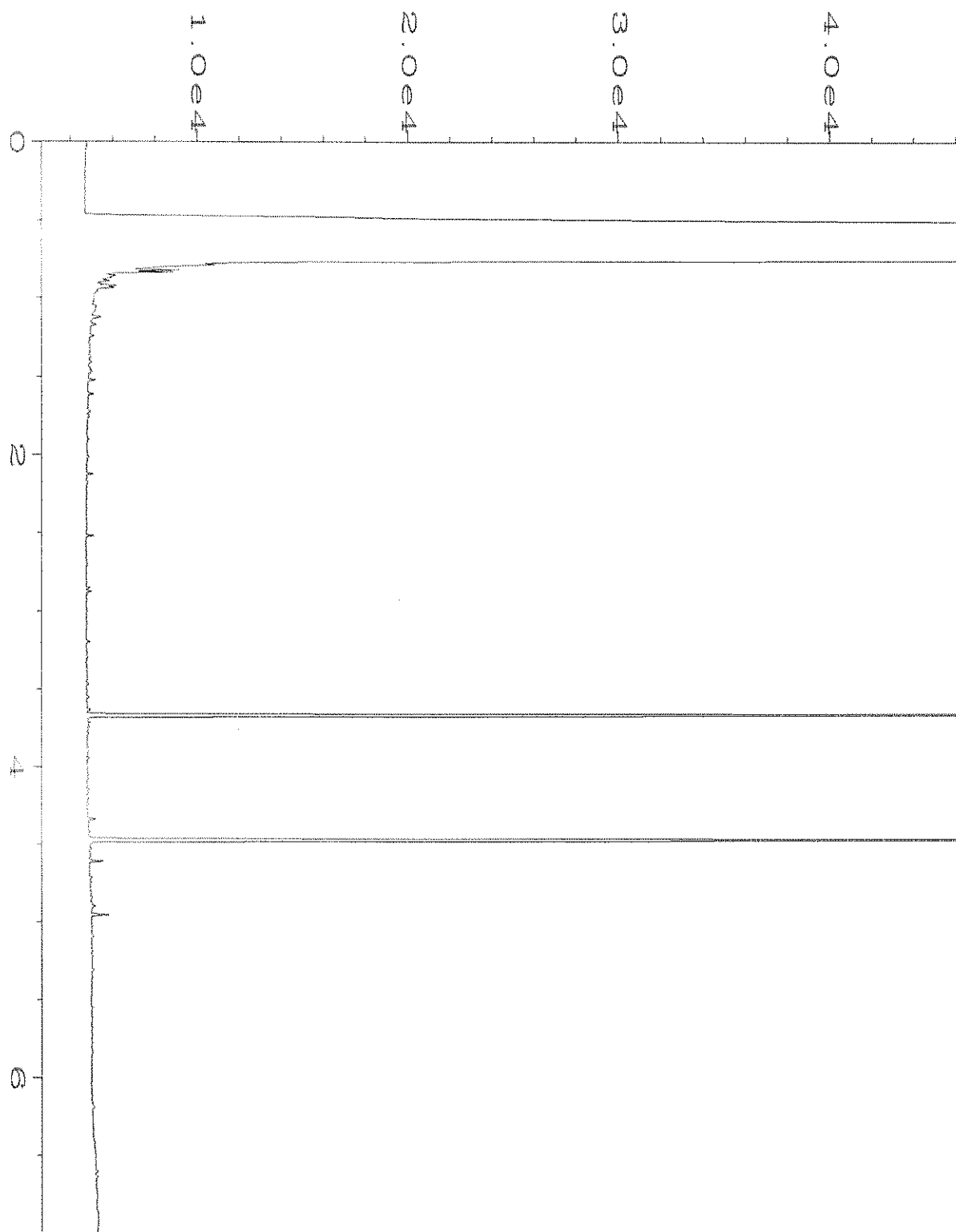
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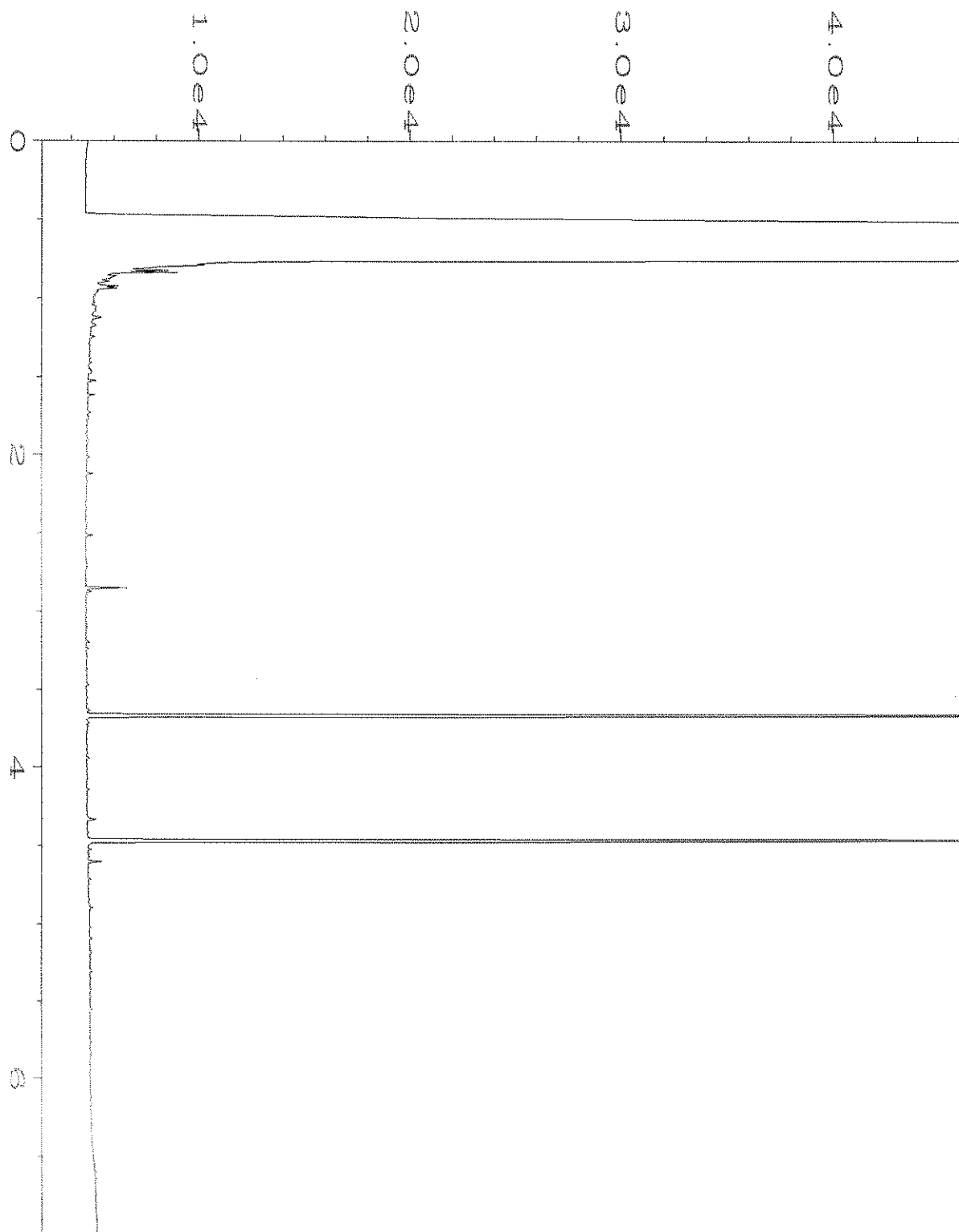
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Operator	: TL	Vial Number	: 16
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-09	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 01:10 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:40 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\017F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 17
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-10	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 01:21 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:40 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\018F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 18
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-17	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
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Report Created on:	24 Dec 19 07:40 AM		

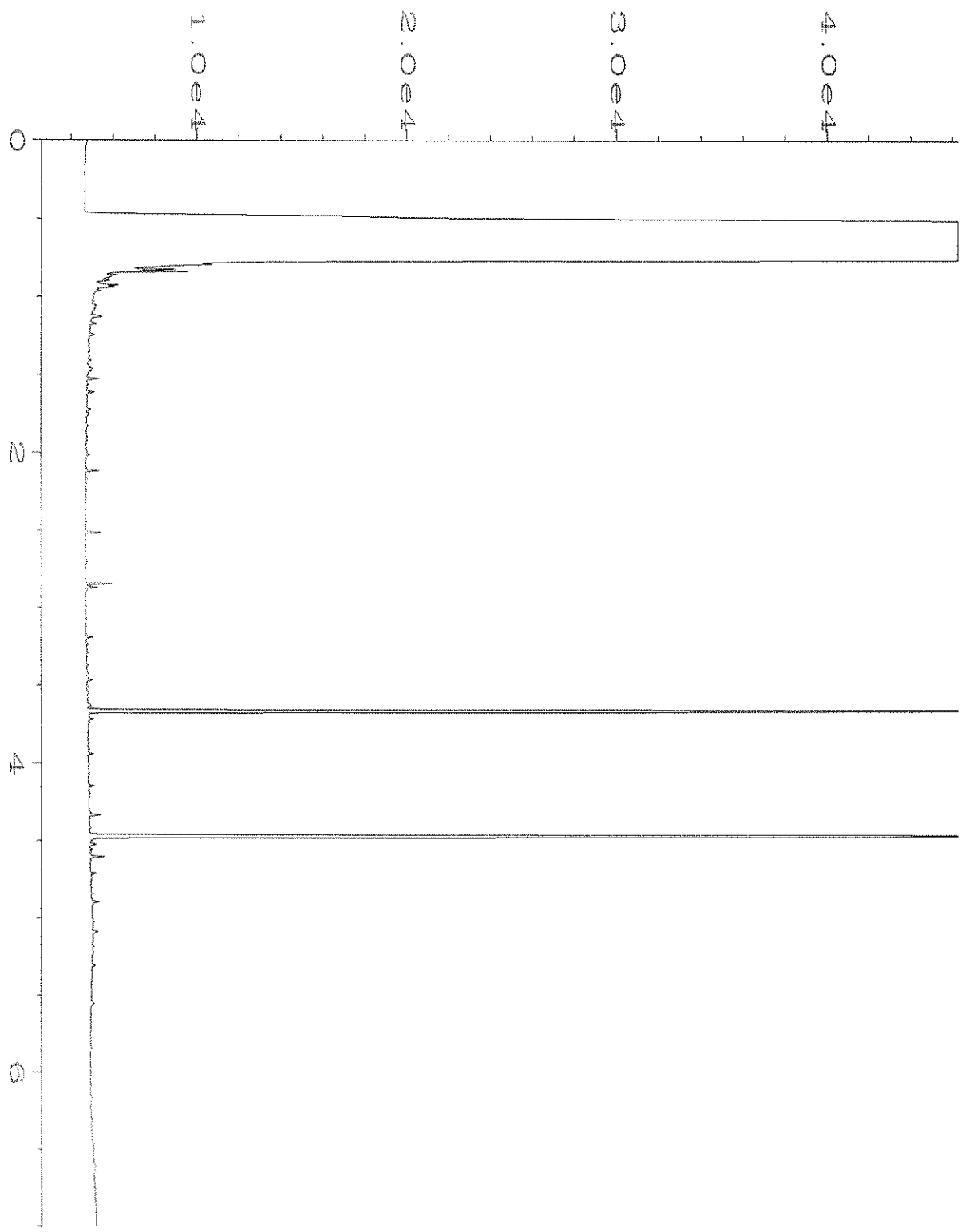


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Operator	: TL	Vial Number	: 19
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-19	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 01:42 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:40 AM		

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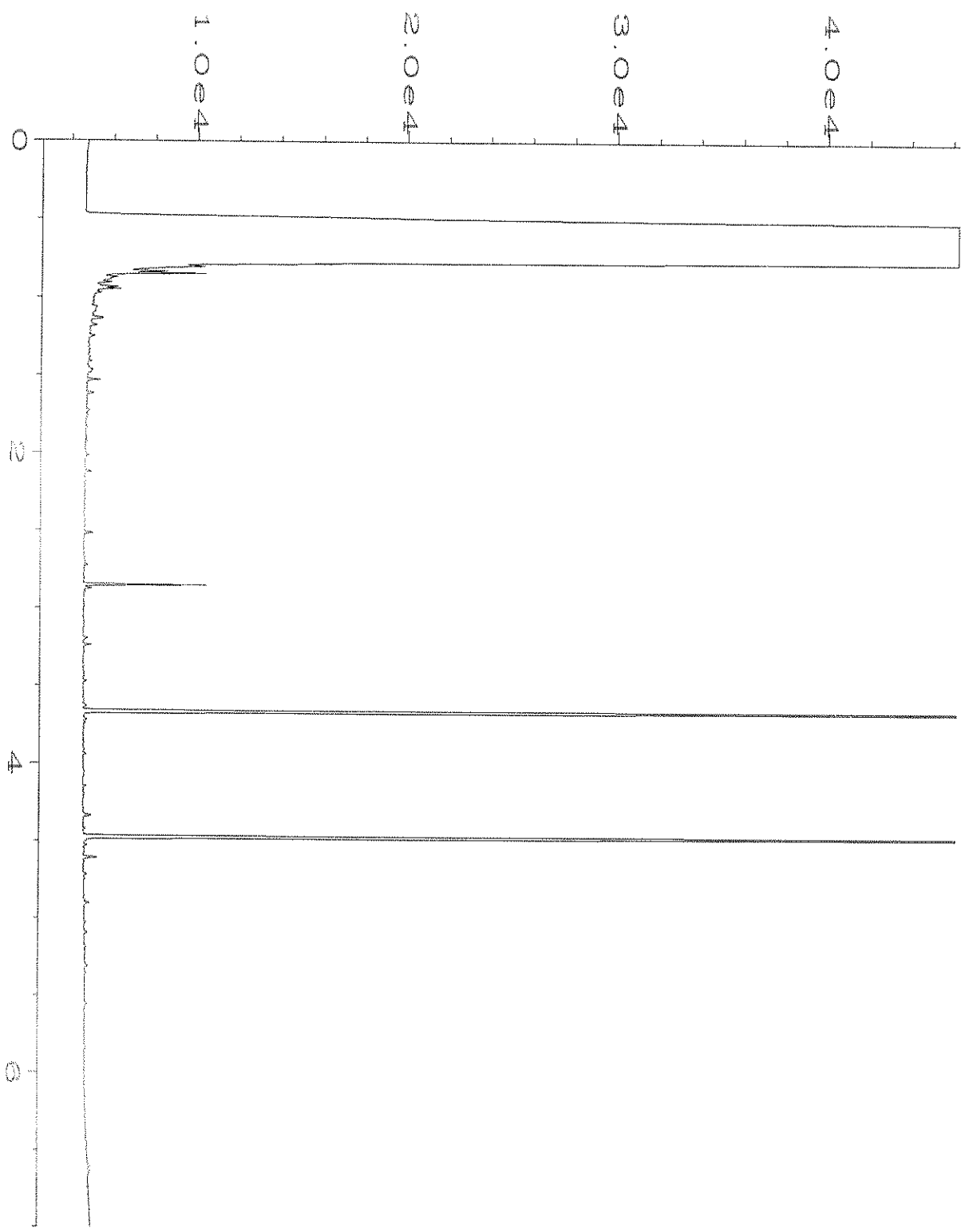


Data File Name : C:\HPCHEM\6\DATA\12-23-19\020F0501.D
Operator : TL Page Number : 1
Instrument : GC6 Vial Number : 20
Sample Name : 912215-21 Injection Number : 1
Run Time Bar Code: Sequence Line : 5
Acquired on : 23 Dec 19 01:53 PM Instrument Method: DX.MTH
Report Created on: 24 Dec 19 07:41 AM Analysis Method : DEFAULT.MTH

11.11.19

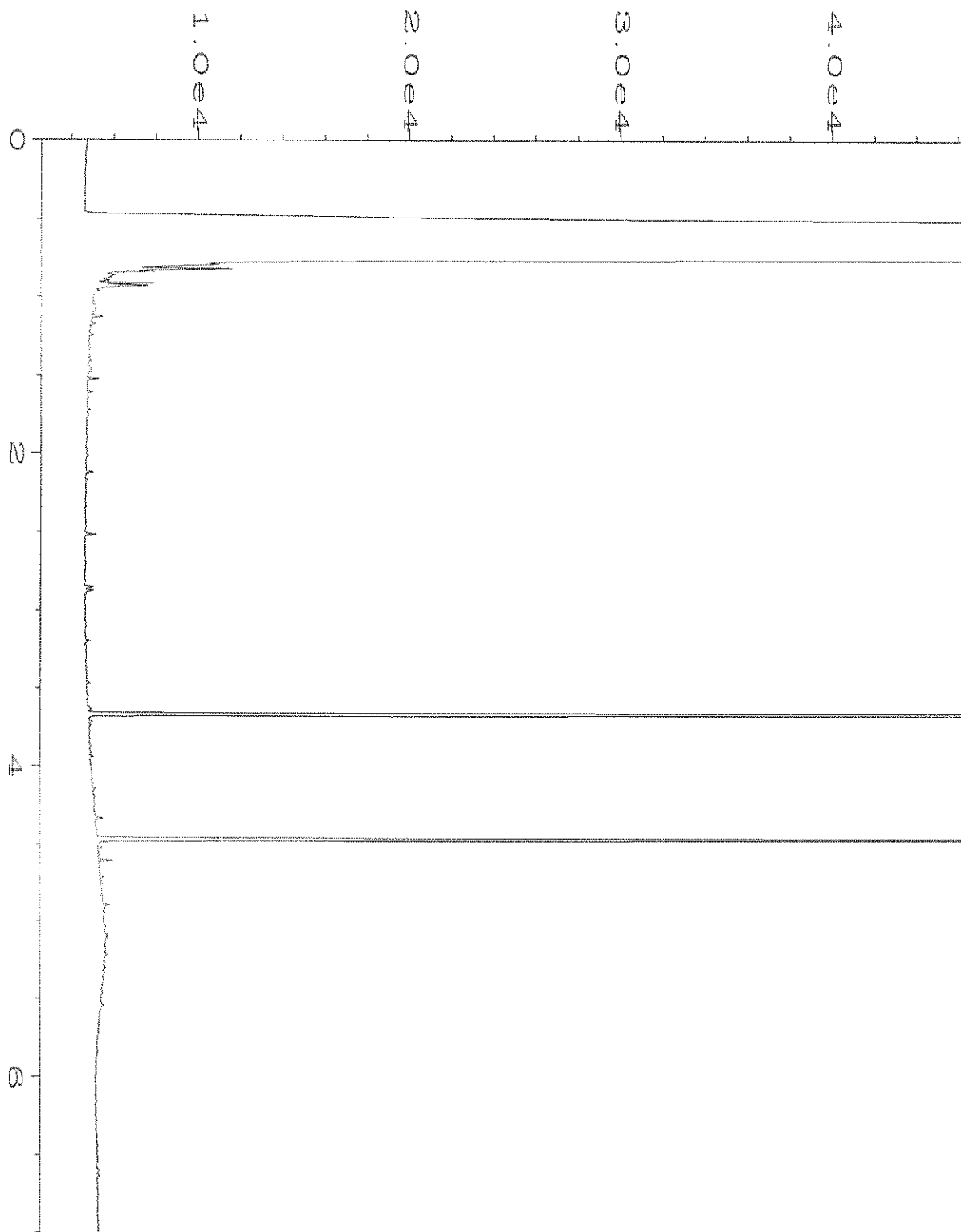
11.11.19

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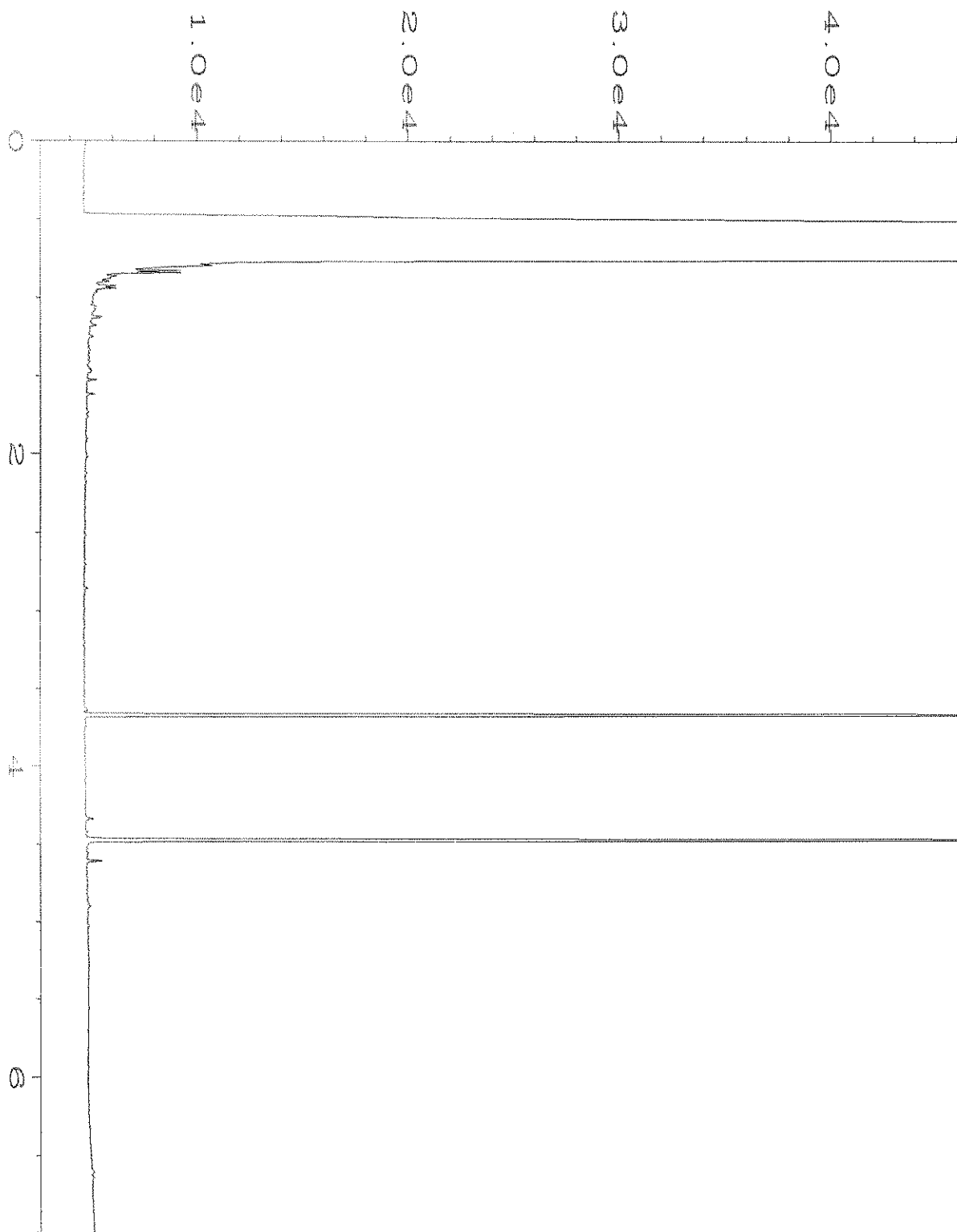


Data File Name : C:\HPCHEM\6\DATA\12-23-19\021F0501.D
Operator : TL
Instrument : GC6
Sample Name : 912215-24
Run Time Bar Code:
Acquired on : 23 Dec 19 02:04 PM
Report Created on: 24 Dec 19 07:41 AM
Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 5
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

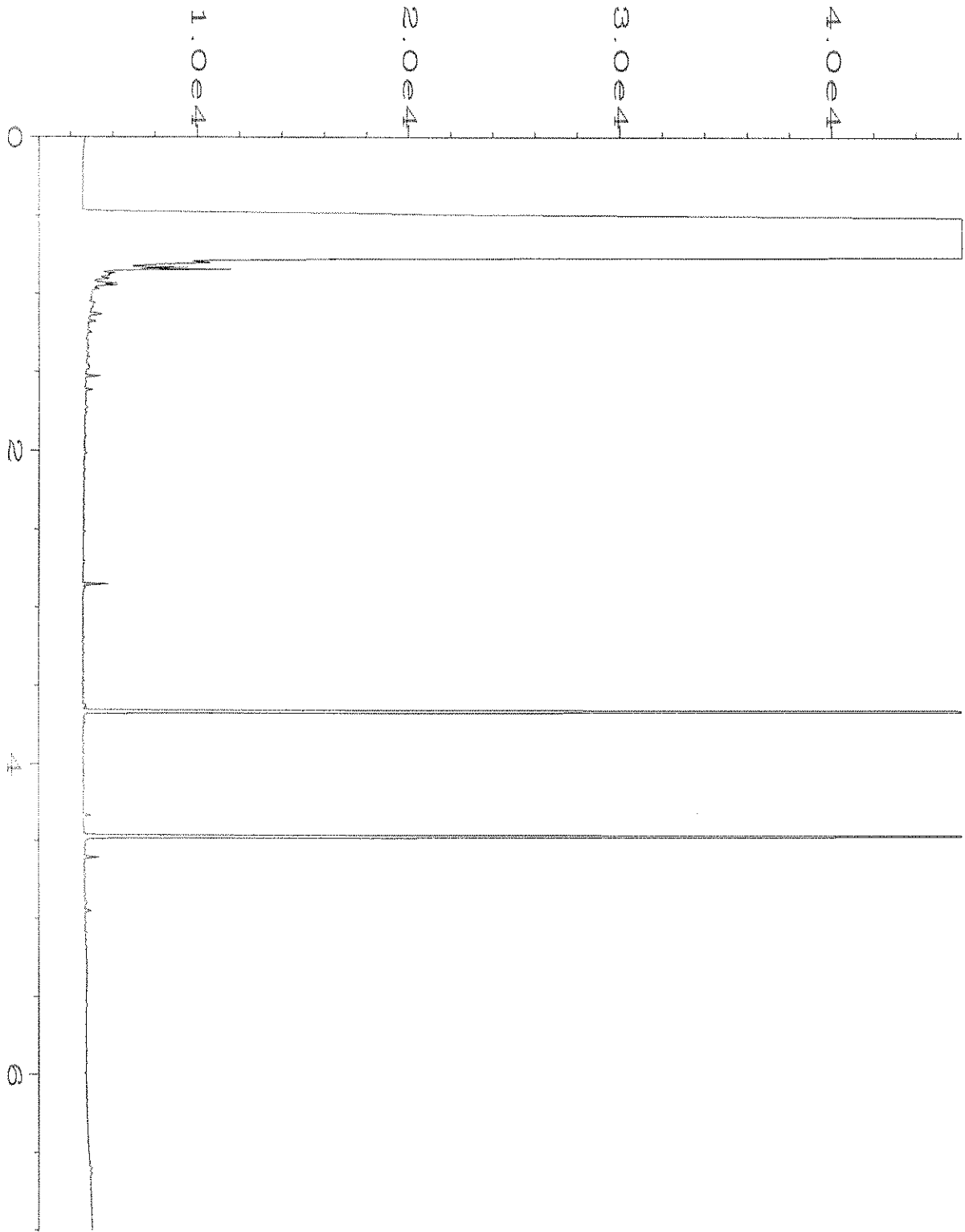
11.11.19



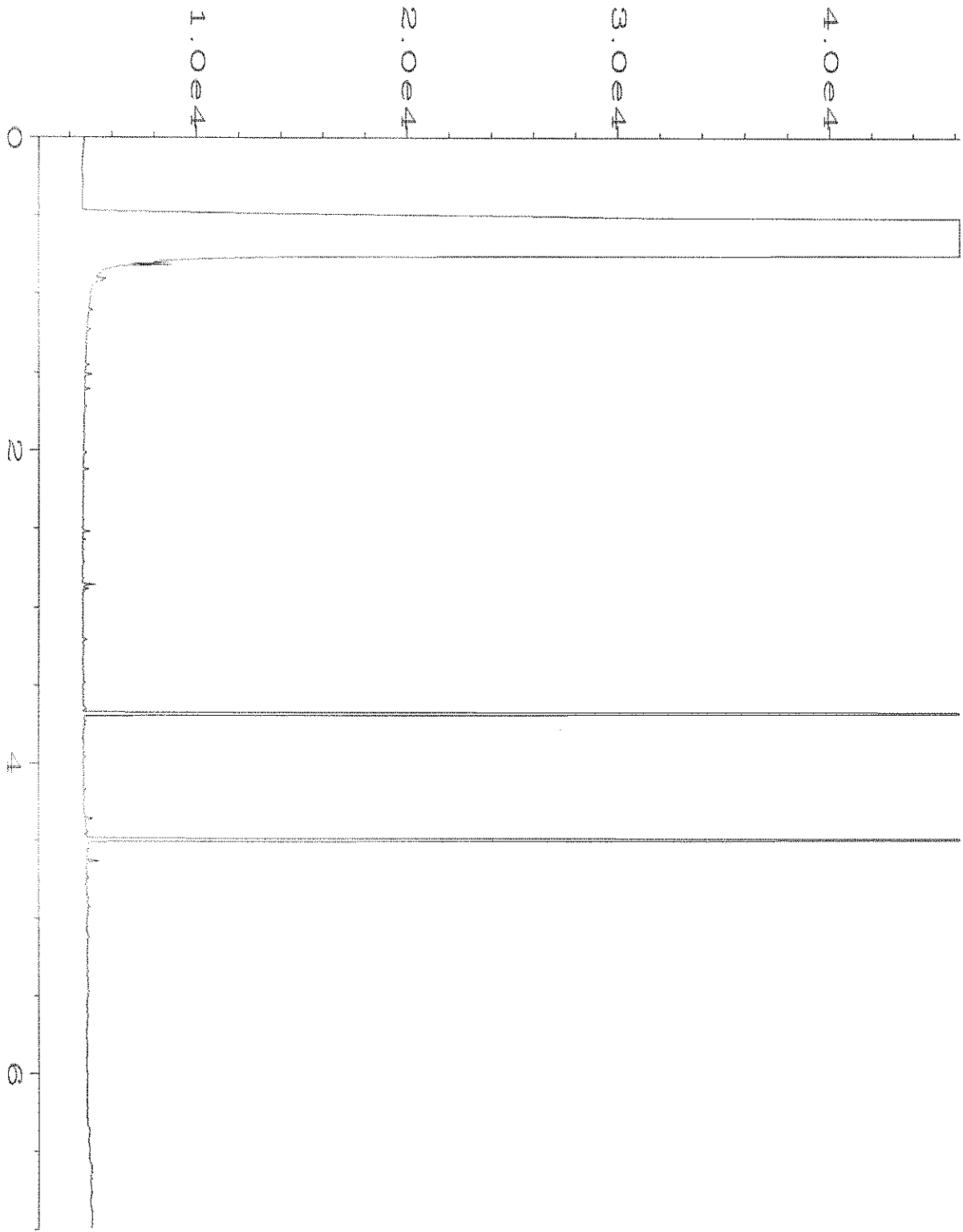
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Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-25	Sequence Line	: 5
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Acquired on	: 23 Dec 19 02:15 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:41 AM		



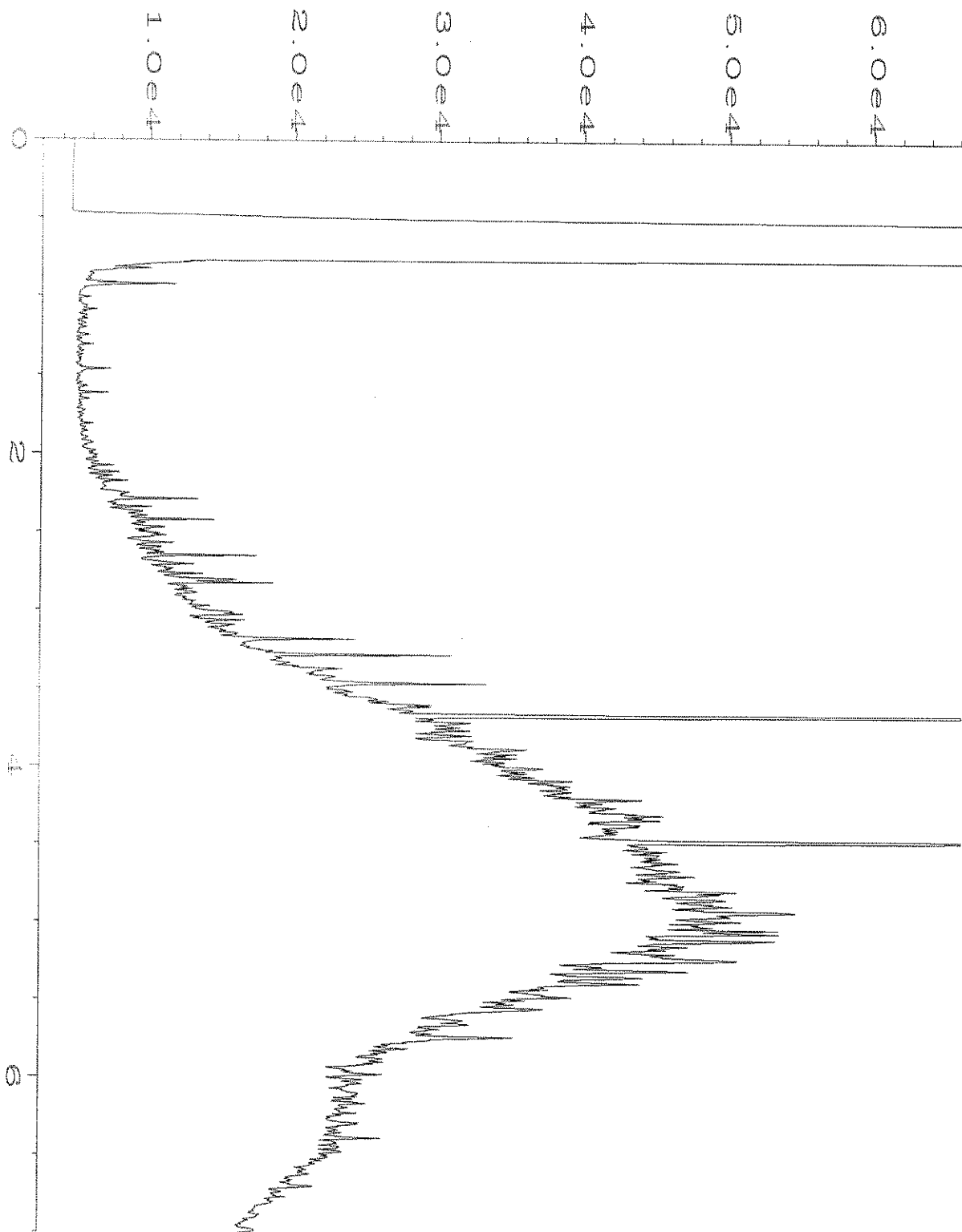
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Operator	: TL	Vial Number	: 23
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-26	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 02:26 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:41 AM		



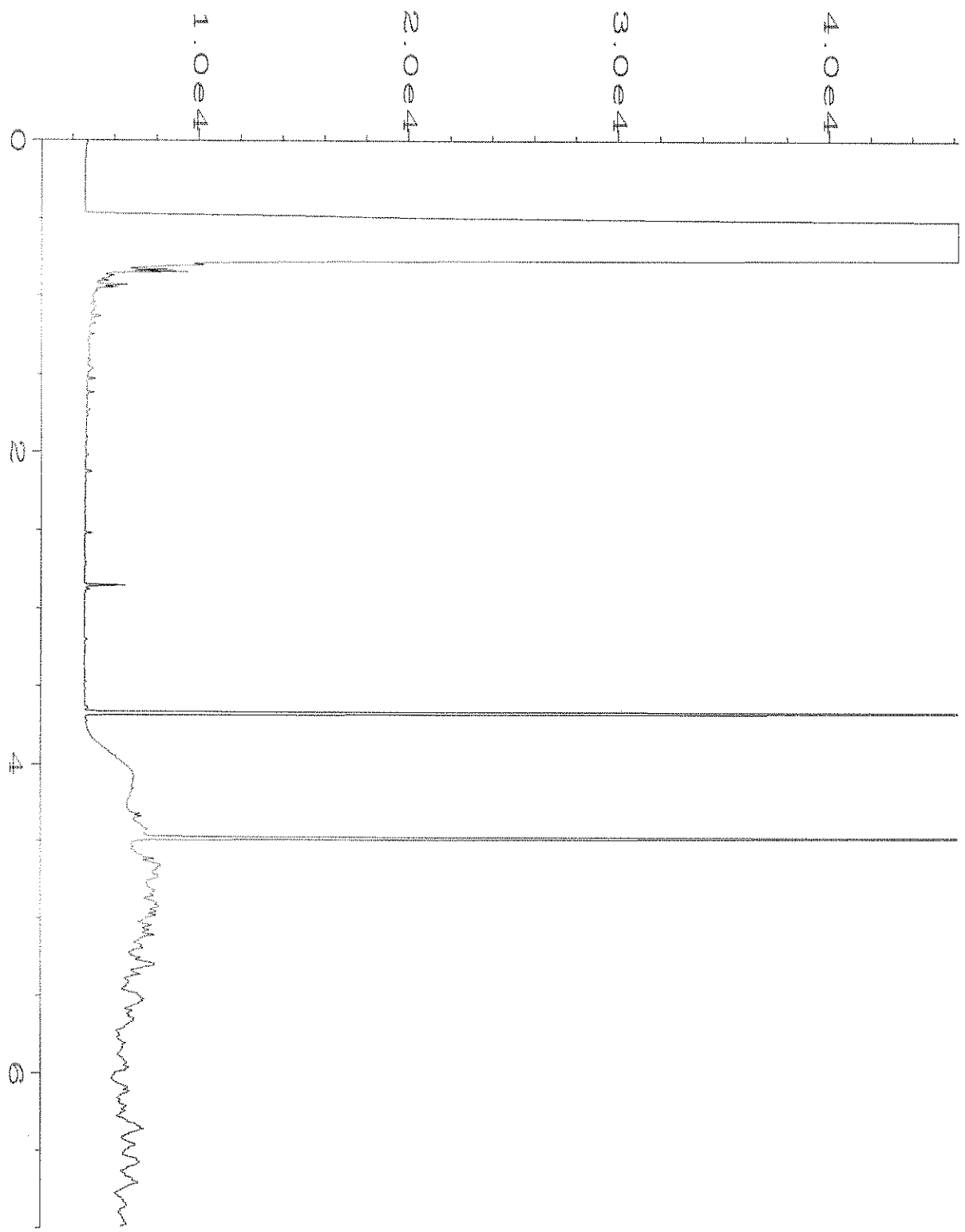
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Operator	: TL	Vial Number	: 24
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-27	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
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Report Created on:	24 Dec 19 07:41 AM		



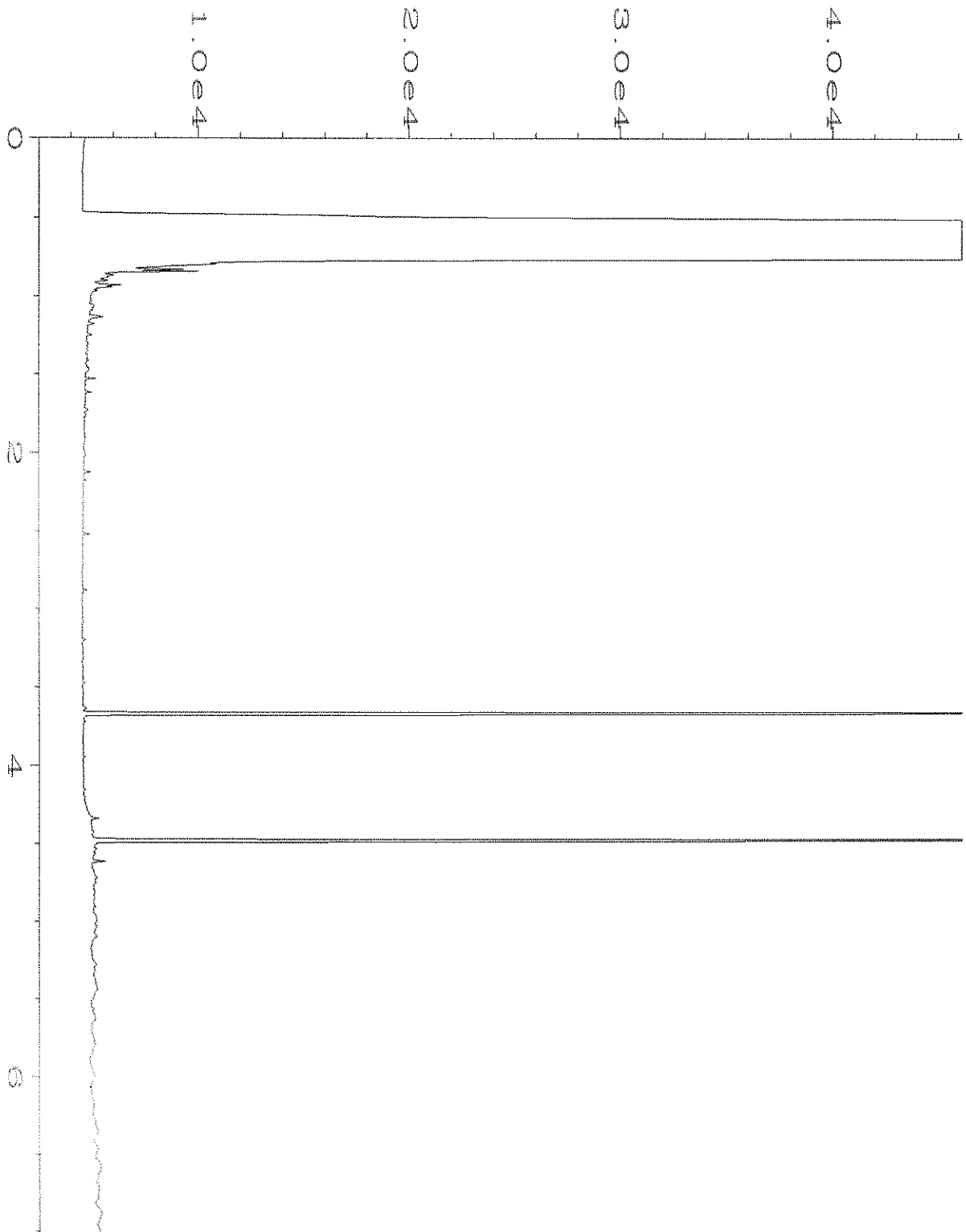
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Operator	: TL	Vial Number	: 25
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-31	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 03:35 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:41 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\026F0701.D	Page Number	: 1
Operator	: TL	Vial Number	: 26
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-33	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 03:44 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:42 AM		

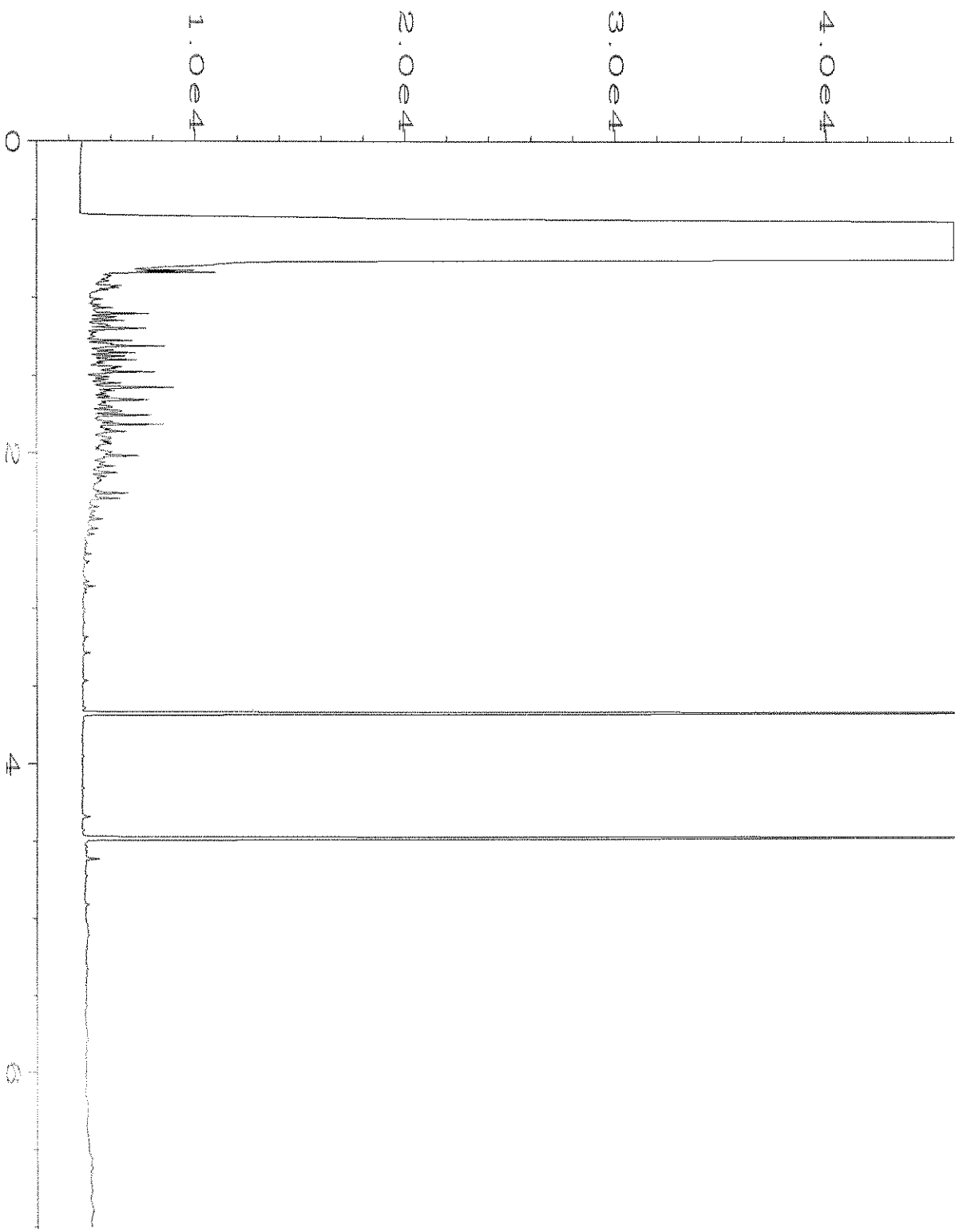


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Operator	: TL	Vial Number	: 27
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-34	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 03:55 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:42 AM		

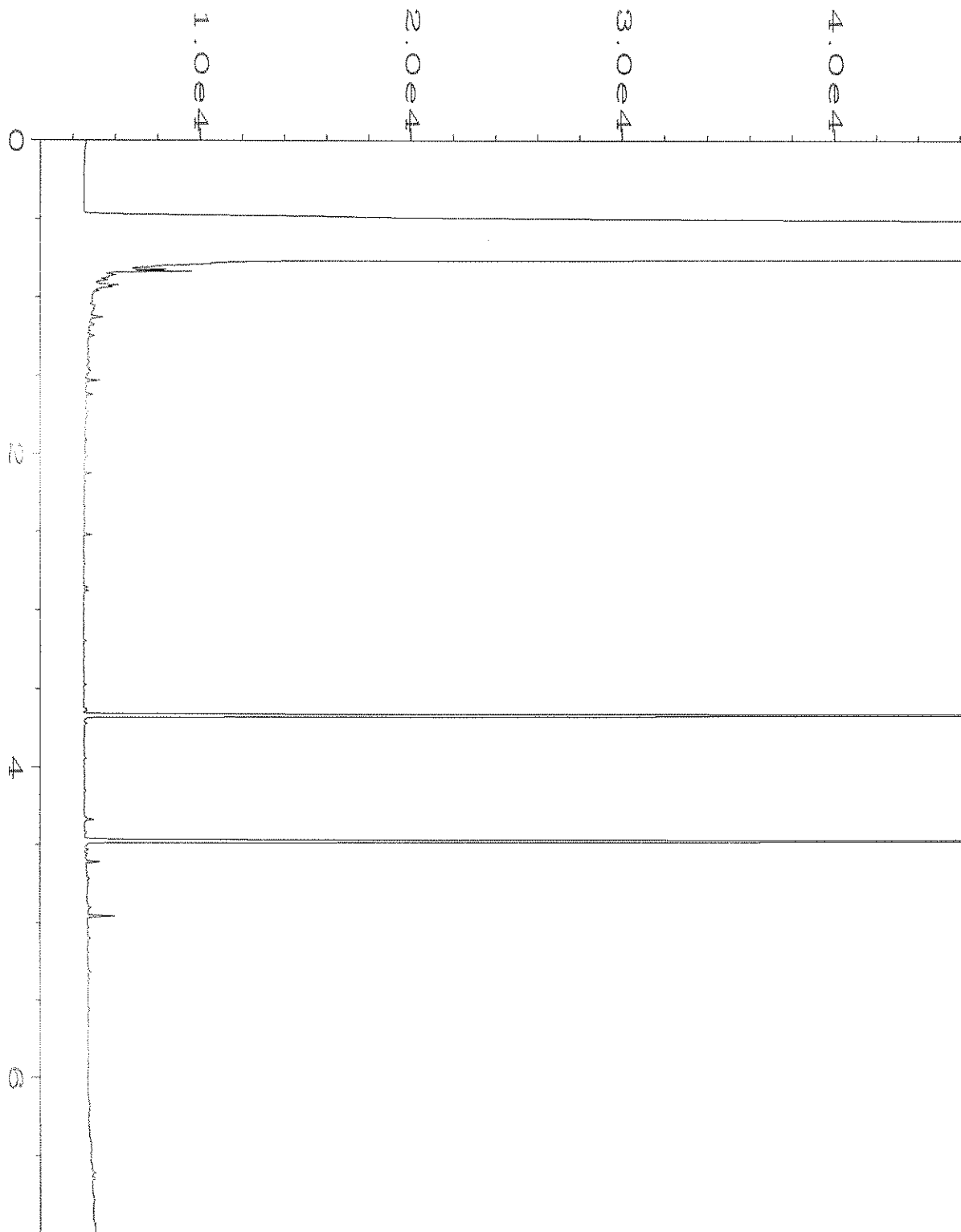


Data File Name	: C:\HPCHEM\6\DATA\12-23-19\028F0701.D	Page Number	: 1
Operator	: TL	Vial Number	: 28
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-40	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 04:06 PM	Analysis Method	: DEFAULT.MTH
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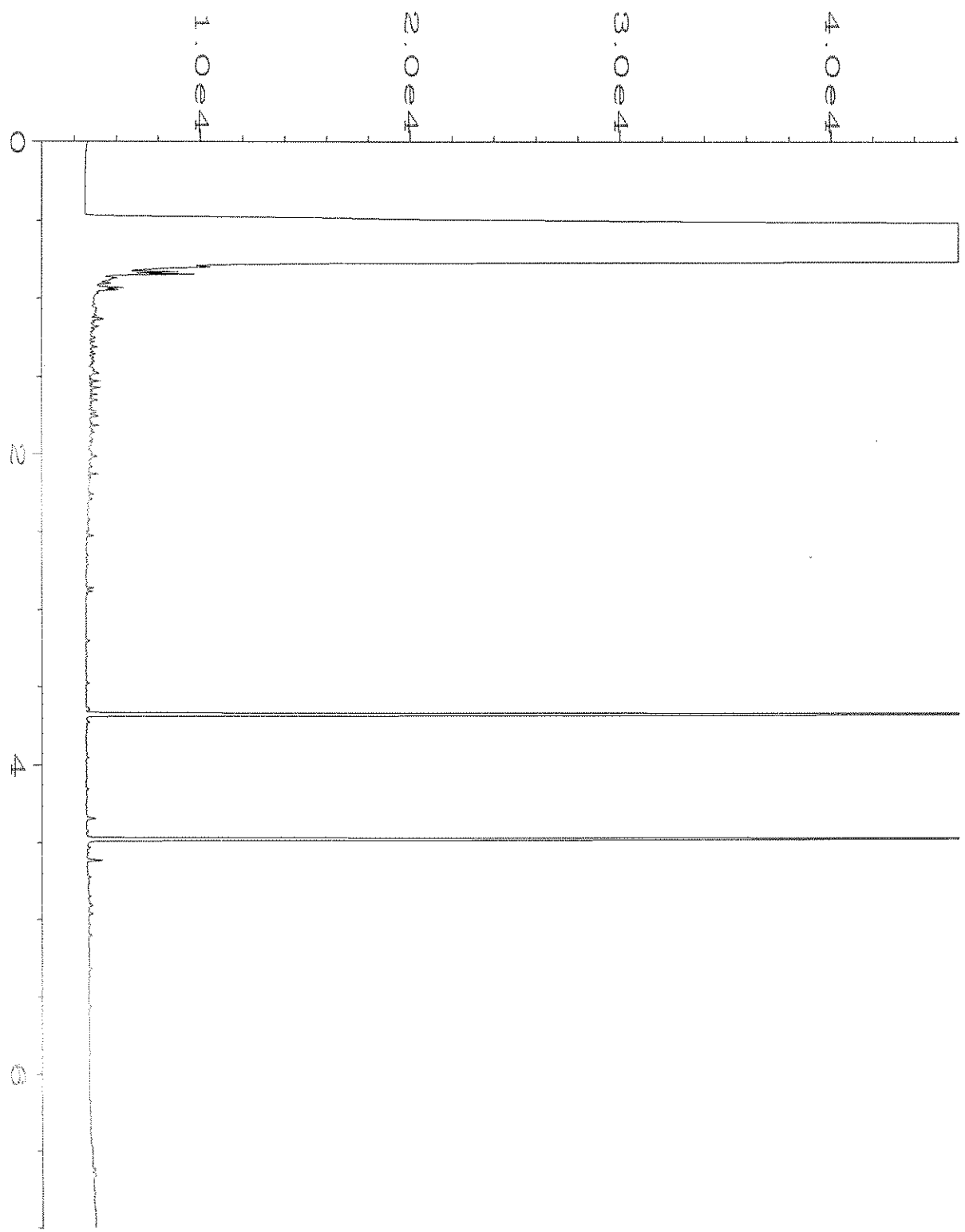
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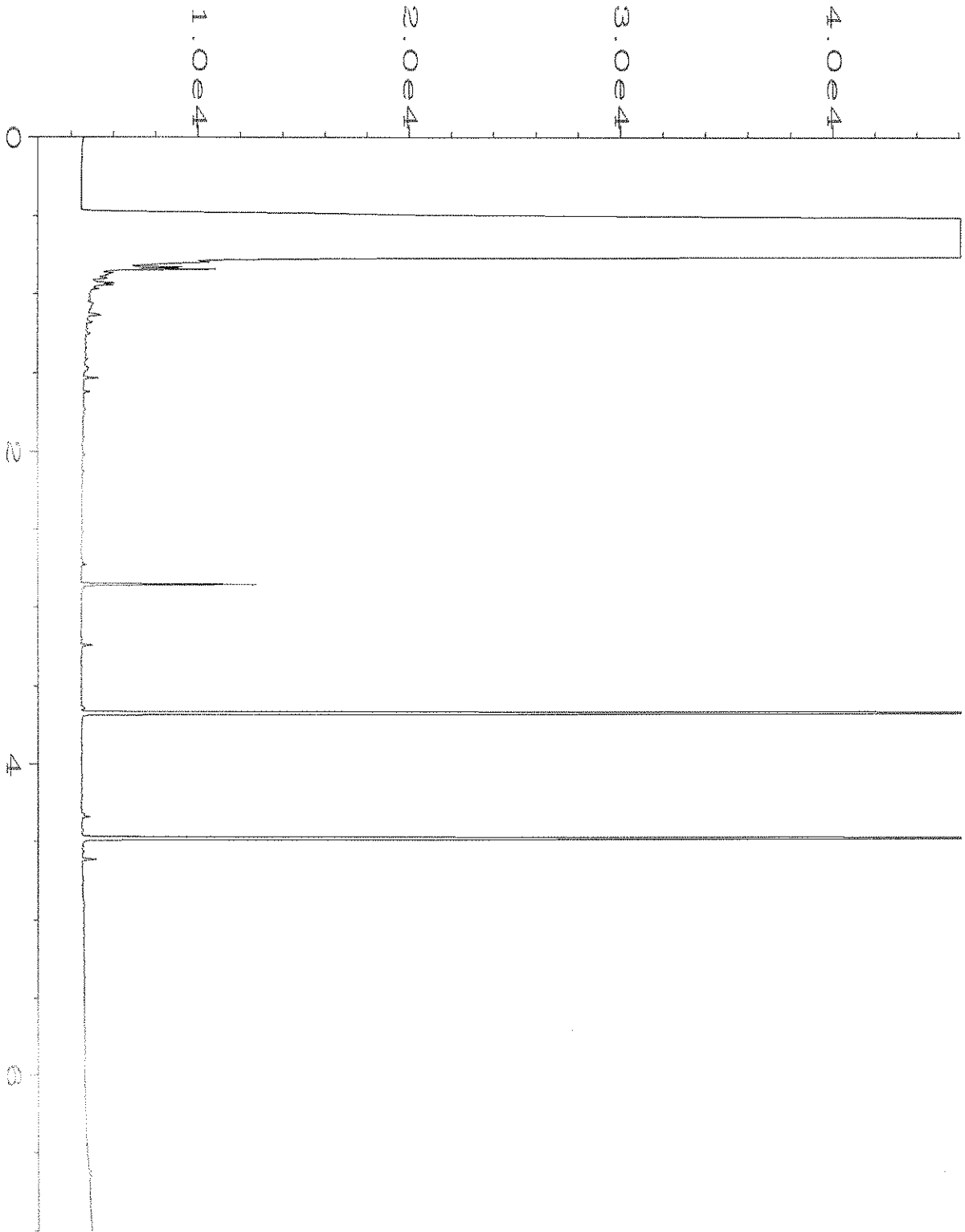
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Operator : TL Page Number : 1
Instrument : GC6 Vial Number : 29
Sample Name : 912215-41 Injection Number : 1
Run Time Bar Code: Sequence Line : 7
Acquired on : 23 Dec 19 04:16 PM Instrument Method: DX.MTH
Report Created on: 24 Dec 19 07:42 AM Analysis Method : DEFAULT.MTH



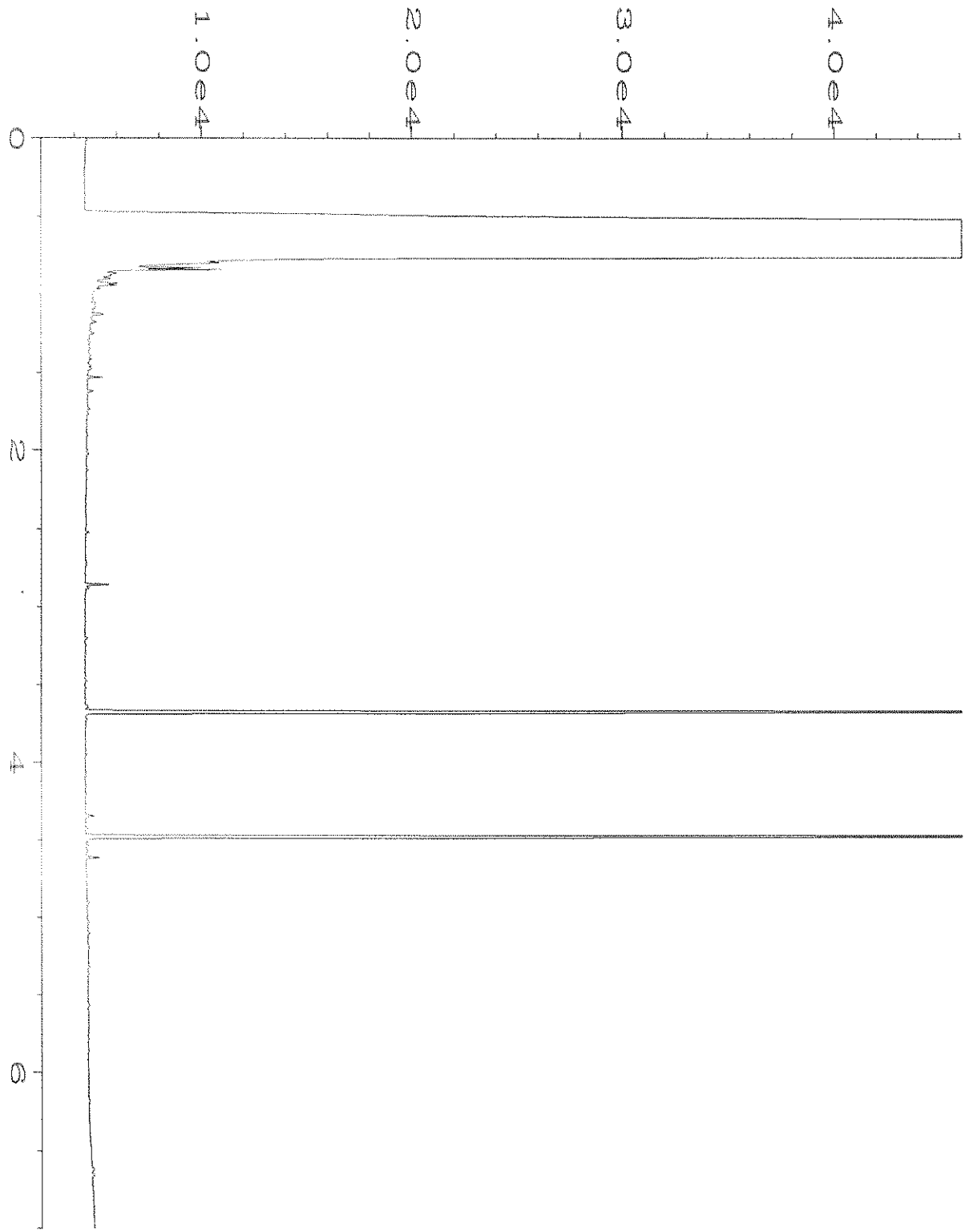
Data File Name	: C:\HPCHEM\6\DATA\12-23-19\030F0701.D	Page Number	: 1
Operator	: TL	Vial Number	: 30
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-43	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 04:27 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:42 AM		



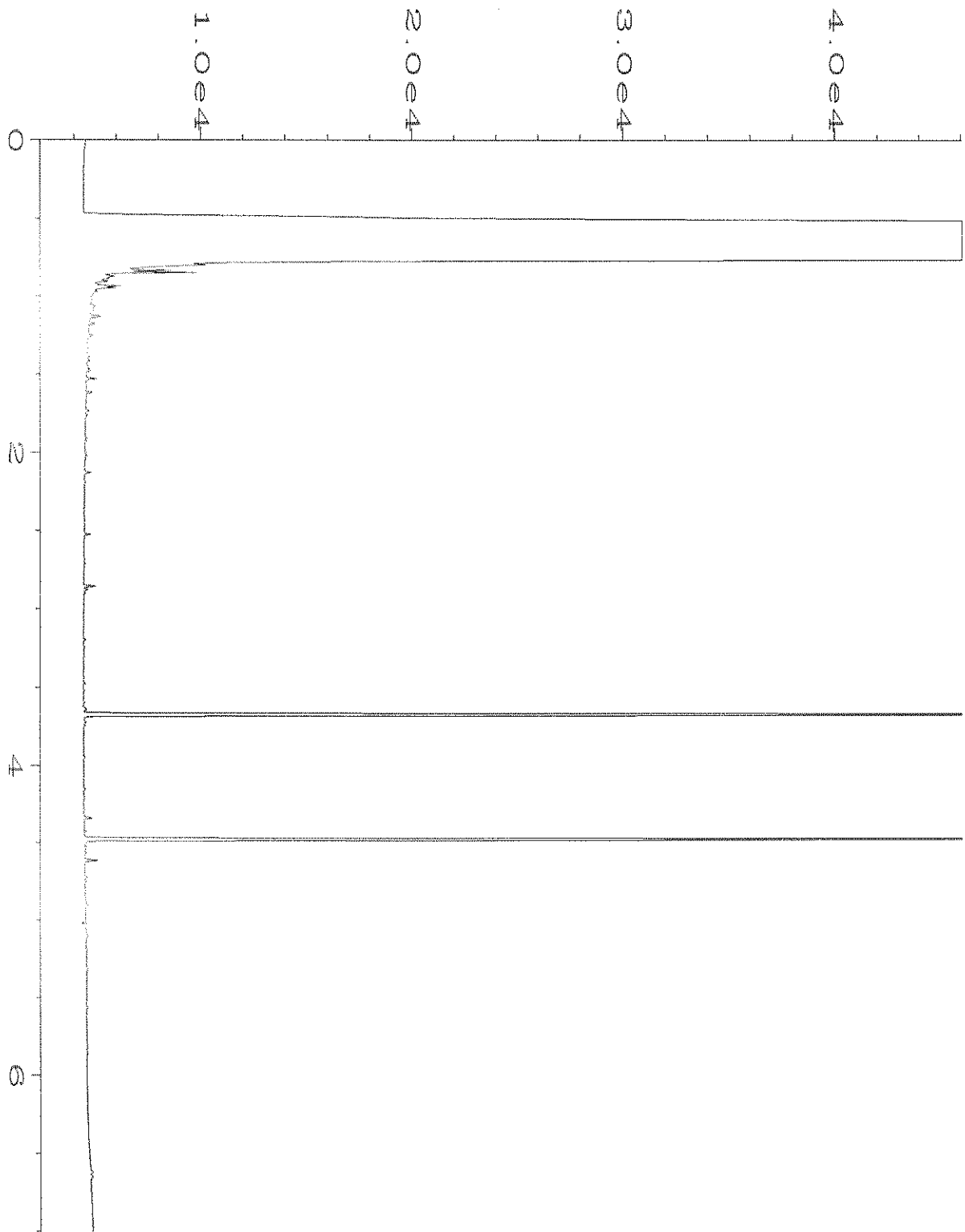
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Operator	: TL	Vial Number	: 31
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-45	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 04:38 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:43 AM		



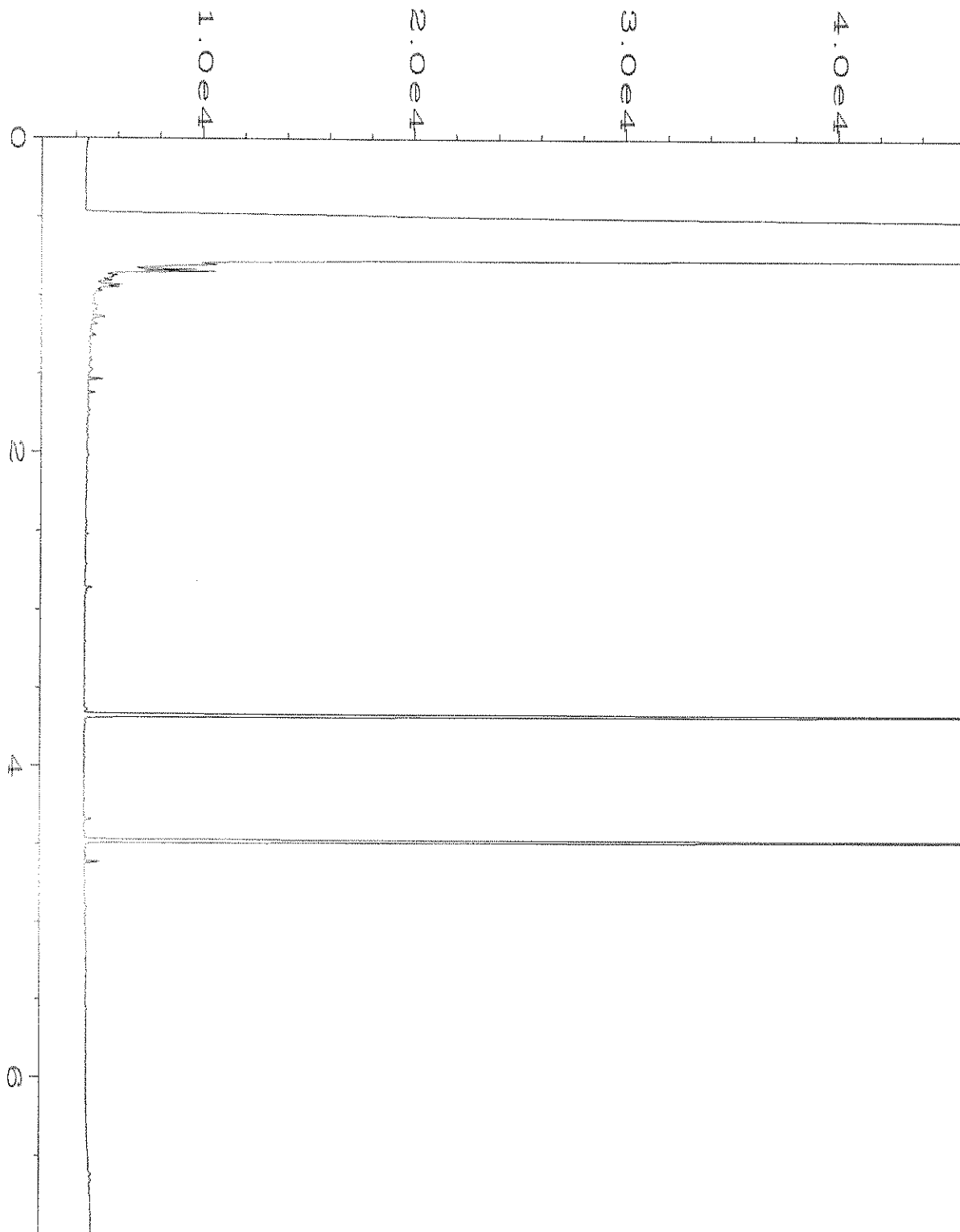
Data File Name	: C:\HPCHEM\6\DATA\12-23-19\032F0701.D	Page Number	: 1
Operator	: TL	Vial Number	: 32
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-46	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 04:49 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:43 AM		



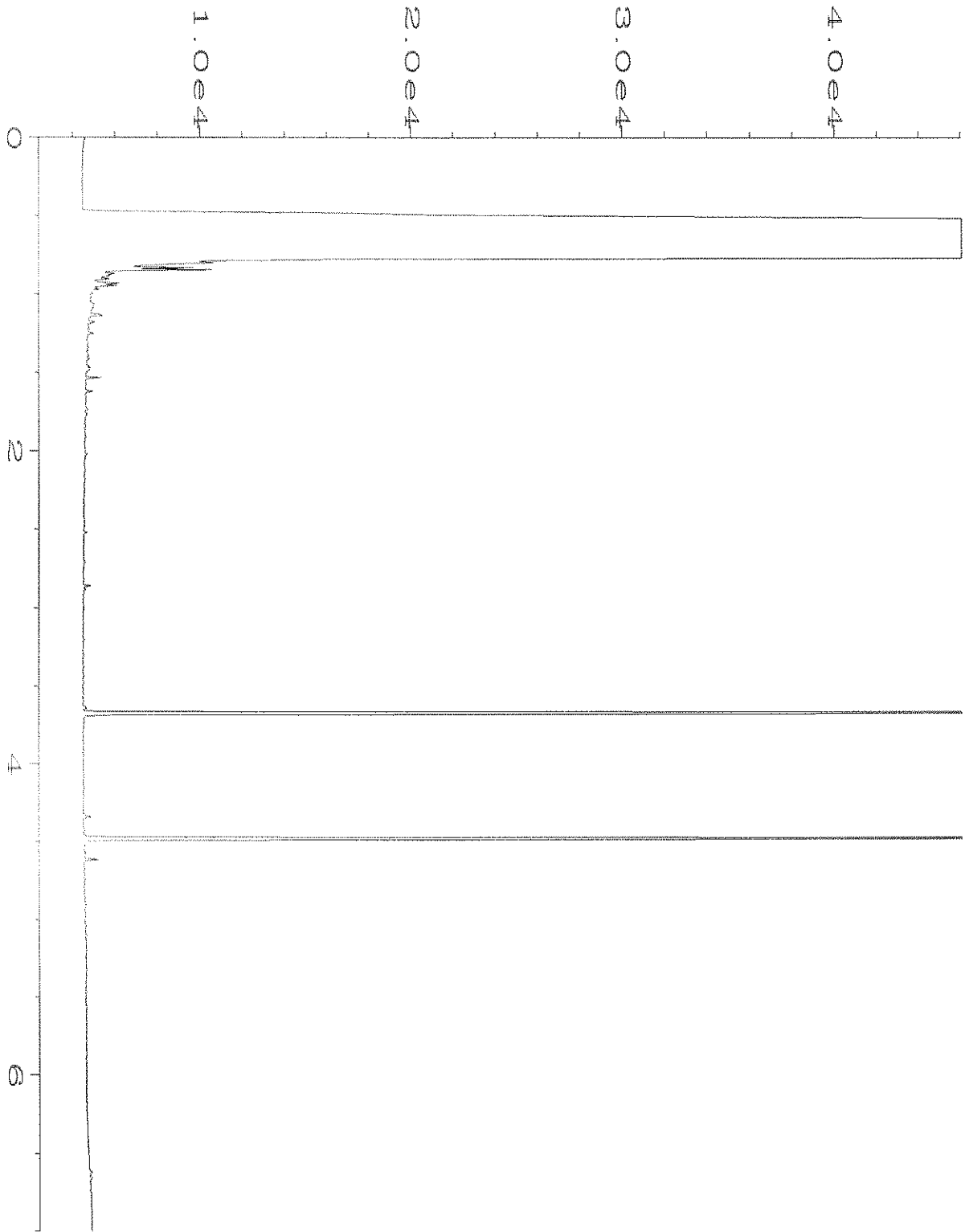
Data File Name	: C:\HPCHEM\6\DATA\12-23-19\033F0701.D	Page Number	: 1
Operator	: TL	Vial Number	: 33
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-49	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 05:00 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:43 AM		



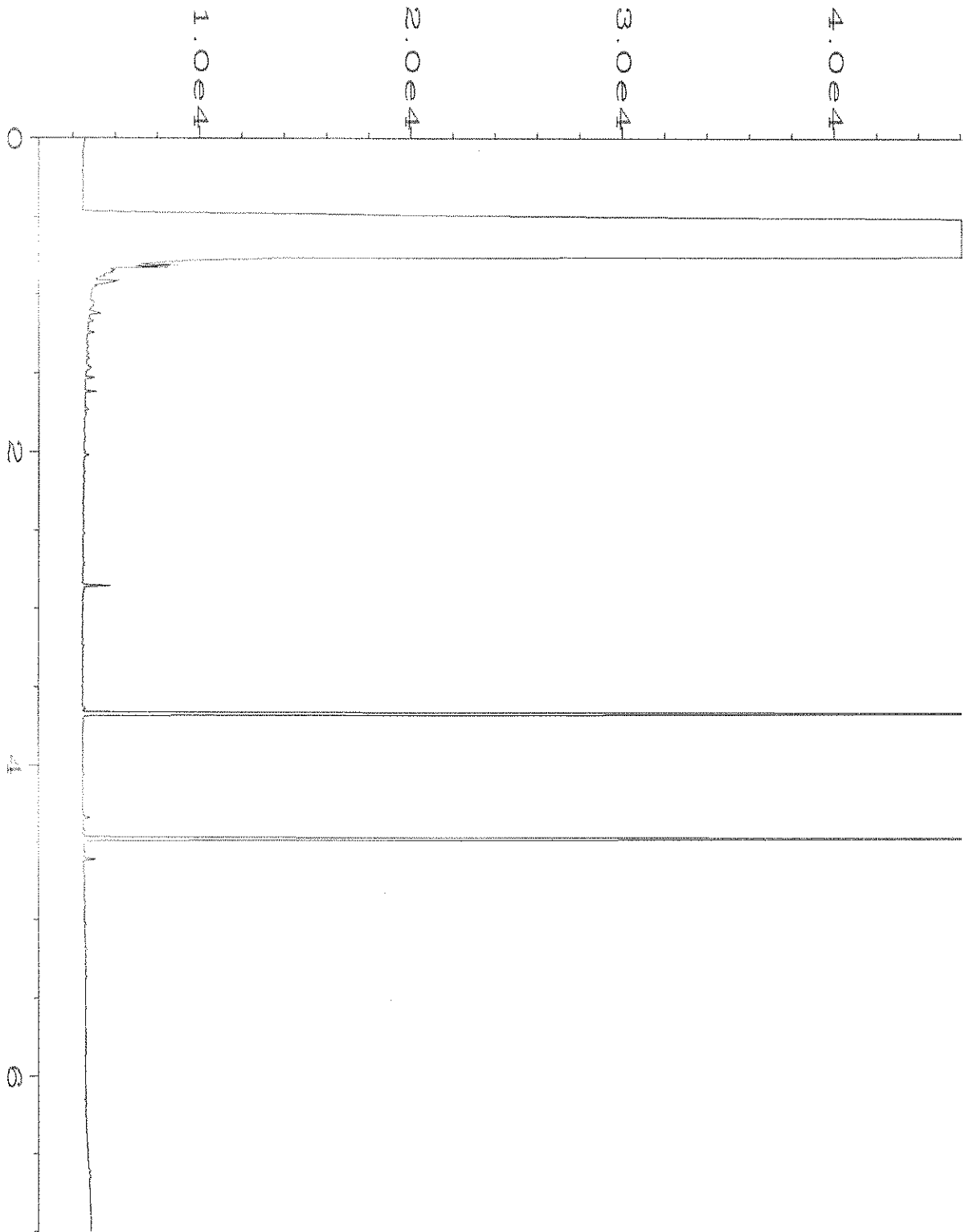
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Operator	: TL	Vial Number	: 34
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-50	Sequence Line	: 7
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Report Created on:	24 Dec 19 07:43 AM		



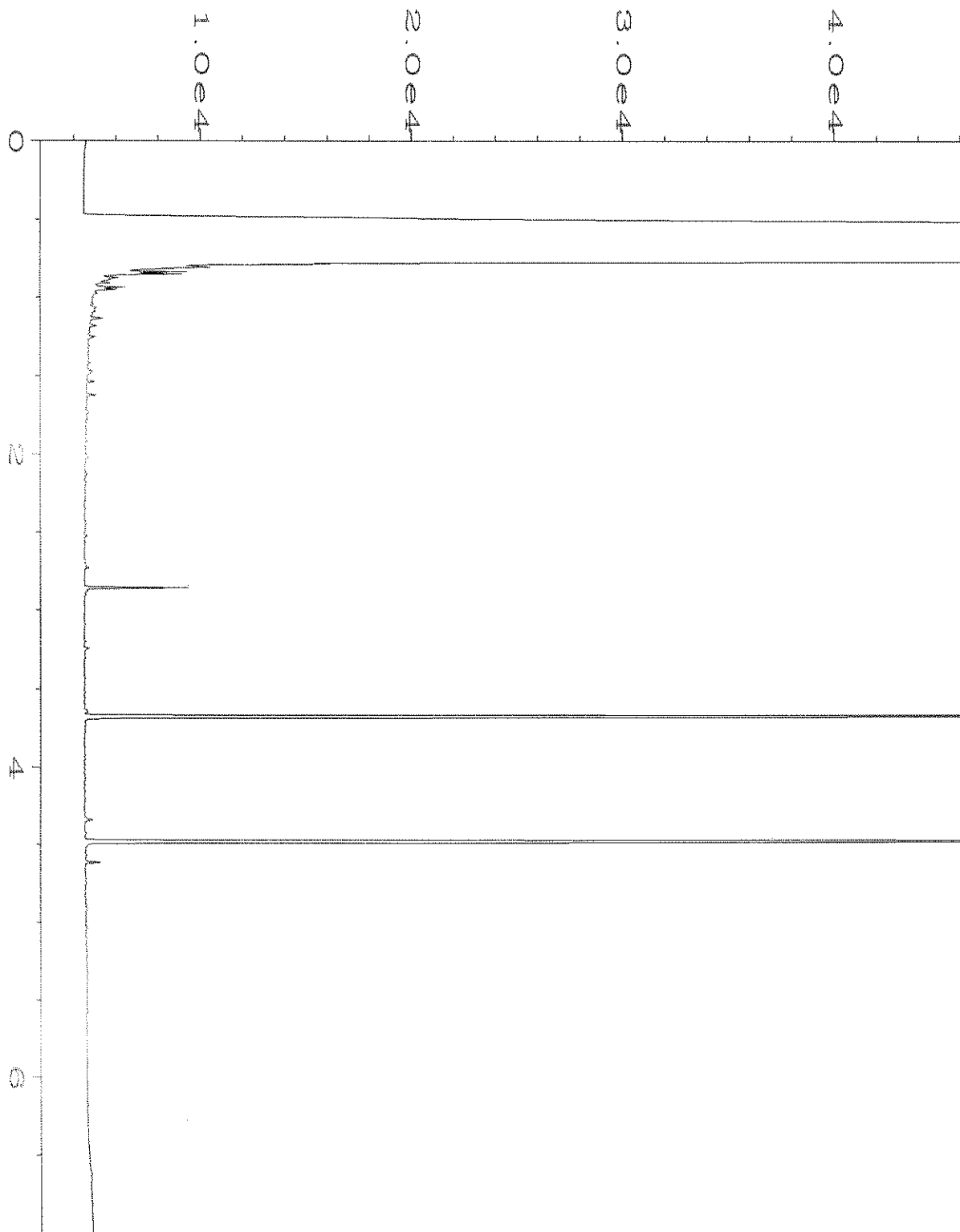
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Operator	: TL	Vial Number	: 35
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-52	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 05:22 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:44 AM		



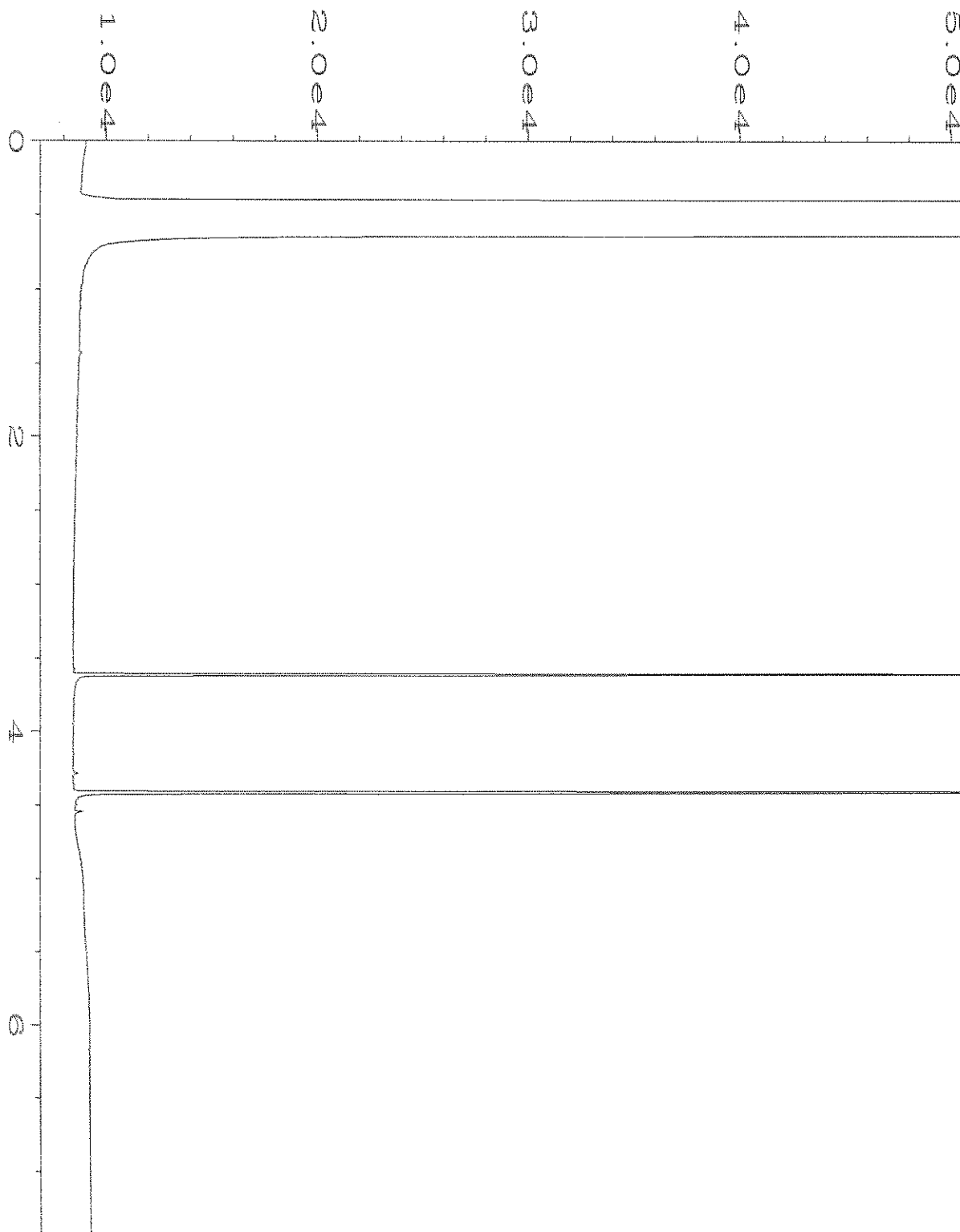
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Operator	: TL	Vial Number	: 35
Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-52	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 05:22 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:44 AM		



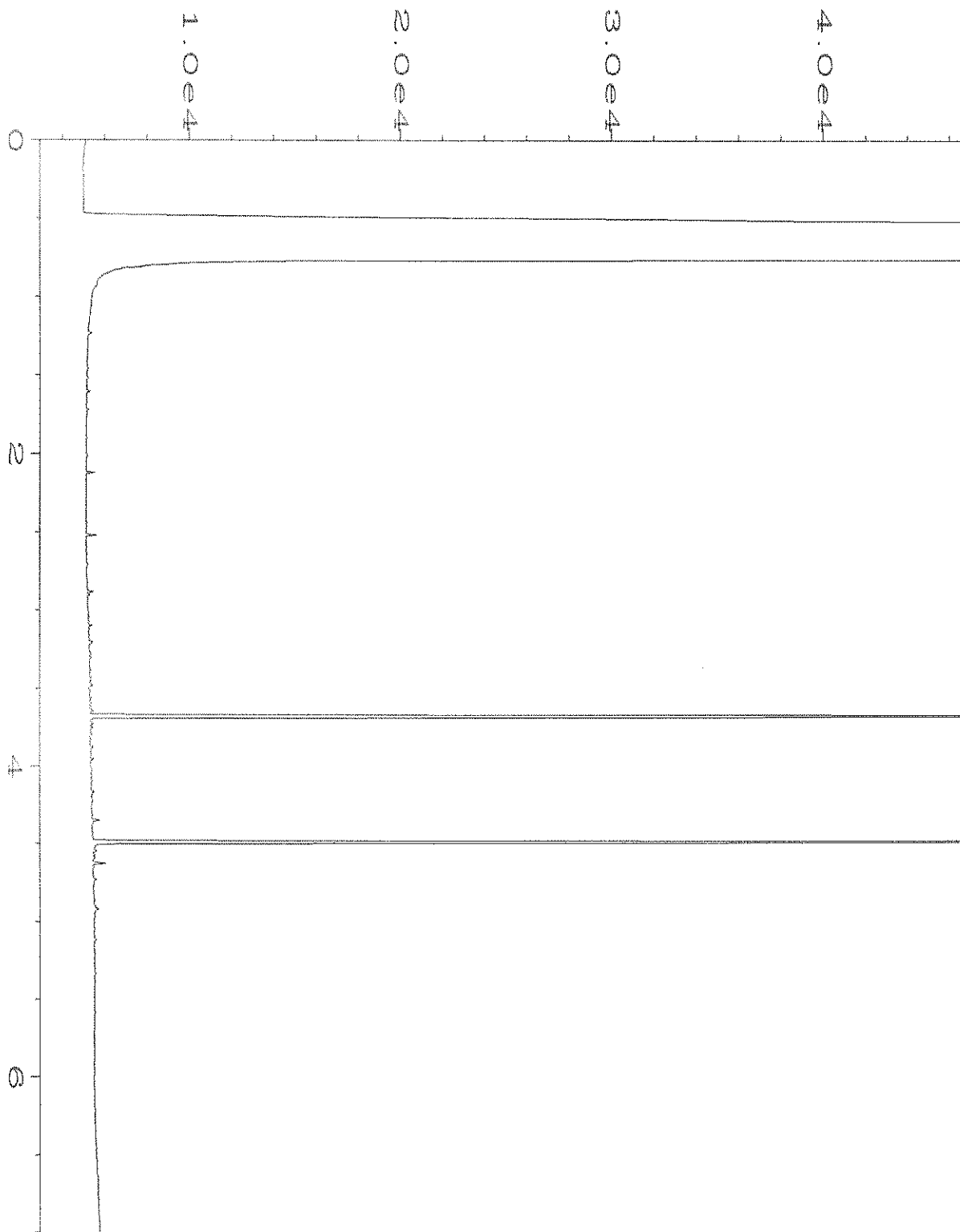
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Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-55	Sequence Line	: 7
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Acquired on	: 23 Dec 19 05:32 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:44 AM		



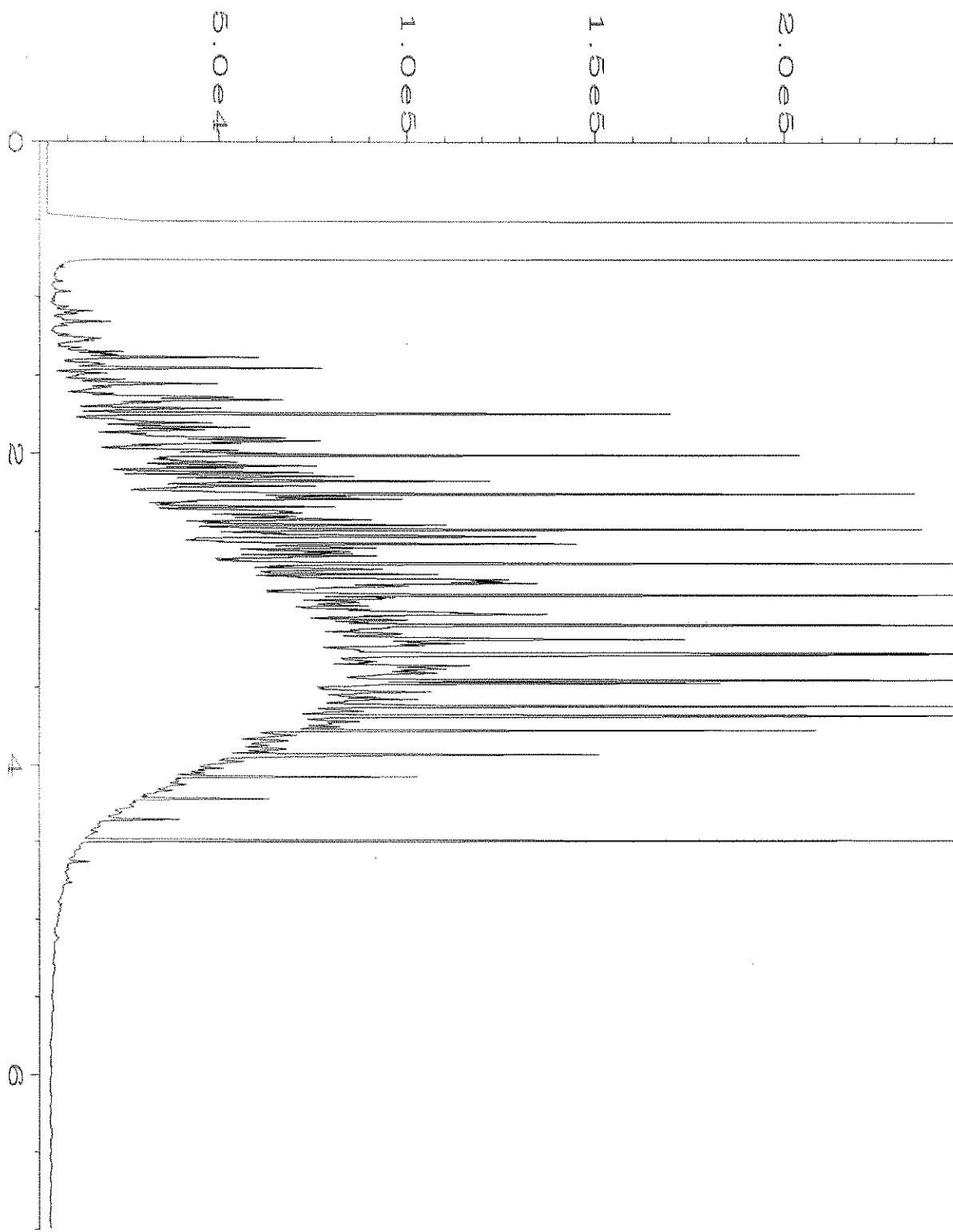
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Instrument	: GC6	Injection Number	: 1
Sample Name	: 912215-56	Sequence Line	: 7
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 05:43 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:44 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-23-19\006F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 6
Instrument	: GC1	Injection Number	: 1
Sample Name	: 09-3096 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 08:09 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:37 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\006F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 6
Instrument	: GC6	Injection Number	: 1
Sample Name	: 09-3097 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 08:14 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:52 AM		



Data File Name	: C:\HPCHEM\6\DATA\12-23-19\005F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 5
Instrument	: GC6	Injection Number	: 1
Sample Name	: 1000 Dx 58-146C	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 23 Dec 19 02:59 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	24 Dec 19 07:52 AM		

912215

SAMPLE CHAIN OF CUSTODY ME 12/12/19

Page # 1 of 10

Report To Angie Goodwin

Company HAPT Croswater

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLERS (signature)	PROJECT NAME	PO #
	<u>65 mbs</u>	
REMARKS	INVOICE TO	
Project specific RLS? Yes / No		

TURNAROUND TIME	SAMPLE DISPOSAL
<input checked="" type="checkbox"/> Standard turnaround <input type="checkbox"/> RUSH	Archive samples Other _____
Rush charges authorized by: <u>VSS</u>	Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
B-6-5	01 A-6	12/12	1155	Sb11	5	X	X			X	X			*See Angir for analysis
B-6-10	02		1200		1									
B-6-15	03		1205		1									
B-6-20	04		1210		1									*Added on 12/19/19 by VSS
B-6-25	05		1220		1									
B-6-30	06		1225		1									
B-6-35	07		1240		1	X	X	X		X				
B-6-40	08		1245		1	X	X	X		X				
B-7-5	09		1445		1	X	X	X		X				Samples received at 4:00
B-7-10	10		1450		1	X	X	X		X				

Relinquished by: <u>[Signature]</u>	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	<u>Police Higgins</u>	<u>HC</u>	<u>12/12</u>	<u>20:30</u>
Received by: <u>[Signature]</u>	<u>Felic Powers</u>	<u>F&B</u>	<u>12/19</u>	<u>20:30</u>
Received by: _____				

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

Report To 912215 Knight Goodwin
 Company HAYET CROUSER
 Address _____
 City, State, ZIP _____
 Phone _____ Email _____

SAMPLERS (signature) _____
 PROJECT NAME KOSMOS PO # _____
 REMARKS _____ INVOICE TO _____
 Project specific RLS? - Yes / No

TURNAROUND TIME VSB
 Standard turnaround _____
 RUSH _____
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples _____
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
B-7-15	11 A-E	12/12	1500	SOIL	5									Ysee
B-7-20	12		1505		1									Bright
B-7-25	13		1515		1									
B-7-30	14		1520		1									
B-7-35	15		1530		1									
B-7-40	16		1535		1									
B-9-5	17	12/12	830		1	X								
B-9-10	18		835		1	X								
B-9-15	19		840		1									
B-9-20	20		845		1									

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
Relinquished by: <u>[Signature]</u>	<u>John</u>	<u>John Higgins</u>	<u>HC</u>	<u>12/12</u>	<u>2030</u>		
Received by: <u>[Signature]</u>	<u>[Signature]</u>	<u>Eric Sporns</u>	<u>HR</u>	<u>12/12</u>	<u>2050</u>		
Received by: _____	_____	_____	_____	_____	_____		

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

9/22/15

Report To Angie Goodwin

Company HPT ROSSER

Address _____

City, State, ZIP _____

Phone _____ Email _____

SAMPLE CHAIN OF CUSTODY ME 12/12/14

SAMPLERS (signature) _____

PROJECT NAME KOSMOS

PO # _____

REMARKS

INVOICE TO

Project specific RLS? - Yes / No

Page # 3 of 12

TURNAROUND TIME

Standard turnaround

RUSH

Rush charges authorized by: _____

SAMPLE DISPOSAL

Archive samples

Other _____

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
B-9-25	21A-E	12/12	910	Soil	5	X								
B-9-30	22		915											
B-9-35	23		935											
B-9-40	24	↓	945	↓	↓	X	X	X						
B-1-5	25	12/11	1415			X	X	X						
B-1-10	26		1420			X	X							
B-1-15	27		1435			X			X					
B-1-20	28		1440											
B-1-25	29		1445											
B-1-30	30	✓	1450	✓	✓									

SIGNATURE _____ PRINT NAME _____ COMPANY _____ DATE _____ TIME _____

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

Relinquished by: [Signature]

Received by: [Signature]

Relinquished by: [Signature]

Received by: _____

Jane Higgins

Eric Johnson

HC

FER

12/12

2030

Samples received at 4 °C

SAMPLE CHAIN OF CUSTODY NE 12/12/19

912215

Report To: Angie Goodwin

Company: HAET CONSULTING

Address: _____

City, State, ZIP: _____

Phone: _____ Email: _____

SAMPLERS (signature)

PROJECT NAME

KOSMOS

PO #

REMARKS

INVOICE TO

Project specific RI's? - Yes / No

Page # 4 of 10

(TURNAROUND) TIME

Standard turnaround
RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Archive samples

Other

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED						Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270		PCBs EPA 8082	
B-1-35	31 A.E	12/11	1456	Soil	5	X								
B-1-40	32	12/11	1500	Soil	5	X								
B-5-5	33	12/11	1020	Soil	5	X	X			X				
B-5-10				Soil	5	X	X	X						
B-5-15	34 A.E		1030	Soil	5	X	X	X						
B-5-20	35		1035											
B-5-25	34		1045											
B-5-30	37		1050											
B-5-35	38		1115											
B-5-40	39		1120											

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

Relinquished by: [Signature]

Jolie Higgins

HC

12/12/2019

Received by: [Signature]

Felic Lane

FB

12/12/2019

Relinquished by:

Received by:

Samples received at 4

°C

SAMPLE CHAIN OF CUSTODY

9/12/15

ME 12/12/19
Page # 5 of 10
V55

Report To

Angie Goodwin

Company

Andrew Couster

Address

City, State, ZIP

Phone

Email

SAMPLERS (signature)

PROJECT NAME

LOS MOS

PO #

REMARKS

INVOICE TO

Project specific RLS? - Yes / No

TURNAROUND TIME
Standard turnaround
RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
Archive samples
Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED						Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270		PCBs EPA 8082	
B-4-5	40#E	12/11	815	Soil	5	X								
B-4-10														
B-4-15	41#E		830			X	X			X				
B-4-20	42		835			X	X			X				
B-4-25	43		850			X								
B-4-30	44		855			X								
B-4-35	45		905			X	X			X				
B-4-35			910			X								
B-4-40	46#E		910			X	X			X				
B-4-45	47		1206			X	X			X				

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Friedman & Bryna, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

Relinquished by:

Received by:

Relinquished by:

Received by:

JOHN HIGGINS

Andrew Couster

HC

FeB

12/12

12/12/19 20:30

Samples received at

4 °C

Report To Angie Grodwin
 Company HAFT CONSULT
 Address _____
 City, State, ZIP _____
 Phone _____ Email _____

SAMPLETERS (signature) _____
 PROJECT NAME: KIDSWOS PO # _____
 REMARKS: _____ INVOICE TO: _____
 Project specific PLS? - Yes / No

TURNAROUND TIME
 Standard turnaround _____
 RUSH _____
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
B-4-50	4/8 A.E	12/11	1205	SB11 S										
B-2-5	49		1376			X	X			X				
B-2-10	50		1335			X	X	X						
B-2-15	51		1345			X	X							
B-2-20	52		1350			X				X				
B-28-25	53		1355											
B-28-30	54		1355	1600										
B-28-35	55		1605			X	X	X						
B-28-40	56		1620			X								
B-28-45														

RECEIVED BY: [Signature] DATE: 12/12/19 TIME: 2030
 RECEIVED BY: [Signature] DATE: 12/19 TIME: 2030
 RECEIVED BY: _____ DATE: _____ TIME: _____
 Received by: _____ Samples received at 4 °C

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 24, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 13, 2019 from the Kosmos, F&BI 912244 project. There are 16 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1224R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 13, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912244 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912244 -01	Creekbed 1

Sample Creekbed 1 could not be analyzed for gasoline without a dilution due to a foamy matrix.

1,1-Dichloroethane and 1,2-dichloroethane in the 8260C laboratory control sample exceeded the acceptance criteria. The analytes were not detected in the sample, therefore the data were acceptable.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19
Date Received: 12/13/19
Project: Kosmos, F&BI 912244
Date Extracted: 12/17/19
Date Analyzed: 12/17/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
Creekbed 1 912244-01 1/5	<25	85
Method Blank 09-2926 MB	<5	82

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19
Date Received: 12/13/19
Project: Kosmos, F&BI 912244
Date Extracted: 12/16/19
Date Analyzed: 12/16/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
Creekbed 1 912244-01	6,100 x	7,600	82
Method Blank 09-3041 MB	<50	<250	77

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Creekbed 1	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912244
Date Extracted:	12/17/19	Lab ID:	912244-01 1/500
Date Analyzed:	12/17/19	Data File:	121713.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	361 d	31	163
Benzo(a)anthracene-d12	136 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<1
Acenaphthylene	<1
Acenaphthene	3.4
Fluorene	5.7
Phenanthrene	19
Anthracene	5.2
Fluoranthene	2.2
Pyrene	19
Benz(a)anthracene	5.9
Chrysene	9.5
Benzo(a)pyrene	3.0
Benzo(b)fluoranthene	1.1
Benzo(k)fluoranthene	<1
Indeno(1,2,3-cd)pyrene	<1
Dibenz(a,h)anthracene	<1
Benzo(g,h,i)perylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912244
Date Extracted:	12/17/19	Lab ID:	09-3047 mb 1/5
Date Analyzed:	12/17/19	Data File:	121708.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	163
Benzo(a)anthracene-d12	104	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Creekbed 1	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912244
Date Extracted:	12/17/19	Lab ID:	912244-01
Date Analyzed:	12/17/19	Data File:	121724A.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	0.069
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912244
Date Extracted:	12/17/19	Lab ID:	09-3017 mb
Date Analyzed:	12/17/19	Data File:	121713.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	104	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Creekbed 1	Client:	Hart Crowser
Date Received:	12/13/19	Project:	Kosmos, F&BI 912244
Date Extracted:	12/16/19	Lab ID:	912244-01 1/6
Date Analyzed:	12/18/19	Data File:	121791.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	56	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912244
Date Extracted:	12/16/19	Lab ID:	09-3042 mb 1/6
Date Analyzed:	12/17/19	Data File:	121749.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	98	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912244

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 912188-21 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	85	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912244

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912245-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	86	86	63-146	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	88	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912244

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912263-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	80	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	81	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	80	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	83	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	82	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	83	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	91	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	84	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	88	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	82	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	84	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	70	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	75	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	77	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	74	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	71	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	84	83	58-121	1
Acenaphthylene	mg/kg (ppm)	0.17	89	89	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	88	85	54-123	3
Fluorene	mg/kg (ppm)	0.17	91	90	56-127	1
Phenanthrene	mg/kg (ppm)	0.17	88	88	55-122	0
Anthracene	mg/kg (ppm)	0.17	87	89	50-120	2
Fluoranthene	mg/kg (ppm)	0.17	92	92	54-129	0
Pyrene	mg/kg (ppm)	0.17	98	104	53-127	6
Benz(a)anthracene	mg/kg (ppm)	0.17	92	94	51-115	2
Chrysene	mg/kg (ppm)	0.17	89	91	55-129	2
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	84	88	56-123	5
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	78	74	54-131	5
Benzo(a)pyrene	mg/kg (ppm)	0.17	77	78	51-118	1
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	85	92	49-148	8
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	83	93	50-141	11
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	82	90	52-131	9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912244

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912244-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	15	13	10-56	14
Chloromethane	mg/kg (ppm)	2.5	<0.5	49	45	10-90	9
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	43	39	10-91	10
Bromomethane	mg/kg (ppm)	2.5	<0.5	65	49	10-110	28 vo
Chloroethane	mg/kg (ppm)	2.5	<0.5	54	49	10-101	10
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	41	38	10-95	8
Acetone	mg/kg (ppm)	12.5	<0.5	125	96	11-141	26 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	56	51	22-107	9
Hexane	mg/kg (ppm)	2.5	<0.25	38	33	10-95	14
Methylene chloride	mg/kg (ppm)	2.5	<0.5	78	70	14-128	11
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	90	82	17-134	9
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	70	65	13-112	7
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	82	77	23-115	6
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	71	63	18-117	12
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	77	73	25-120	5
Chloroform	mg/kg (ppm)	2.5	<0.05	83	78	29-117	6
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	109	100	20-133	9
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	91	85	22-124	7
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	73	67	27-112	9
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	71	66	26-107	7
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	67	61	28-126	9
Benzene	mg/kg (ppm)	2.5	<0.03	74	70	26-114	6
Trichloroethene	mg/kg (ppm)	2.5	<0.02	70	66	30-112	6
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	84	78	31-119	7
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	84	78	31-131	7
Dibromomethane	mg/kg (ppm)	2.5	<0.05	77	72	27-124	7
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	103	93	16-147	10
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	81	74	28-137	9
Toluene	mg/kg (ppm)	2.5	<0.05	72	69	34-112	4
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	79	75	30-136	5
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	87	81	32-126	7
2-Hexanone	mg/kg (ppm)	12.5	<0.5	109	100	17-147	9
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	84	77	29-125	9
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	59	56	25-114	5
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	75	70	32-143	7
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	78	75	32-126	4
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	73	69	37-113	6
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	73	69	34-115	6
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	79	73	35-126	8
m,p-Xylene	mg/kg (ppm)	5	<0.1	70	65	25-125	7
o-Xylene	mg/kg (ppm)	2.5	<0.05	72	68	27-126	6
Styrene	mg/kg (ppm)	2.5	<0.05	76	72	39-121	5
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	72	67	34-123	7
Bromoform	mg/kg (ppm)	2.5	<0.05	78	70	18-155	11
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	70	66	31-120	6
Bromobenzene	mg/kg (ppm)	2.5	<0.05	70	67	40-115	4
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	67	63	24-130	6
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	99	93	27-148	6
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	94	89	33-123	5
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	73	69	39-110	6
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	70	67	39-111	4
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	70	66	36-116	6
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	67	64	35-116	5
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	69	65	33-118	6
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	66	62	32-119	6
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	67	64	38-111	5
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	67	63	39-109	6
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	73	68	40-111	7
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	98	90	44-112	9
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	68	59	31-121	14
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	65	56	24-128	15
Naphthalene	mg/kg (ppm)	2.5	0.051	88	77	24-139	13
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	76	65	35-117	16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912244

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	55	10-76
Chloromethane	mg/kg (ppm)	2.5	83	34-98
Vinyl chloride	mg/kg (ppm)	2.5	81	42-107
Bromomethane	mg/kg (ppm)	2.5	85	46-113
Chloroethane	mg/kg (ppm)	2.5	87	47-115
Trichlorofluoromethane	mg/kg (ppm)	2.5	81	53-112
Acetone	mg/kg (ppm)	12.5	128	39-147
1,1-Dichloroethene	mg/kg (ppm)	2.5	89	65-110
Hexane	mg/kg (ppm)	2.5	102	55-107
Methylene chloride	mg/kg (ppm)	2.5	106	50-127
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	102	72-122
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	98	71-113
1,1-Dichloroethane	mg/kg (ppm)	2.5	110 vo	74-109
2,2-Dichloropropane	mg/kg (ppm)	2.5	90	63-145
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	101	73-110
Chloroform	mg/kg (ppm)	2.5	107	76-110
2-Butanone (MEK)	mg/kg (ppm)	12.5	119	60-121
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	115 vo	73-111
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	98	72-116
1,1-Dichloropropene	mg/kg (ppm)	2.5	107	72-112
Carbon tetrachloride	mg/kg (ppm)	2.5	93	67-123
Benzene	mg/kg (ppm)	2.5	101	72-106
Trichloroethene	mg/kg (ppm)	2.5	99	72-107
1,2-Dichloropropane	mg/kg (ppm)	2.5	107	74-115
Bromodichloromethane	mg/kg (ppm)	2.5	104	75-126
Dibromomethane	mg/kg (ppm)	2.5	95	76-116
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	109	80-128
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	102	71-138
Toluene	mg/kg (ppm)	2.5	103	74-111
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	103	73-124
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	107	76-118
2-Hexanone	mg/kg (ppm)	12.5	119	67-123
1,3-Dichloropropene	mg/kg (ppm)	2.5	106	75-118
Tetrachloroethene	mg/kg (ppm)	2.5	96	73-111
Dibromochloromethane	mg/kg (ppm)	2.5	94	64-152
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	104	77-117
Chlorobenzene	mg/kg (ppm)	2.5	101	76-109
Ethylbenzene	mg/kg (ppm)	2.5	105	75-112
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	102	75-129
m,p-Xylene	mg/kg (ppm)	5	102	77-115
o-Xylene	mg/kg (ppm)	2.5	104	76-115
Styrene	mg/kg (ppm)	2.5	104	76-119
Isopropylbenzene	mg/kg (ppm)	2.5	105	76-120
Bromoform	mg/kg (ppm)	2.5	93	50-174
n-Propylbenzene	mg/kg (ppm)	2.5	109	77-115
Bromobenzene	mg/kg (ppm)	2.5	100	76-112
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	106	77-121
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	118	74-121
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	115	73-117
2-Chlorotoluene	mg/kg (ppm)	2.5	108	75-113
4-Chlorotoluene	mg/kg (ppm)	2.5	106	77-115
tert-Butylbenzene	mg/kg (ppm)	2.5	106	77-123
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	106	77-119
sec-Butylbenzene	mg/kg (ppm)	2.5	108	78-120
p-Isopropyltoluene	mg/kg (ppm)	2.5	106	77-120
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	102	76-112
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	101	74-109
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	103	75-114
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	120	68-122
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	107	75-122
Hexachlorobutadiene	mg/kg (ppm)	2.5	102	74-130
Naphthalene	mg/kg (ppm)	2.5	113	73-122
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	110	75-117

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/13/19

Project: Kosmos, F&BI 912244

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912248-01 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Control Limits	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	81	78	30-123	4
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	83	80	26-131	4

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Aroclor 1016	mg/kg (ppm)	0.25	88	55-137
Aroclor 1260	mg/kg (ppm)	0.25	87	51-150

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY

ME 12-13-19 Page # _____ of 101 VSD

Report To Angie Goodman 912244
 Company HC
 Address _____
 City, State, ZIP _____
 Phone _____ Email angie.goodman@westcoast.com

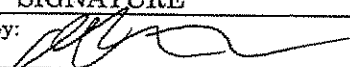
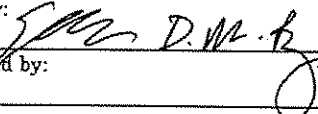
SAMPLERS (signature) _____	
PROJECT NAME <u>Kosmos</u>	PO # _____
REMARKS Project specific RLs? - Yes / No	INVOICE TO _____

TURNAROUND TIME <input type="checkbox"/> Standard turnaround <input checked="" type="checkbox"/> RUSH Rush charges authorized by: _____
SAMPLE DISPOSAL <input type="checkbox"/> Archive samples <input type="checkbox"/> Other _____ Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
<u>Creek bed 1</u>	<u>DIA-E</u>	<u>12/13</u>	<u>1230</u>	<u>Soil</u>	<u>5</u>	<u>X</u>	<u>X</u>			<u>X</u>	<u>X</u>	<u>X</u>		

Samples received at 4 °C

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: 	Andrew Takahara	HC	12/13	1605
Received by: 	Liz Webber - Bruya	FBI	12/13	1605
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 24, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 16, 2019 from the Kosmos, F&BI 912263 project. There are 22 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1224R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 16, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912263 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912263 -01	LB-1
912263 -02	LB-2
912263 -03	LB-3

1,1-Dichloroethane and 1,2-dichloroethane in the 8260C laboratory control sample exceeded the acceptance criteria. In addition, the matrix spike and matrix spike duplicate failed the relative percent difference for bromomethane and acetone. The analytes were not detected in the samples therefore the data were acceptable.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912263
Date Extracted: 12/18/19
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-G_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
LB-1 912263-01	<5	82
LB-2 912263-02	73	88
LB-3 912263-03	<5	83
Method Blank 09-2931 MB	<5	77

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912263
Date Extracted: 12/17/19
Date Analyzed: 12/17/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-Dx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 53-144)
LB-1 912263-01	<50	<250	96
LB-2 912263-02	3,800	3,700	104
LB-3 912263-03	<50	<250	97
Method Blank 09-3049 MB	<50	<250	87

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	LB-1	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-01 1/5
Date Analyzed:	12/17/19	Data File:	121724.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	89	31	163
Benzo(a)anthracene-d12	96	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	LB-2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-02 1/25
Date Analyzed:	12/19/19	Data File:	121823.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	112 d	31	163
Benzo(a)anthracene-d12	123 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	0.48
Fluorene	0.79
Phenanthrene	2.8
Anthracene	0.78
Fluoranthene	0.23
Pyrene	1.9
Benz(a)anthracene	0.51
Chrysene	0.83
Benzo(a)pyrene	0.21
Benzo(b)fluoranthene	0.11
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	LB-3	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-03 1/25
Date Analyzed:	12/18/19	Data File:	121822.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	154 d	31	163
Benzo(a)anthracene-d12	117 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	09-3047 mb 1/5
Date Analyzed:	12/17/19	Data File:	121708.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	95	31	163
Benzo(a)anthracene-d12	104	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: LB-1	Client: Hart Crowser
Date Received: 12/16/19	Project: Kosmos, F&BI 912263
Date Extracted: 12/17/19	Lab ID: 912263-01
Date Analyzed: 12/17/19	Data File: 121719.D
Matrix: Soil	Instrument: GCMS9
Units: mg/kg (ppm) Dry Weight	Operator: MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	105	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	LB-2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-02
Date Analyzed:	12/17/19	Data File:	121720.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	108	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: LB-3	Client: Hart Crowser
Date Received: 12/16/19	Project: Kosmos, F&BI 912263
Date Extracted: 12/17/19	Lab ID: 912263-03
Date Analyzed: 12/17/19	Data File: 121721.D
Matrix: Soil	Instrument: GCMS9
Units: mg/kg (ppm) Dry Weight	Operator: MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	102	50	150
4-Bromofluorobenzene	106	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	09-3017 mb
Date Analyzed:	12/17/19	Data File:	121713.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	104	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	LB-1	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-01 1/6
Date Analyzed:	12/18/19	Data File:	121754.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	66	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	LB-2	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-02 1/6
Date Analyzed:	12/18/19	Data File:	121755.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	59	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	LB-3	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	912263-03 1/6
Date Analyzed:	12/18/19	Data File:	121756.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	78	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912263
Date Extracted:	12/17/19	Lab ID:	09-3042 mb2 1/6
Date Analyzed:	12/18/19	Data File:	121751.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	88	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx**

Laboratory Code: 912263-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	80	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912263

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912260-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	106	106	64-133	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	108	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912263-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	80	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	81	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	80	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	83	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	82	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	83	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	91	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	84	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	88	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	82	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	84	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	70	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	75	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	77	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	74	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	71	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	84	83	58-121	1
Acenaphthylene	mg/kg (ppm)	0.17	89	89	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	88	85	54-123	3
Fluorene	mg/kg (ppm)	0.17	91	90	56-127	1
Phenanthrene	mg/kg (ppm)	0.17	88	88	55-122	0
Anthracene	mg/kg (ppm)	0.17	87	89	50-120	2
Fluoranthene	mg/kg (ppm)	0.17	92	92	54-129	0
Pyrene	mg/kg (ppm)	0.17	98	104	53-127	6
Benz(a)anthracene	mg/kg (ppm)	0.17	92	94	51-115	2
Chrysene	mg/kg (ppm)	0.17	89	91	55-129	2
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	84	88	56-123	5
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	78	74	54-131	5
Benzo(a)pyrene	mg/kg (ppm)	0.17	77	78	51-118	1
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	85	92	49-148	8
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	83	93	50-141	11
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	82	90	52-131	9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912244-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	15	13	10-56	14
Chloromethane	mg/kg (ppm)	2.5	<0.5	49	45	10-90	9
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	43	39	10-91	10
Bromomethane	mg/kg (ppm)	2.5	<0.5	65	49	10-110	28 vo
Chloroethane	mg/kg (ppm)	2.5	<0.5	54	49	10-101	10
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	41	38	10-95	8
Acetone	mg/kg (ppm)	12.5	<0.5	125	96	11-141	26 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	56	51	22-107	9
Hexane	mg/kg (ppm)	2.5	<0.25	38	33	10-95	14
Methylene chloride	mg/kg (ppm)	2.5	<0.5	78	70	14-128	11
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	90	82	17-134	9
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	70	65	13-112	7
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	82	77	23-115	6
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	71	63	18-117	12
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	77	73	25-120	5
Chloroform	mg/kg (ppm)	2.5	<0.05	83	78	29-117	6
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	109	100	20-133	9
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	91	85	22-124	7
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	73	67	27-112	9
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	71	66	26-107	7
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	67	61	28-126	9
Benzene	mg/kg (ppm)	2.5	<0.03	74	70	26-114	6
Trichloroethene	mg/kg (ppm)	2.5	<0.02	70	66	30-112	6
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	84	78	31-119	7
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	84	78	31-131	7
Dibromomethane	mg/kg (ppm)	2.5	<0.05	77	72	27-124	7
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	103	93	16-147	10
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	81	74	28-137	9
Toluene	mg/kg (ppm)	2.5	<0.05	72	69	34-112	4
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	79	75	30-136	5
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	87	81	32-126	7
2-Hexanone	mg/kg (ppm)	12.5	<0.5	109	100	17-147	9
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	84	77	29-125	9
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	59	56	25-114	5
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	75	70	32-143	7
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	78	75	32-126	4
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	73	69	37-113	6
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	73	69	34-115	6
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	79	73	35-126	8
m,p-Xylene	mg/kg (ppm)	5	<0.1	70	65	25-125	7
o-Xylene	mg/kg (ppm)	2.5	<0.05	72	68	27-126	6
Styrene	mg/kg (ppm)	2.5	<0.05	76	72	39-121	5
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	72	67	34-123	7
Bromoform	mg/kg (ppm)	2.5	<0.05	78	70	18-155	11
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	70	66	31-120	6
Bromobenzene	mg/kg (ppm)	2.5	<0.05	70	67	40-115	4
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	67	63	24-130	6
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	99	93	27-148	6
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	94	89	33-123	5
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	73	69	39-110	6
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	70	67	39-111	4
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	70	66	36-116	6
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	67	64	35-116	5
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	69	65	33-118	6
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	66	62	32-119	6
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	67	64	38-111	5
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	67	63	39-109	6
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	73	68	40-111	7
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	98	90	44-112	9
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	68	59	31-121	14
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	65	56	24-128	15
Naphthalene	mg/kg (ppm)	2.5	0.051	88	77	24-139	13
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	76	65	35-117	16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912263

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	55	10-76
Chloromethane	mg/kg (ppm)	2.5	83	34-98
Vinyl chloride	mg/kg (ppm)	2.5	81	42-107
Bromomethane	mg/kg (ppm)	2.5	85	46-113
Chloroethane	mg/kg (ppm)	2.5	87	47-115
Trichlorofluoromethane	mg/kg (ppm)	2.5	81	53-112
Acetone	mg/kg (ppm)	12.5	128	39-147
1,1-Dichloroethene	mg/kg (ppm)	2.5	89	65-110
Hexane	mg/kg (ppm)	2.5	102	55-107
Methylene chloride	mg/kg (ppm)	2.5	106	50-127
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	102	72-122
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	98	71-113
1,1-Dichloroethane	mg/kg (ppm)	2.5	110 vo	74-109
2,2-Dichloropropane	mg/kg (ppm)	2.5	90	63-145
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	101	73-110
Chloroform	mg/kg (ppm)	2.5	107	76-110
2-Butanone (MEK)	mg/kg (ppm)	12.5	119	60-121
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	115 vo	73-111
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	98	72-116
1,1-Dichloropropene	mg/kg (ppm)	2.5	107	72-112
Carbon tetrachloride	mg/kg (ppm)	2.5	93	67-123
Benzene	mg/kg (ppm)	2.5	101	72-106
Trichloroethene	mg/kg (ppm)	2.5	99	72-107
1,2-Dichloropropane	mg/kg (ppm)	2.5	107	74-115
Bromodichloromethane	mg/kg (ppm)	2.5	104	75-126
Dibromomethane	mg/kg (ppm)	2.5	95	76-116
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	109	80-128
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	102	71-138
Toluene	mg/kg (ppm)	2.5	103	74-111
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	103	73-124
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	107	76-118
2-Hexanone	mg/kg (ppm)	12.5	119	67-123
1,3-Dichloropropene	mg/kg (ppm)	2.5	106	75-118
Tetrachloroethene	mg/kg (ppm)	2.5	96	73-111
Dibromochloromethane	mg/kg (ppm)	2.5	94	64-152
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	104	77-117
Chlorobenzene	mg/kg (ppm)	2.5	101	76-109
Ethylbenzene	mg/kg (ppm)	2.5	105	75-112
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	102	75-129
m,p-Xylene	mg/kg (ppm)	5	102	77-115
o-Xylene	mg/kg (ppm)	2.5	104	76-115
Styrene	mg/kg (ppm)	2.5	104	76-119
Isopropylbenzene	mg/kg (ppm)	2.5	105	76-120
Bromoform	mg/kg (ppm)	2.5	93	50-174
n-Propylbenzene	mg/kg (ppm)	2.5	109	77-115
Bromobenzene	mg/kg (ppm)	2.5	100	76-112
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	106	77-121
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	118	74-121
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	115	73-117
2-Chlorotoluene	mg/kg (ppm)	2.5	108	75-113
4-Chlorotoluene	mg/kg (ppm)	2.5	106	77-115
tert-Butylbenzene	mg/kg (ppm)	2.5	106	77-123
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	106	77-119
sec-Butylbenzene	mg/kg (ppm)	2.5	108	78-120
p-Isopropyltoluene	mg/kg (ppm)	2.5	106	77-120
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	102	76-112
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	101	74-109
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	103	75-114
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	120	68-122
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	107	75-122
Hexachlorobutadiene	mg/kg (ppm)	2.5	102	74-130
Naphthalene	mg/kg (ppm)	2.5	113	73-122
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	110	75-117

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912263

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912248-01 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Control Limits	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	81	78	30-123	4
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	83	80	26-131	4

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Aroclor 1016	mg/kg (ppm)	0.25	88	55-137
Aroclor 1260	mg/kg (ppm)	0.25	87	51-150

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

911263 912263

TPB 12/16/14

SAMPLE CHAIN OF CUSTODY

ME 12/16/14

Page # 1 of 1 DOI

Report To Angie Goodwin
 Company HC
 Address _____
 City, State, ZIP _____
 Phone _____ Email _____

SAMPLERS (signature) [Signature]
 PROJECT NAME KOI nos PO # _____
 REMARKS _____ INVOICE TO _____
 Project specific RLs? - Yes / No

TURNAROUND TIME 15-D2
 Standard turnaround
 RUSH
 Rush charges authorized by: _____
 SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					
LB-1	01A-E	12/16	1345	soil	5	X	X			X	X	X					
LB-2	02	↓	1350	↓	↓	X	X			X	X	X					
LB-3	03	↓	1410	↓	↓	X	X			X	X	X					

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Andrew Dubynski	HC	12/16	1945
Received by: <u>[Signature]</u>	BISLAT TAYLOR	FBI	↓	↓
Relinquished by:				
Received by:				
Samples received at			2°C	

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

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December 26, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 16, 2019 from the Kosmos, F&BI 912265 project. There are 23 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1226R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 16, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912265 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912265 -01	B-4-W
912265 -02	Unlabeled

A 200.8 internal standard failed the acceptance criteria for sample B-4-W due to matrix interferences. The data were flagged accordingly. The sample was diluted and reanalyzed. All data sets were reported.

Benz(a)anthracene in 8270D failed below the acceptance criteria in the matrix spike samples. The laboratory control samples met the acceptance criteria, therefore the data were likely due to sample matrix effect.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912265
Date Extracted: 12/18/19
Date Analyzed: 12/19/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-G_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
B-4-W 912265-01	<100	89
Method Blank 09-2930 MB	<100	93

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912265
Date Extracted: 12/17/19
Date Analyzed: 12/17/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 41-152)
B-4-W 912265-01 1/1.4	150 x	<350	94
Method Blank 09-3050 MB	<50	<250	78

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	B-4-W	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912265
Date Extracted:	12/18/19	Lab ID:	912265-01
Date Analyzed:	12/18/19	Data File:	912265-01.082
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	37.0
Barium	1,830 ve
Cadmium	6.22
Chromium	52.8 J
Lead	48.0 J
Mercury	<1 J
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	B-4-W	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912265
Date Extracted:	12/18/19	Lab ID:	912265-01 x10
Date Analyzed:	12/18/19	Data File:	912265-01 x10.079
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Mercury	<10
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	B-4-W	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912265
Date Extracted:	12/18/19	Lab ID:	912265-01 x100
Date Analyzed:	12/20/19	Data File:	912265-01 x100.089
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Barium	2,420
Chromium	334
Lead	128

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912265
Date Extracted:	12/18/19	Lab ID:	I9-809 mb2
Date Analyzed:	12/18/19	Data File:	I9-809 mb2.075
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	B-4-W	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912265
Date Extracted:	12/17/19	Lab ID:	912265-01 1/2
Date Analyzed:	12/18/19	Data File:	121733.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	160
Benzo(a)anthracene-d12	101	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.4
Acenaphthylene	<0.04
Acenaphthene	<0.04
Fluorene	<0.04
Phenanthrene	0.12
Anthracene	<0.04
Fluoranthene	0.071
Pyrene	0.086
Benz(a)anthracene	<0.04
Chrysene	<0.04
Benzo(a)pyrene	<0.04
Benzo(b)fluoranthene	<0.04
Benzo(k)fluoranthene	<0.04
Indeno(1,2,3-cd)pyrene	<0.04
Dibenz(a,h)anthracene	<0.04
Benzo(g,h,i)perylene	<0.04

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912265
Date Extracted:	12/17/19	Lab ID:	09-3044 mb2
Date Analyzed:	12/17/19	Data File:	121717.D
Matrix:	Water	Instrument:	GCMS6
Units:	ug/L (ppb)	Operator:	ya

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	160
Benzo(a)anthracene-d12	110	25	165

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.2
Acenaphthylene	<0.02
Acenaphthene	<0.02
Fluorene	<0.02
Phenanthrene	<0.02
Anthracene	<0.02
Fluoranthene	<0.02
Pyrene	<0.02
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02
Benzo(g,h,i)perylene	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	B-4-W	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912265
Date Extracted:	12/17/19	Lab ID:	912265-01
Date Analyzed:	12/18/19	Data File:	121838.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912265
Date Extracted:	12/17/19	Lab ID:	09-3024 mb
Date Analyzed:	12/18/19	Data File:	121812.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19
Date Received: 12/16/19
Project: Kosmos, F&BI 912265
Date Extracted: NA
Date Analyzed: 12/19/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL SUSPENDED SOLIDS
BY METHOD 2540D**

Results Reported as mg/L (ppm)

<u>Sample ID</u> Laboratory ID	Total Suspended <u>Solids</u>
B-4-W 912265-01	19,000
Method Blank	<5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	B-4-W	Client:	Hart Crowser
Date Received:	12/16/19	Project:	Kosmos, F&BI 912265
Date Extracted:	12/17/19	Lab ID:	912265-01
Date Analyzed:	12/18/19	Data File:	121758.D
Matrix:	Water	Instrument:	GC7
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	63	24	127

Compounds:	Concentration ug/L (ppb)
Aroclor 1221	<0.1
Aroclor 1232	<0.1
Aroclor 1016	<0.1
Aroclor 1242	<0.1
Aroclor 1248	<0.1
Aroclor 1254	<0.1
Aroclor 1260	<0.1
Aroclor 1262	<0.1
Aroclor 1268	<0.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912265
Date Extracted:	12/17/19	Lab ID:	09-3045 mb2
Date Analyzed:	12/18/19	Data File:	121757.D
Matrix:	Water	Instrument:	GC7
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	72	24	127

Compounds:	Concentration ug/L (ppb)
Aroclor 1221	<0.1
Aroclor 1232	<0.1
Aroclor 1016	<0.1
Aroclor 1242	<0.1
Aroclor 1248	<0.1
Aroclor 1254	<0.1
Aroclor 1260	<0.1
Aroclor 1262	<0.1
Aroclor 1268	<0.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 912295-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	100	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	96	100	63-142	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 912264-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<1	104	98	70-130	6
Barium	ug/L (ppb)	50	1.60	100	94	70-130	6
Cadmium	ug/L (ppb)	5	<1	99	94	70-130	5
Chromium	ug/L (ppb)	20	<1	103	99	70-130	4
Lead	ug/L (ppb)	10	<1	103	97	70-130	6
Mercury	ug/L (ppb)	5	<1	98	93	70-130	5
Selenium	ug/L (ppb)	5	<1	102	97	70-130	5
Silver	ug/L (ppb)	5	<1	101	94	70-130	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	103	85-115
Barium	ug/L (ppb)	50	99	85-115
Cadmium	ug/L (ppb)	5	100	85-115
Chromium	ug/L (ppb)	20	100	85-115
Lead	ug/L (ppb)	10	101	85-115
Mercury	ug/L (ppb)	5	97	85-115
Selenium	ug/L (ppb)	5	101	85-115
Silver	ug/L (ppb)	5	100	85-115

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912238-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	1	<0.2	82	82	10-172	0
Acenaphthylene	ug/L (ppb)	1	<0.02	90	90	38-137	0
Acenaphthene	ug/L (ppb)	1	<0.02	89	86	20-150	3
Fluorene	ug/L (ppb)	1	<0.02	95	95	10-181	0
Phenanthrene	ug/L (ppb)	1	<0.02	90	91	58-109	1
Anthracene	ug/L (ppb)	1	<0.02	93	95	47-114	2
Fluoranthene	ug/L (ppb)	1	<0.02	100	101	10-171	1
Pyrene	ug/L (ppb)	1	<0.02	99	103	63-107	4
Benz(a)anthracene	ug/L (ppb)	1	<0.02	95 vo	94 vo	60-93	1
Chrysene	ug/L (ppb)	1	<0.02	89	88	60-102	1
Benzo(b)fluoranthene	ug/L (ppb)	1	<0.02	81	79	62-91	2
Benzo(k)fluoranthene	ug/L (ppb)	1	<0.02	68	69	51-98	1
Benzo(a)pyrene	ug/L (ppb)	1	<0.02	78	76	60-86	3
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	<0.02	69	62	10-98	11
Dibenz(a,h)anthracene	ug/L (ppb)	1	<0.02	50	49	10-97	2
Benzo(g,h,i)perylene	ug/L (ppb)	1	<0.02	59	57	10-102	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	1	85	85	57-114	0
Acenaphthylene	ug/L (ppb)	1	85	92	65-119	8
Acenaphthene	ug/L (ppb)	1	86	90	66-118	5
Fluorene	ug/L (ppb)	1	90	95	64-125	5
Phenanthrene	ug/L (ppb)	1	91	91	67-120	0
Anthracene	ug/L (ppb)	1	93	96	65-122	3
Fluoranthene	ug/L (ppb)	1	94	98	65-127	4
Pyrene	ug/L (ppb)	1	100	107	62-130	7
Benz(a)anthracene	ug/L (ppb)	1	97	98	60-118	1
Chrysene	ug/L (ppb)	1	92	93	66-125	1
Benzo(b)fluoranthene	ug/L (ppb)	1	90	94	55-135	4
Benzo(k)fluoranthene	ug/L (ppb)	1	79	77	62-125	3
Benzo(a)pyrene	ug/L (ppb)	1	86	87	58-127	1
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	1	92	91	36-142	1
Dibenz(a,h)anthracene	ug/L (ppb)	1	80	81	37-133	1
Benzo(g,h,i)perylene	ug/L (ppb)	1	84	85	34-135	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912300-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Dichlorodifluoromethane	ug/L (ppb)	50	<1	111	10-172
Chloromethane	ug/L (ppb)	50	<10	108	25-166
Vinyl chloride	ug/L (ppb)	50	<0.2	105	36-166
Bromomethane	ug/L (ppb)	50	<1	117	47-169
Chloroethane	ug/L (ppb)	50	<1	113	46-160
Trichlorofluoromethane	ug/L (ppb)	50	<1	107	44-165
Acetone	ug/L (ppb)	250	<50	88	10-182
1,1-Dichloroethene	ug/L (ppb)	50	<1	105	60-136
Hexane	ug/L (ppb)	50	<1	97	52-150
Methylene chloride	ug/L (ppb)	50	<5	101	67-132
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	<1	104	74-127
trans-1,2-Dichloroethene	ug/L (ppb)	50	<1	101	72-129
1,1-Dichloroethane	ug/L (ppb)	50	<1	101	70-128
2,2-Dichloropropane	ug/L (ppb)	50	<1	102	36-154
cis-1,2-Dichloroethene	ug/L (ppb)	50	<1	103	71-127
Chloroform	ug/L (ppb)	50	<1	99	65-132
2-Butanone (MEK)	ug/L (ppb)	250	<10	95	10-129
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	101	48-149
1,1,1-Trichloroethane	ug/L (ppb)	50	<1	105	60-146
1,1-Dichloropropene	ug/L (ppb)	50	<1	99	69-133
Carbon tetrachloride	ug/L (ppb)	50	<1	106	56-152
Benzene	ug/L (ppb)	50	<0.35	101	76-125
Trichloroethene	ug/L (ppb)	50	<1	96	66-135
1,2-Dichloropropane	ug/L (ppb)	50	<1	101	78-125
Bromodichloromethane	ug/L (ppb)	50	<1	101	61-150
Dibromomethane	ug/L (ppb)	50	<1	97	66-141
4-Methyl-2-pentanone	ug/L (ppb)	250	<10	104	10-185
cis-1,3-Dichloropropene	ug/L (ppb)	50	<1	105	72-132
Toluene	ug/L (ppb)	50	<1	96	76-122
trans-1,3-Dichloropropene	ug/L (ppb)	50	<1	101	76-130
1,1,2-Trichloroethane	ug/L (ppb)	50	<1	96	68-131
2-Hexanone	ug/L (ppb)	250	<10	102	10-185
1,3-Dichloropropane	ug/L (ppb)	50	<1	97	71-128
Tetrachloroethene	ug/L (ppb)	50	<1	97	10-226
Dibromochloromethane	ug/L (ppb)	50	<1	101	70-139
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	<1	95	69-134
Chlorobenzene	ug/L (ppb)	50	<1	97	77-122
Ethylbenzene	ug/L (ppb)	50	<1	98	69-135
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	<1	102	73-137
m,p-Xylene	ug/L (ppb)	100	<2	98	69-135
o-Xylene	ug/L (ppb)	50	<1	97	60-140
Styrene	ug/L (ppb)	50	<1	98	71-133
Isopropylbenzene	ug/L (ppb)	50	<1	97	65-142
Bromoform	ug/L (ppb)	50	<1	106	65-142
n-Propylbenzene	ug/L (ppb)	50	<1	93	58-144
Bromobenzene	ug/L (ppb)	50	<1	95	75-124
1,3,5-Trimethylbenzene	ug/L (ppb)	50	<1	95	66-137
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	<1	96	51-154
1,2,3-Trichloropropane	ug/L (ppb)	50	<1	96	53-150
2-Chlorotoluene	ug/L (ppb)	50	<1	94	66-127
4-Chlorotoluene	ug/L (ppb)	50	<1	95	65-130
tert-Butylbenzene	ug/L (ppb)	50	<1	94	65-137
1,2,4-Trimethylbenzene	ug/L (ppb)	50	<1	94	59-146
sec-Butylbenzene	ug/L (ppb)	50	<1	88	64-140
p-Isopropyltoluene	ug/L (ppb)	50	<1	89	65-141
1,3-Dichlorobenzene	ug/L (ppb)	50	<1	93	72-123
1,4-Dichlorobenzene	ug/L (ppb)	50	<1	92	69-126
1,2-Dichlorobenzene	ug/L (ppb)	50	<1	94	69-128
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	<10	99	32-164
1,2,4-Trichlorobenzene	ug/L (ppb)	50	<1	89	66-136
Hexachlorobutadiene	ug/L (ppb)	50	<1	61	60-143
Naphthalene	ug/L (ppb)	50	<1	96	44-164
1,2,3-Trichlorobenzene	ug/L (ppb)	50	<1	86	69-148

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	50	97	119	25-158	20
Chloromethane	ug/L (ppb)	50	98	114	45-156	15
Vinyl chloride	ug/L (ppb)	50	94	110	50-154	16
Bromomethane	ug/L (ppb)	50	104	124	55-143	18
Chloroethane	ug/L (ppb)	50	102	119	58-146	15
Trichlorofluoromethane	ug/L (ppb)	250	100	112	50-150	11
Acetone	ug/L (ppb)	250	89	95	53-131	7
1,1-Dichloroethene	ug/L (ppb)	50	102	113	67-136	10
Hexane	ug/L (ppb)	50	99	104	57-137	5
Methylene chloride	ug/L (ppb)	50	105	115	39-148	9
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	101	116	64-147	14
trans-1,2-Dichloroethene	ug/L (ppb)	50	102	111	68-128	8
1,1-Dichloroethane	ug/L (ppb)	50	103	111	79-121	7
2,2-Dichloropropane	ug/L (ppb)	50	93	106	55-143	13
cis-1,2-Dichloroethene	ug/L (ppb)	50	105	112	80-123	6
Chloroform	ug/L (ppb)	50	100	108	80-121	8
2-Butanone (MEK)	ug/L (ppb)	250	103	103	57-149	0
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	109	111	73-132	2
1,1,1-Trichloroethane	ug/L (ppb)	50	103	115	81-125	11
1,1-Dichloropropene	ug/L (ppb)	50	103	108	77-129	5
Carbon tetrachloride	ug/L (ppb)	50	104	117	75-158	12
Benzene	ug/L (ppb)	50	104	108	69-134	4
Trichloroethene	ug/L (ppb)	50	101	105	79-113	4
1,2-Dichloropropane	ug/L (ppb)	50	107	110	77-123	3
Bromodichloromethane	ug/L (ppb)	50	108	112	81-133	4
Dibromomethane	ug/L (ppb)	50	105	107	82-125	2
4-Methyl-2-pentanone	ug/L (ppb)	250	106	110	65-138	4
cis-1,3-Dichloropropene	ug/L (ppb)	50	114	116	82-132	2
Toluene	ug/L (ppb)	50	102	105	72-122	3
trans-1,3-Dichloropropene	ug/L (ppb)	50	113	112	80-136	1
1,1,2-Trichloroethane	ug/L (ppb)	50	102	106	75-124	4
2-Hexanone	ug/L (ppb)	250	107	110	60-136	3
1,3-Dichloropropane	ug/L (ppb)	50	105	107	76-126	2
Tetrachloroethene	ug/L (ppb)	50	103	106	76-121	3
Dibromochloromethane	ug/L (ppb)	50	113	116	84-133	3
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	103	106	82-115	3
Chlorobenzene	ug/L (ppb)	50	102	107	83-114	5
Ethylbenzene	ug/L (ppb)	50	104	109	77-124	5
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	104	116	84-127	11
m,p-Xylene	ug/L (ppb)	100	103	108	81-112	5
o-Xylene	ug/L (ppb)	50	101	108	81-121	7
Styrene	ug/L (ppb)	50	104	108	84-119	4
Isopropylbenzene	ug/L (ppb)	50	100	109	80-117	9
Bromoform	ug/L (ppb)	50	115	119	74-136	3
n-Propylbenzene	ug/L (ppb)	50	105	107	74-126	2
Bromobenzene	ug/L (ppb)	50	107	107	80-121	0
1,3,5-Trimethylbenzene	ug/L (ppb)	50	105	110	78-123	5
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	106	109	66-126	3
1,2,3-Trichloropropane	ug/L (ppb)	50	107	107	67-124	0
2-Chlorotoluene	ug/L (ppb)	50	105	108	77-127	3
4-Chlorotoluene	ug/L (ppb)	50	106	107	78-128	1
tert-Butylbenzene	ug/L (ppb)	50	106	111	80-123	5
1,2,4-Trimethylbenzene	ug/L (ppb)	50	103	108	79-122	5
sec-Butylbenzene	ug/L (ppb)	50	102	107	80-116	5
p-Isopropyltoluene	ug/L (ppb)	50	100	106	81-123	6
1,3-Dichlorobenzene	ug/L (ppb)	50	104	108	83-113	4
1,4-Dichlorobenzene	ug/L (ppb)	50	102	106	83-107	4
1,2-Dichlorobenzene	ug/L (ppb)	50	103	110	84-112	7
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	102	112	57-141	9
1,2,4-Trichlorobenzene	ug/L (ppb)	50	101	112	72-130	10
Hexachlorobutadiene	ug/L (ppb)	50	92	101	53-141	9
Naphthalene	ug/L (ppb)	50	103	113	64-133	9
1,2,3-Trichlorobenzene	ug/L (ppb)	50	99	110	65-136	11

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
TOTAL SUSPENDED SOLIDS BY METHOD 2540D**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
TSS	mg/L (ppm)	20	104	102	35-146	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/26/19

Date Received: 12/16/19

Project: Kosmos, F&BI 912265

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912238-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	ug/L (ppb)	0.25	<0.1	62	63	50-150	2
Aroclor 1260	ug/L (ppb)	0.25	<0.1	65	72	50-150	10

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	ug/L (ppb)	0.25	76	78	35-111	3
Aroclor 1260	ug/L (ppb)	0.25	72	74	29-130	3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

012265
12/11

912265

SAMPLE CHAIN OF CUSTODY

ME 12/18/19

APR 1 11 03 AM '19

Report To: Angie Ludwin

Company: _____

Address: _____

City, State, ZIP: _____

Phone: _____ Email: _____

SAMPLERS (signature)		PROJECT NAME	PO #
<u>COSMOS</u>		REMARKS	INVOICE TO
Project specific RIs? - Yes / No			

<input checked="" type="checkbox"/> Standard turnaround <input type="checkbox"/> RUSH Rush charges authorized by: _____	Page # _____ of _____ TURNAROUND TIME SAMPLE DISPOSAL <input type="checkbox"/> Archive samples <input type="checkbox"/> Other Default: Dispose after 30 days
---	---

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TSS	Metals			
B-4-W	01A-6	12/11	1245	water		X	X			X	X	X	X	X	X	X	SEE PREVIOUS
UNlabeled	02A-Z				3												AS B4 CLIN P6, B5, A5, SE CWC COLLECTORS

SIGNATURE		PRINT NAME		COMPANY		DATE	TIME
<u>[Signature]</u>	<u>[Signature]</u>	Andrew Valbuena	HC	12/16	1915		
<u>[Signature]</u>	<u>[Signature]</u>	BISWIT TAPPESE	FBI				
Received by:		Received by:					
Relinquished by:		Relinquished by:					
Received by:		Received by:					

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

Samples received at 2:00

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 27, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 17, 2019 from the Kosmos, F&BI 912296 project. There are 30 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1227R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 17, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912296 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912296 -01	Westbank 1
912296 -02	Westbank 2
912296 -03	Westbank 3

A 6020B internal standard failed the acceptance criteria for the samples. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

Several compounds in the 8260C laboratory control sample exceeded the acceptance criteria. The analytes were not detected in the samples, therefore the data were acceptable.

The 8082 PCB reporting limits in samples Westbank 2 and Westbank 3 were raised due to the presence of interfering compounds.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19
Date Received: 12/17/19
Project: Kosmos, F&BI 912296
Date Extracted: 12/18/19
Date Analyzed: 12/19/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
Westbank 1 912296-01	<5	84
Westbank 2 912296-02	<5	85
Westbank 3 912296-03	<5	84
Method Blank	<5	7709-2931 MB

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19
Date Received: 12/17/19
Project: Kosmos, F&BI 912296
Date Extracted: 12/18/19
Date Analyzed: 12/18/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 48-168)
Westbank 1 912296-01	<50	<250	99
Westbank 2 912296-02	<50	<250	98
Westbank 3 912296-03	<50	<250	100
Method Blank 09-3052 MB2	<50	<250	95

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Westbank 1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-01
Date Analyzed:	12/23/19	Data File:	912296-01.127
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.29
Barium	28.3
Cadmium	<1
Chromium	6.88 J
Lead	1.93
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Westbank 1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-01 x5
Date Analyzed:	12/23/19	Data File:	912296-01 x5.126
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	7.85
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Westbank 2	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-02
Date Analyzed:	12/23/19	Data File:	912296-02.133
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.63
Barium	80.0
Cadmium	<1
Chromium	13.5 J
Lead	3.83
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Westbank 2	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-02 x5
Date Analyzed:	12/23/19	Data File:	912296-02 x5.132
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	17.1
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Westbank 3	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-03
Date Analyzed:	12/23/19	Data File:	912296-03.135
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	1.51
Barium	58.7
Cadmium	<1
Chromium	9.33 J
Lead	2.41
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Westbank 3	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-03 x5
Date Analyzed:	12/23/19	Data File:	912296-03 x5.134
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
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Chromium	11.7
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Hart Crowser
Date Received:	NA	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	I9-819 mb
Date Analyzed:	12/19/19	Data File:	I9-819 mb.089
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Westbank 1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	912296-01 1/5
Date Analyzed:	12/18/19	Data File:	121817.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	96	31	163
Benzo(a)anthracene-d12	102	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Westbank 2	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	912296-02 1/5
Date Analyzed:	12/18/19	Data File:	121818.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	98	31	163
Benzo(a)anthracene-d12	107	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Westbank 3	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	912296-03 1/5
Date Analyzed:	12/18/19	Data File:	121819.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	100	31	163
Benzo(a)anthracene-d12	111	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	09-3047 mb2 1/5
Date Analyzed:	12/18/19	Data File:	121816.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	96	31	163
Benzo(a)anthracene-d12	103	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Westbank 1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	912296-01
Date Analyzed:	12/18/19	Data File:	121814.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	62	145
Toluene-d8	100	55	145
4-Bromofluorobenzene	97	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Westbank 2	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	912296-02
Date Analyzed:	12/18/19	Data File:	121819.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	62	145
Toluene-d8	100	55	145
4-Bromofluorobenzene	98	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Westbank 3	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	912296-03
Date Analyzed:	12/18/19	Data File:	121820.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	62	145
Toluene-d8	102	55	145
4-Bromofluorobenzene	99	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912296
Date Extracted:	12/18/19	Lab ID:	09-3057 mb
Date Analyzed:	12/18/19	Data File:	121809.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	105	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5 ca	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05 ca	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Westbank 1	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-01 1/6
Date Analyzed:	12/20/19	Data File:	122015.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	67	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Westbank 2	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-02 1/60
Date Analyzed:	12/20/19	Data File:	122016.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	62	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.2
Aroclor 1232	<0.2
Aroclor 1016	<0.2
Aroclor 1242	<0.2
Aroclor 1248	<0.2
Aroclor 1254	<0.2
Aroclor 1260	<0.2
Aroclor 1262	<0.2
Aroclor 1268	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Westbank 3	Client:	Hart Crowser
Date Received:	12/17/19	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	912296-03 1/60
Date Analyzed:	12/20/19	Data File:	122017.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	61	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.2
Aroclor 1232	<0.2
Aroclor 1016	<0.2
Aroclor 1242	<0.2
Aroclor 1248	<0.2
Aroclor 1254	<0.2
Aroclor 1260	<0.2
Aroclor 1262	<0.2
Aroclor 1268	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912296
Date Extracted:	12/19/19	Lab ID:	09-3074 mb 1/6
Date Analyzed:	12/20/19	Data File:	122007.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	85	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx**

Laboratory Code: 912263-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	80	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912283-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	2,500	<50	108	100	64-133	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	2,500	100	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: 912286-05 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	5.41	84	90	75-125	7
Barium	mg/kg (ppm)	50	91.1	108	114	75-125	5
Cadmium	mg/kg (ppm)	10	8.16	71 b	36 b	75-125	65 b
Chromium	mg/kg (ppm)	50	48.1	107	101	75-125	6
Lead	mg/kg (ppm)	50	13.6	101	92	75-125	9
Mercury	mg/kg (ppm)	5	<5	94	102	75-125	8
Selenium	mg/kg (ppm)	5	<5	82	80	75-125	2
Silver	mg/kg (ppm)	10	<5	89	89	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	89	80-120
Barium	mg/kg (ppm)	50	99	80-120
Cadmium	mg/kg (ppm)	10	98	80-120
Chromium	mg/kg (ppm)	50	91	80-120
Lead	mg/kg (ppm)	50	105	80-120
Mercury	mg/kg (ppm)	5	98	80-120
Selenium	mg/kg (ppm)	5	99	80-120
Silver	mg/kg (ppm)	10	97	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912263-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	80	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	81	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	80	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	83	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	82	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	83	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	91	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	84	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	88	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	82	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	84	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	70	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	75	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	77	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	74	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	71	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	84	83	58-121	1
Acenaphthylene	mg/kg (ppm)	0.17	89	89	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	88	85	54-123	3
Fluorene	mg/kg (ppm)	0.17	91	90	56-127	1
Phenanthrene	mg/kg (ppm)	0.17	88	88	55-122	0
Anthracene	mg/kg (ppm)	0.17	87	89	50-120	2
Fluoranthene	mg/kg (ppm)	0.17	92	92	54-129	0
Pyrene	mg/kg (ppm)	0.17	98	104	53-127	6
Benz(a)anthracene	mg/kg (ppm)	0.17	92	94	51-115	2
Chrysene	mg/kg (ppm)	0.17	89	91	55-129	2
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	84	88	56-123	5
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	78	74	54-131	5
Benzo(a)pyrene	mg/kg (ppm)	0.17	77	78	51-118	1
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	85	92	49-148	8
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	83	93	50-141	11
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	82	90	52-131	9

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912296-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	33	37	10-142	11
Chloromethane	mg/kg (ppm)	2.5	<0.5	61	59	10-126	3
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	59	56	10-138	5
Bromomethane	mg/kg (ppm)	2.5	<0.5	75	70	10-163	7
Chloroethane	mg/kg (ppm)	2.5	<0.5	74	71	10-176	4
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	68	63	10-176	8
Acetone	mg/kg (ppm)	12.5	<0.5	76	71	10-163	7
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	78	73	10-160	7
Hexane	mg/kg (ppm)	2.5	<0.25	68	60	10-137	12
Methylene chloride	mg/kg (ppm)	2.5	<0.5	79	74	10-156	7
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	89	86	21-145	3
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	83	79	14-137	5
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	86	79	19-140	8
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	85	81	10-158	5
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	91	84	25-135	8
Chloroform	mg/kg (ppm)	2.5	<0.05	87	81	21-145	7
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	83	73	19-147	13
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	90	83	12-160	8
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	88	84	10-156	5
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	85	78	17-140	9
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	88	84	9-164	5
Benzene	mg/kg (ppm)	2.5	<0.03	87	79	29-129	10
Trichloroethene	mg/kg (ppm)	2.5	<0.02	85	77	21-139	10
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	90	80	30-135	12
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	90	80	23-155	12
Dibromomethane	mg/kg (ppm)	2.5	<0.05	87	79	23-145	10
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	89	80	24-155	11
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	91	79	28-144	14
Toluene	mg/kg (ppm)	2.5	<0.05	86	78	35-130	10
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	88	77	26-149	13
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	85	76	10-205	11
2-Hexanone	mg/kg (ppm)	12.5	<0.5	89	78	15-166	13
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	88	78	31-137	12
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	88	80	20-133	10
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	91	81	28-150	12
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	87	76	28-142	13
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	88	80	32-129	10
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	90	82	32-137	9
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	91	86	31-143	6
m,p-Xylene	mg/kg (ppm)	5	<0.1	90	82	34-136	9
o-Xylene	mg/kg (ppm)	2.5	<0.05	89	82	33-134	8
Styrene	mg/kg (ppm)	2.5	<0.05	89	82	35-137	8
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	90	83	31-142	8
Bromoform	mg/kg (ppm)	2.5	<0.05	91	82	21-156	10
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	88	79	23-146	11
Bromobenzene	mg/kg (ppm)	2.5	<0.05	88	79	34-130	11
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	91	82	18-149	10
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	88	77	28-140	13
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	86	77	25-144	11
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	89	80	31-134	11
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	89	80	31-136	11
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	89	81	30-137	9
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	89	81	10-182	9
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	88	80	23-145	10
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	88	80	21-149	10
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	88	81	30-131	8
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	86	79	29-129	8
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	88	82	31-132	7
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	84	79	11-161	6
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	87	83	22-142	5
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	85	82	10-142	4
Naphthalene	mg/kg (ppm)	2.5	<0.05	86	80	14-157	7
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	84	81	20-144	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	59	10-76
Chloromethane	mg/kg (ppm)	2.5	85	34-98
Vinyl chloride	mg/kg (ppm)	2.5	81	42-107
Bromomethane	mg/kg (ppm)	2.5	86	46-113
Chloroethane	mg/kg (ppm)	2.5	83	47-115
Trichlorofluoromethane	mg/kg (ppm)	2.5	78	53-112
Acetone	mg/kg (ppm)	12.5	71	39-147
1,1-Dichloroethene	mg/kg (ppm)	2.5	83	65-110
Hexane	mg/kg (ppm)	2.5	96	55-107
Methylene chloride	mg/kg (ppm)	2.5	114	50-127
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	95	72-122
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	93	71-113
1,1-Dichloroethane	mg/kg (ppm)	2.5	106	74-109
2,2-Dichloropropane	mg/kg (ppm)	2.5	79	63-145
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	97	73-110
Chloroform	mg/kg (ppm)	2.5	103	76-110
2-Butanone (MEK)	mg/kg (ppm)	12.5	121	60-121
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	119 vo	73-111
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	93	72-116
1,1-Dichloropropene	mg/kg (ppm)	2.5	109	72-112
Carbon tetrachloride	mg/kg (ppm)	2.5	91	67-123
Benzene	mg/kg (ppm)	2.5	103	72-106
Trichloroethene	mg/kg (ppm)	2.5	108 vo	72-107
1,2-Dichloropropane	mg/kg (ppm)	2.5	115	74-115
Bromodichloromethane	mg/kg (ppm)	2.5	116	75-126
Dibromomethane	mg/kg (ppm)	2.5	100	76-116
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	114	80-128
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	117	71-138
Toluene	mg/kg (ppm)	2.5	106	74-111
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	119	73-124
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	116 vo	76-118
2-Hexanone	mg/kg (ppm)	12.5	128 vo	67-123
1,3-Dichloropropane	mg/kg (ppm)	2.5	115	75-118
Tetrachloroethene	mg/kg (ppm)	2.5	96	73-111
Dibromochloromethane	mg/kg (ppm)	2.5	106	64-152
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	113	77-117
Chlorobenzene	mg/kg (ppm)	2.5	106	76-109
Ethylbenzene	mg/kg (ppm)	2.5	107	75-112
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	104	75-129
m,p-Xylene	mg/kg (ppm)	5	104	77-115
o-Xylene	mg/kg (ppm)	2.5	103	76-115
Styrene	mg/kg (ppm)	2.5	107	76-119
Isopropylbenzene	mg/kg (ppm)	2.5	104	76-120
Bromoform	mg/kg (ppm)	2.5	108	50-174
n-Propylbenzene	mg/kg (ppm)	2.5	117 vo	77-115
Bromobenzene	mg/kg (ppm)	2.5	109	76-112
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	114	77-121
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	124 vo	74-121
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	125 vo	73-117
2-Chlorotoluene	mg/kg (ppm)	2.5	115 vo	75-113
4-Chlorotoluene	mg/kg (ppm)	2.5	115	77-115
tert-Butylbenzene	mg/kg (ppm)	2.5	111	77-123
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	107	77-119
sec-Butylbenzene	mg/kg (ppm)	2.5	112	78-120
p-Isopropyltoluene	mg/kg (ppm)	2.5	109	77-120
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	105	76-112
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	107	74-109
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	105	75-114
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	126 vo	68-122
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	111	75-122
Hexachlorobutadiene	mg/kg (ppm)	2.5	105	74-130
Naphthalene	mg/kg (ppm)	2.5	116	73-122
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	119 vo	75-117

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/17/19

Project: Kosmos, F&BI 912296

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912340-01 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	68	30-123
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	67	26-131

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	93	89	55-137	4
Aroclor 1260	mg/kg (ppm)	0.25	93	92	51-150	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

9/12/2016
Sample Custody Record

Samples Shipped to:



ME 12/17/19 VS-32/BI

Hart Crowser, Inc.
 3131 Elliott Avenue, Suite 600
 Seattle, Washington 98121
 Office: 206.324.9530 • Fax 206.328.5581

JOB 194400 LAB NUMBER _____
 PROJECT NAME Exam of
 HART CROWSER CONTACT Angie Lockman Andrew
 SAMPLED BY: Andrew

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX
01A-E	W88bnd1		12/13	1135	501
03	W88bnd2		↓	1200	↓
03	W88bnd3			1225	

RECEIVED BY	DATE	TIME	DATE	TIME	RECEIVED BY	DATE	TIME
<u>Andrew Lockman</u>	12/17		12/17/13		<u>Angie Lockman</u>	12/17/13	17:55

COOLER NO.:	STORAGE LOCATION:	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:
 COOLER NO.:
 STORAGE LOCATION:
 See Lab Work Order No. _____ for Other Contract Requirements

White to Lab Yellow to Project Manager Pink to Sample Custodian

Samples received at POC

TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION

CUSTOMY SEALS: YES NO N/A

GOOD CONDITION: YES NO

TEMPERATURE: HAND OVERNIGHT

SHIPMENT METHOD: HAND OVERNIGHT

TURNAROUND TIME: 24 HOURS 1 WEEK STANDARD 48 HOURS 72 HOURS OTHER _____

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 27, 2019

Angie Goodwin, Project Manager
Hart Crowser
3131 Elliott Ave, Suite 600
Seattle, WA 98121

Dear Ms Goodwin:

Included are the results from the testing of material submitted on December 18, 2019 from the Kosmos, F&BI 912340 project. There are 22 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Andrew Kaparos
HCR1227R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 18, 2019 by Friedman & Bruya, Inc. from the Hart Crowser Kosmos, F&BI 912340 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Hart Crowser</u>
912340 -01	UB-1
912340 -02	UB-2
912340 -03	UB-3

Several 8260C compounds in the matrix spike and matrix spike duplicate showed recoveries or RPDs exceeding of laboratory control limits. The compounds were non-detect for the affected analytes, therefore the data were reported.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19
Date Received: 12/18/19
Project: Kosmos, F&BI 912340
Date Extracted: 12/20/19
Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
UB-1 912340-01	<5	77
UB-2 912340-02	12	83
UB-3 912340-03	<5	83
Method Blank 09-2935 MB	<5	87

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19
Date Received: 12/18/19
Project: Kosmos, F&BI 912340
Date Extracted: 12/20/19
Date Analyzed: 12/20/19

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 56-165)
UB-1 912340-01	<50	<250	80
UB-2 912340-02	<50	<250	79
UB-3 912340-03	90 x	<250	79
Method Blank 09-3089 MB	<50	<250	79

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	UB-1	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-01 1/25
Date Analyzed:	12/20/19	Data File:	121923.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	150 d	31	163
Benzo(a)anthracene-d12	110 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	<0.05
Fluorene	<0.05
Phenanthrene	<0.05
Anthracene	<0.05
Fluoranthene	<0.05
Pyrene	<0.05
Benz(a)anthracene	<0.05
Chrysene	<0.05
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	UB-2	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-02 1/5
Date Analyzed:	12/20/19	Data File:	121922.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	99	31	163
Benzo(a)anthracene-d12	112	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	0.015
Phenanthrene	0.049
Anthracene	0.012
Fluoranthene	<0.01
Pyrene	0.027
Benz(a)anthracene	<0.01
Chrysene	0.016
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	UB-3	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-03 1/25
Date Analyzed:	12/20/19	Data File:	122017.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	125 d	31	163
Benzo(a)anthracene-d12	108 d	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.05
Acenaphthylene	<0.05
Acenaphthene	0.051
Fluorene	0.093
Phenanthrene	0.28
Anthracene	0.067
Fluoranthene	<0.05
Pyrene	0.20
Benz(a)anthracene	0.065
Chrysene	0.077
Benzo(a)pyrene	<0.05
Benzo(b)fluoranthene	<0.05
Benzo(k)fluoranthene	<0.05
Indeno(1,2,3-cd)pyrene	<0.05
Dibenz(a,h)anthracene	<0.05
Benzo(g,h,i)perylene	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Semivolatile Compounds By EPA Method 8270D SIM

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	09-3070 mb 1/5
Date Analyzed:	12/19/19	Data File:	121906.D
Matrix:	Soil	Instrument:	GCMS6
Units:	mg/kg (ppm) Dry Weight	Operator:	YA

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Anthracene-d10	101	31	163
Benzo(a)anthracene-d12	110	24	168

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: UB-1	Client: Hart Crowser
Date Received: 12/18/19	Project: Kosmos, F&BI 912340
Date Extracted: 12/19/19	Lab ID: 912340-01
Date Analyzed: 12/20/19	Data File: 122021.D
Matrix: Soil	Instrument: GCMS4
Units: mg/kg (ppm) Dry Weight	Operator: MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	62	145
Toluene-d8	101	55	145
4-Bromofluorobenzene	95	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: UB-2	Client: Hart Crowser
Date Received: 12/18/19	Project: Kosmos, F&BI 912340
Date Extracted: 12/19/19	Lab ID: 912340-02
Date Analyzed: 12/20/19	Data File: 122022.D
Matrix: Soil	Instrument: GCMS4
Units: mg/kg (ppm) Dry Weight	Operator: MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	62	145
Toluene-d8	104	55	145
4-Bromofluorobenzene	99	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	UB-3	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-03
Date Analyzed:	12/20/19	Data File:	122023.D
Matrix:	Soil	Instrument:	GCMS4
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	62	145
Toluene-d8	103	55	145
4-Bromofluorobenzene	101	65	139

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	09-3076 mb
Date Analyzed:	12/19/19	Data File:	121914.D
Matrix:	Soil	Instrument:	GCMS9
Units:	mg/kg (ppm) Dry Weight	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	103	50	150
4-Bromofluorobenzene	111	50	150

Compounds:	Concentration mg/kg (ppm)	Compounds:	Concentration mg/kg (ppm)
Dichlorodifluoromethane	<0.5	1,3-Dichloropropane	<0.05
Chloromethane	<0.5	Tetrachloroethene	<0.025
Vinyl chloride	<0.05	Dibromochloromethane	<0.05
Bromomethane	<0.5	1,2-Dibromoethane (EDB)	<0.05
Chloroethane	<0.5	Chlorobenzene	<0.05
Trichlorofluoromethane	<0.5	Ethylbenzene	<0.05
Acetone	<0.5	1,1,1,2-Tetrachloroethane	<0.05
1,1-Dichloroethene	<0.05	m,p-Xylene	<0.1
Hexane	<0.25	o-Xylene	<0.05
Methylene chloride	<0.5	Styrene	<0.05
Methyl t-butyl ether (MTBE)	<0.05	Isopropylbenzene	<0.05
trans-1,2-Dichloroethene	<0.05	Bromoform	<0.05
1,1-Dichloroethane	<0.05	n-Propylbenzene	<0.05
2,2-Dichloropropane	<0.05	Bromobenzene	<0.05
cis-1,2-Dichloroethene	<0.05	1,3,5-Trimethylbenzene	<0.05
Chloroform	<0.05	1,1,2,2-Tetrachloroethane	<0.05
2-Butanone (MEK)	<0.5	1,2,3-Trichloropropane	<0.05
1,2-Dichloroethane (EDC)	<0.05	2-Chlorotoluene	<0.05
1,1,1-Trichloroethane	<0.05	4-Chlorotoluene	<0.05
1,1-Dichloropropene	<0.05	tert-Butylbenzene	<0.05
Carbon tetrachloride	<0.05	1,2,4-Trimethylbenzene	<0.05
Benzene	<0.03	sec-Butylbenzene	<0.05
Trichloroethene	<0.02	p-Isopropyltoluene	<0.05
1,2-Dichloropropane	<0.05	1,3-Dichlorobenzene	<0.05
Bromodichloromethane	<0.05	1,4-Dichlorobenzene	<0.05
Dibromomethane	<0.05	1,2-Dichlorobenzene	<0.05
4-Methyl-2-pentanone	<0.5	1,2-Dibromo-3-chloropropane	<0.5
cis-1,3-Dichloropropene	<0.05	1,2,4-Trichlorobenzene	<0.25
Toluene	<0.05	Hexachlorobutadiene	<0.25
trans-1,3-Dichloropropene	<0.05	Naphthalene	<0.05
1,1,2-Trichloroethane	<0.05	1,2,3-Trichlorobenzene	<0.25
2-Hexanone	<0.5		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	UB-1	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-01 1/6
Date Analyzed:	12/20/19	Data File:	122010.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	55	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	UB-2	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-02 1/6
Date Analyzed:	12/20/19	Data File:	122012.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	59	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	UB-3	Client:	Hart Crowser
Date Received:	12/18/19	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	912340-03 1/6
Date Analyzed:	12/20/19	Data File:	122013.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	52	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Hart Crowser
Date Received:	Not Applicable	Project:	Kosmos, F&BI 912340
Date Extracted:	12/19/19	Lab ID:	09-3074 mb 1/6
Date Analyzed:	12/20/19	Data File:	122007.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	85	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912340

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 912358-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Gasoline	mg/kg (ppm)	11	12	9

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	mg/kg (ppm)	20	80	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912340

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 912340-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	86	90	63-146	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	86	79-144

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912340

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL
SAMPLES FOR PAHS BY EPA METHOD 8270D SIM**

Laboratory Code: 912123-13 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.17	<0.01	75	44-129
Acenaphthylene	mg/kg (ppm)	0.17	<0.01	75	52-121
Acenaphthene	mg/kg (ppm)	0.17	<0.01	75	51-123
Fluorene	mg/kg (ppm)	0.17	<0.01	80	37-137
Phenanthrene	mg/kg (ppm)	0.17	<0.01	78	34-141
Anthracene	mg/kg (ppm)	0.17	<0.01	78	32-124
Fluoranthene	mg/kg (ppm)	0.17	<0.01	85	16-160
Pyrene	mg/kg (ppm)	0.17	<0.01	80	10-180
Benz(a)anthracene	mg/kg (ppm)	0.17	<0.01	84	23-144
Chrysene	mg/kg (ppm)	0.17	<0.01	79	32-149
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	<0.01	81	23-176
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	<0.01	71	42-139
Benzo(a)pyrene	mg/kg (ppm)	0.17	<0.01	76	21-163
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	<0.01	78	23-170
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	<0.01	73	31-146
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	<0.01	69	37-133

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.17	83	85	58-121	2
Acenaphthylene	mg/kg (ppm)	0.17	84	84	54-121	0
Acenaphthene	mg/kg (ppm)	0.17	84	86	54-123	2
Fluorene	mg/kg (ppm)	0.17	88	88	56-127	0
Phenanthrene	mg/kg (ppm)	0.17	85	86	55-122	1
Anthracene	mg/kg (ppm)	0.17	85	86	50-120	1
Fluoranthene	mg/kg (ppm)	0.17	91	90	54-129	1
Pyrene	mg/kg (ppm)	0.17	87	91	53-127	4
Benz(a)anthracene	mg/kg (ppm)	0.17	90	91	51-115	1
Chrysene	mg/kg (ppm)	0.17	86	90	55-129	5
Benzo(b)fluoranthene	mg/kg (ppm)	0.17	83	81	56-123	2
Benzo(k)fluoranthene	mg/kg (ppm)	0.17	74	79	54-131	7
Benzo(a)pyrene	mg/kg (ppm)	0.17	75	75	51-118	0
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.17	79	84	49-148	6
Dibenz(a,h)anthracene	mg/kg (ppm)	0.17	77	85	50-141	10
Benzo(g,h,i)perylene	mg/kg (ppm)	0.17	73	83	52-131	13

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912340

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 912319-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	mg/kg (ppm)	2.5	<0.5	31	29	10-56	7
Chloromethane	mg/kg (ppm)	2.5	<0.5	57	58	10-90	2
Vinyl chloride	mg/kg (ppm)	2.5	<0.05	59	59	10-91	0
Bromomethane	mg/kg (ppm)	2.5	<0.5	64	86	10-110	29 vo
Chloroethane	mg/kg (ppm)	2.5	<0.5	65	63	10-101	3
Trichlorofluoromethane	mg/kg (ppm)	2.5	<0.5	55	53	10-95	4
Acetone	mg/kg (ppm)	12.5	<0.5	84	145 vo	11-141	53 vo
1,1-Dichloroethene	mg/kg (ppm)	2.5	<0.05	66	67	22-107	2
Hexane	mg/kg (ppm)	2.5	<0.25	67	70	10-95	4
Methylene chloride	mg/kg (ppm)	2.5	<0.5	92	103	14-128	11
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	<0.05	83	96	17-134	15
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	84	88	13-112	5
1,1-Dichloroethane	mg/kg (ppm)	2.5	<0.05	96	103	23-115	7
2,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	68	72	18-117	6
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	<0.05	87	95	25-120	9
Chloroform	mg/kg (ppm)	2.5	<0.05	94	102	29-117	8
2-Butanone (MEK)	mg/kg (ppm)	12.5	<0.5	101	130	20-133	25 vo
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	<0.05	104	116	22-124	11
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	<0.05	81	86	27-112	6
1,1-Dichloropropene	mg/kg (ppm)	2.5	<0.05	95	101	26-107	6
Carbon tetrachloride	mg/kg (ppm)	2.5	<0.05	77	84	28-126	9
Benzene	mg/kg (ppm)	2.5	<0.03	92	98	26-114	6
Trichloroethene	mg/kg (ppm)	2.5	<0.02	93	99	30-112	6
1,2-Dichloropropane	mg/kg (ppm)	2.5	<0.05	101	106	31-119	5
Bromodichloromethane	mg/kg (ppm)	2.5	<0.05	97	103	31-131	6
Dibromomethane	mg/kg (ppm)	2.5	<0.05	87	96	27-124	10
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	<0.5	105	111	16-147	6
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	93	101	28-137	8
Toluene	mg/kg (ppm)	2.5	<0.05	91	96	34-112	5
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	<0.05	91	98	30-136	7
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	<0.05	97	104	32-126	7
2-Hexanone	mg/kg (ppm)	12.5	<0.5	114	123	17-147	8
1,3-Dichloropropane	mg/kg (ppm)	2.5	<0.05	97	102	29-125	5
Tetrachloroethene	mg/kg (ppm)	2.5	<0.025	81	88	25-114	8
Dibromochloromethane	mg/kg (ppm)	2.5	<0.05	83	89	32-143	7
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	<0.05	93	100	32-126	7
Chlorobenzene	mg/kg (ppm)	2.5	<0.05	89	94	37-113	5
Ethylbenzene	mg/kg (ppm)	2.5	<0.05	91	97	34-115	6
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	86	92	35-126	7
m,p-Xylene	mg/kg (ppm)	5	<0.1	89	94	25-125	5
o-Xylene	mg/kg (ppm)	2.5	<0.05	88	95	27-126	8
Styrene	mg/kg (ppm)	2.5	<0.05	90	97	39-121	7
Isopropylbenzene	mg/kg (ppm)	2.5	<0.05	88	96	34-123	9
Bromoform	mg/kg (ppm)	2.5	0.045	82	87	18-155	6
n-Propylbenzene	mg/kg (ppm)	2.5	<0.05	93	99	31-120	6
Bromobenzene	mg/kg (ppm)	2.5	<0.05	86	93	40-115	8
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	90	98	24-130	9
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	<0.05	106	109	27-148	3
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	<0.05	105	113	33-123	7
2-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	93	100	39-110	7
4-Chlorotoluene	mg/kg (ppm)	2.5	<0.05	92	97	39-111	5
tert-Butylbenzene	mg/kg (ppm)	2.5	<0.05	92	96	36-116	4
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	<0.05	89	97	35-116	9
sec-Butylbenzene	mg/kg (ppm)	2.5	<0.05	92	98	33-118	6
p-Isopropyltoluene	mg/kg (ppm)	2.5	<0.05	89	96	32-119	8
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	87	93	38-111	7
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	86	92	39-109	7
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	<0.05	87	95	40-111	9
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	<0.5	102	109	44-112	7
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	85	99	31-121	15
Hexachlorobutadiene	mg/kg (ppm)	2.5	<0.25	86	94	24-128	9
Naphthalene	mg/kg (ppm)	2.5	<0.05	94	104	24-139	10
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	<0.25	88	101	35-117	14

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912340

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Dichlorodifluoromethane	mg/kg (ppm)	2.5	46	10-76
Chloromethane	mg/kg (ppm)	2.5	76	34-98
Vinyl chloride	mg/kg (ppm)	2.5	80	42-107
Bromomethane	mg/kg (ppm)	2.5	89	46-113
Chloroethane	mg/kg (ppm)	2.5	97	47-115
Trichlorofluoromethane	mg/kg (ppm)	2.5	94	53-112
Acetone	mg/kg (ppm)	12.5	102	39-147
1,1-Dichloroethene	mg/kg (ppm)	2.5	104	65-110
Hexane	mg/kg (ppm)	2.5	106	55-107
Methylene chloride	mg/kg (ppm)	2.5	108	50-127
Methyl t-butyl ether (MTBE)	mg/kg (ppm)	2.5	107	72-122
trans-1,2-Dichloroethene	mg/kg (ppm)	2.5	109	71-113
1,1-Dichloroethane	mg/kg (ppm)	2.5	107	74-109
2,2-Dichloropropane	mg/kg (ppm)	2.5	106	63-145
cis-1,2-Dichloroethene	mg/kg (ppm)	2.5	110	73-110
Chloroform	mg/kg (ppm)	2.5	104	76-110
2-Butanone (MEK)	mg/kg (ppm)	12.5	100	60-121
1,2-Dichloroethane (EDC)	mg/kg (ppm)	2.5	105	73-111
1,1,1-Trichloroethane	mg/kg (ppm)	2.5	110	72-116
1,1-Dichloropropene	mg/kg (ppm)	2.5	105	72-112
Carbon tetrachloride	mg/kg (ppm)	2.5	112	67-123
Benzene	mg/kg (ppm)	2.5	105	72-106
Trichloroethene	mg/kg (ppm)	2.5	103	72-107
1,2-Dichloropropane	mg/kg (ppm)	2.5	106	74-115
Bromodichloromethane	mg/kg (ppm)	2.5	106	75-126
Dibromomethane	mg/kg (ppm)	2.5	104	76-116
4-Methyl-2-pentanone	mg/kg (ppm)	12.5	103	80-128
cis-1,3-Dichloropropene	mg/kg (ppm)	2.5	112	71-138
Toluene	mg/kg (ppm)	2.5	101	74-111
trans-1,3-Dichloropropene	mg/kg (ppm)	2.5	105	73-124
1,1,2-Trichloroethane	mg/kg (ppm)	2.5	97	76-118
2-Hexanone	mg/kg (ppm)	12.5	99	67-123
1,3-Dichloropropene	mg/kg (ppm)	2.5	99	75-118
Tetrachloroethene	mg/kg (ppm)	2.5	104	73-111
Dibromochloromethane	mg/kg (ppm)	2.5	105	64-152
1,2-Dibromoethane (EDB)	mg/kg (ppm)	2.5	97	77-117
Chlorobenzene	mg/kg (ppm)	2.5	100	76-109
Ethylbenzene	mg/kg (ppm)	2.5	103	75-112
1,1,1,2-Tetrachloroethane	mg/kg (ppm)	2.5	108	75-129
m,p-Xylene	mg/kg (ppm)	5	103	77-115
o-Xylene	mg/kg (ppm)	2.5	104	76-115
Styrene	mg/kg (ppm)	2.5	101	76-119
Isopropylbenzene	mg/kg (ppm)	2.5	105	76-120
Bromoform	mg/kg (ppm)	2.5	110	50-174
n-Propylbenzene	mg/kg (ppm)	2.5	105	77-115
Bromobenzene	mg/kg (ppm)	2.5	102	76-112
1,3,5-Trimethylbenzene	mg/kg (ppm)	2.5	108	77-121
1,1,2,2-Tetrachloroethane	mg/kg (ppm)	2.5	102	74-121
1,2,3-Trichloropropane	mg/kg (ppm)	2.5	100	73-117
2-Chlorotoluene	mg/kg (ppm)	2.5	104	75-113
4-Chlorotoluene	mg/kg (ppm)	2.5	103	77-115
tert-Butylbenzene	mg/kg (ppm)	2.5	108	77-123
1,2,4-Trimethylbenzene	mg/kg (ppm)	2.5	106	77-119
sec-Butylbenzene	mg/kg (ppm)	2.5	105	78-120
p-Isopropyltoluene	mg/kg (ppm)	2.5	105	77-120
1,3-Dichlorobenzene	mg/kg (ppm)	2.5	102	76-112
1,4-Dichlorobenzene	mg/kg (ppm)	2.5	101	74-109
1,2-Dichlorobenzene	mg/kg (ppm)	2.5	103	75-114
1,2-Dibromo-3-chloropropane	mg/kg (ppm)	2.5	105	68-122
1,2,4-Trichlorobenzene	mg/kg (ppm)	2.5	107	75-122
Hexachlorobutadiene	mg/kg (ppm)	2.5	108	74-130
Naphthalene	mg/kg (ppm)	2.5	104	73-122
1,2,3-Trichlorobenzene	mg/kg (ppm)	2.5	102	75-117

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/27/19

Date Received: 12/18/19

Project: Kosmos, F&BI 912340

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 912340-01 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	68	30-123
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	67	26-131

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	93	89	55-137	4
Aroclor 1260	mg/kg (ppm)	0.25	93	92	51-150	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

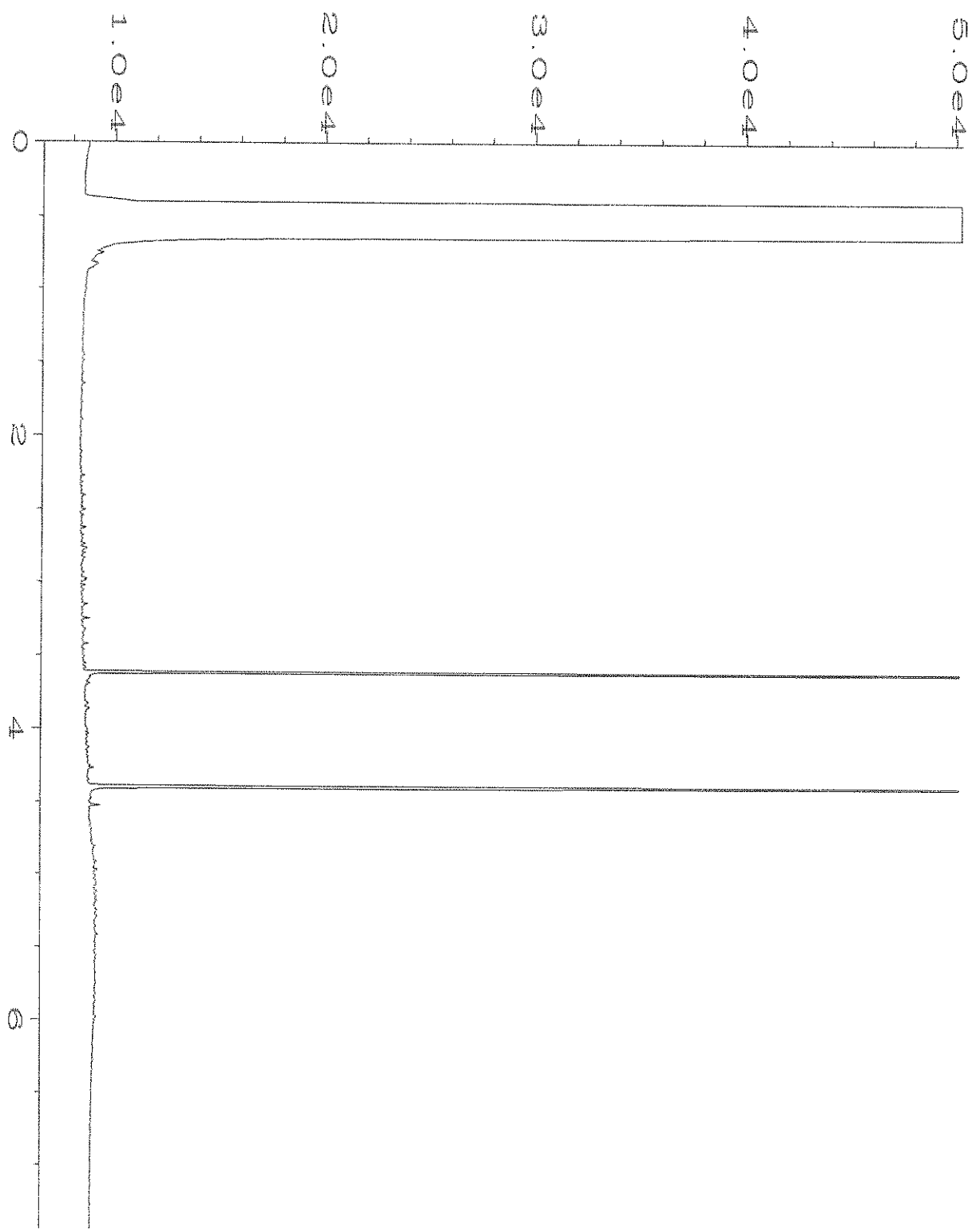
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

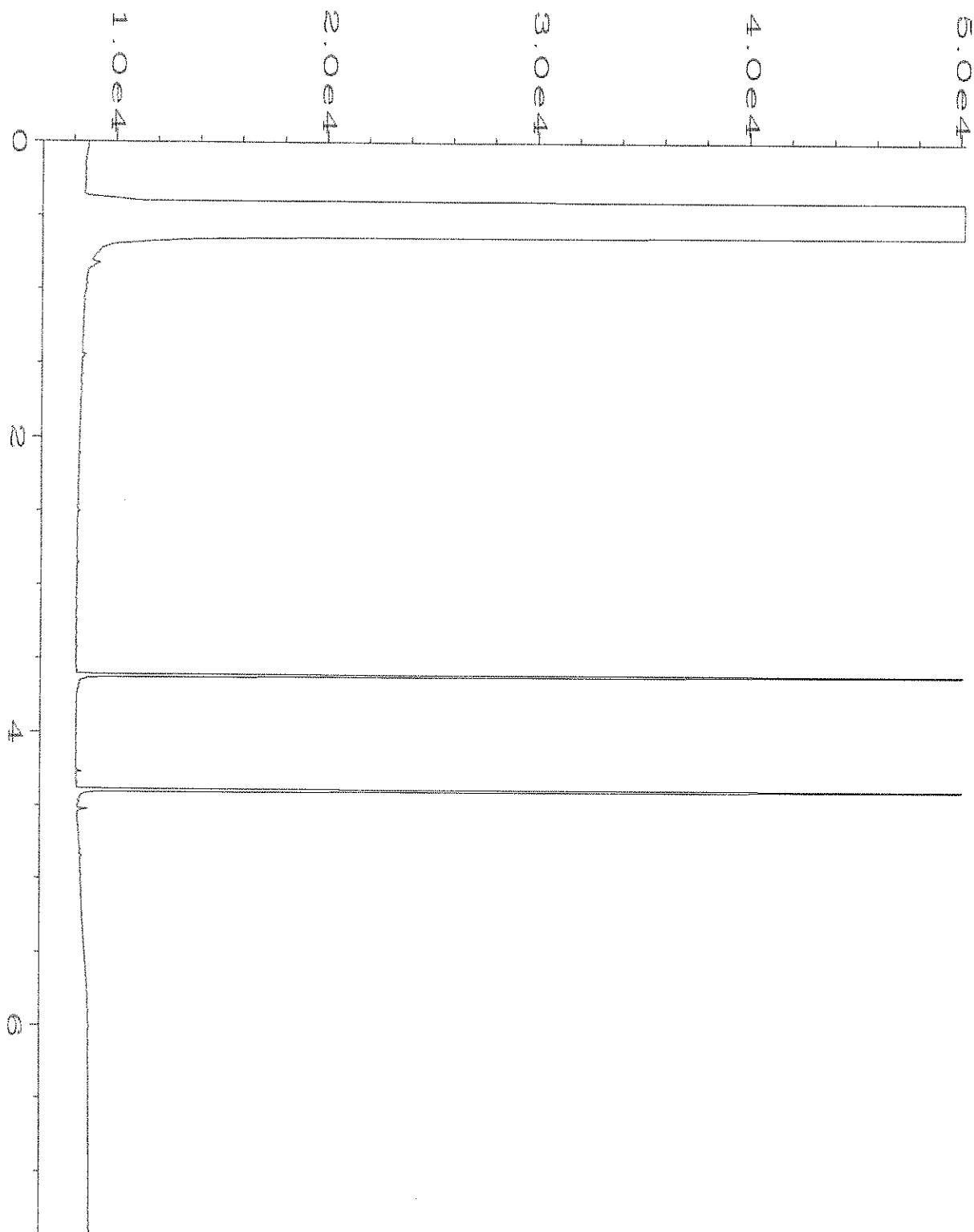
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

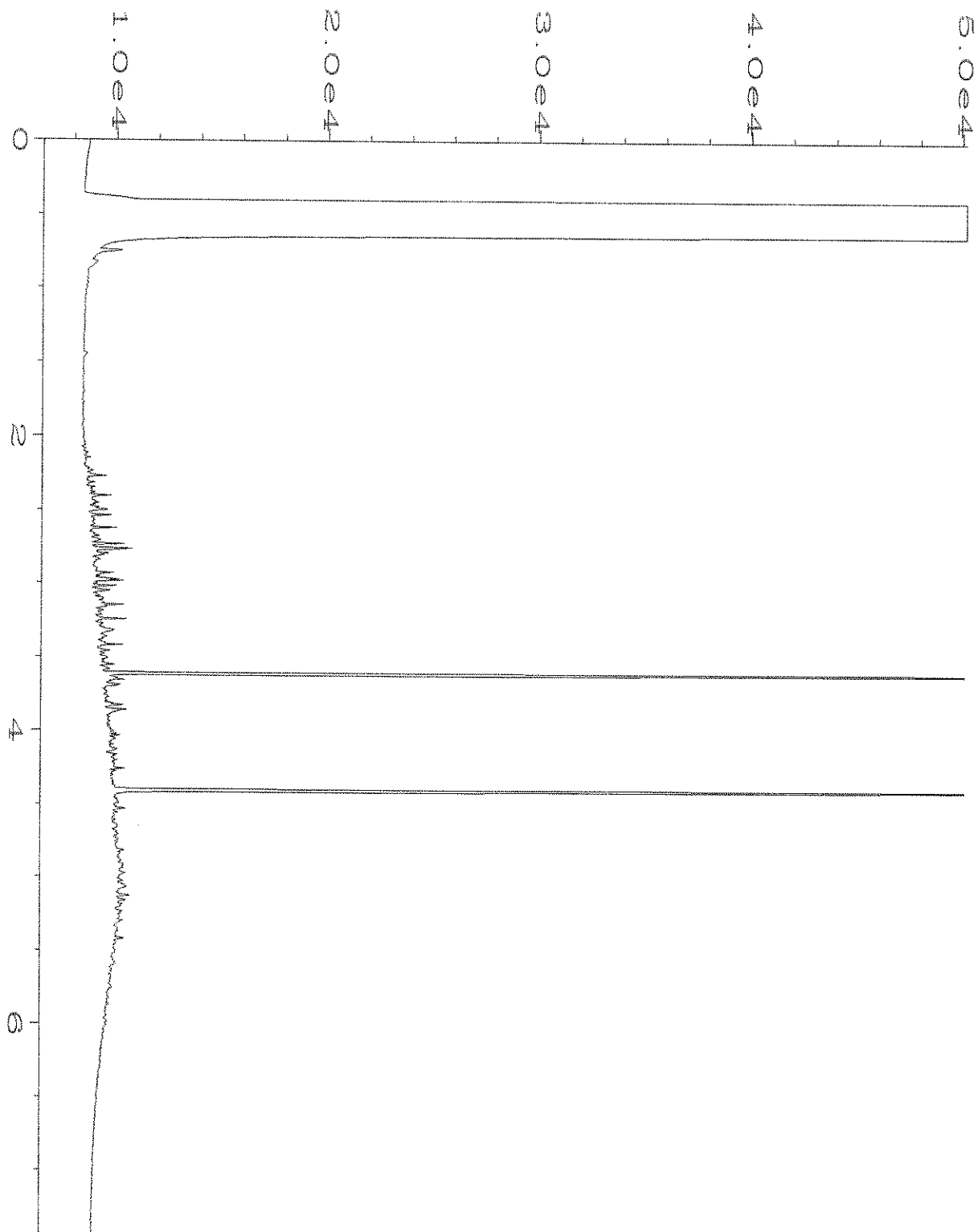
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



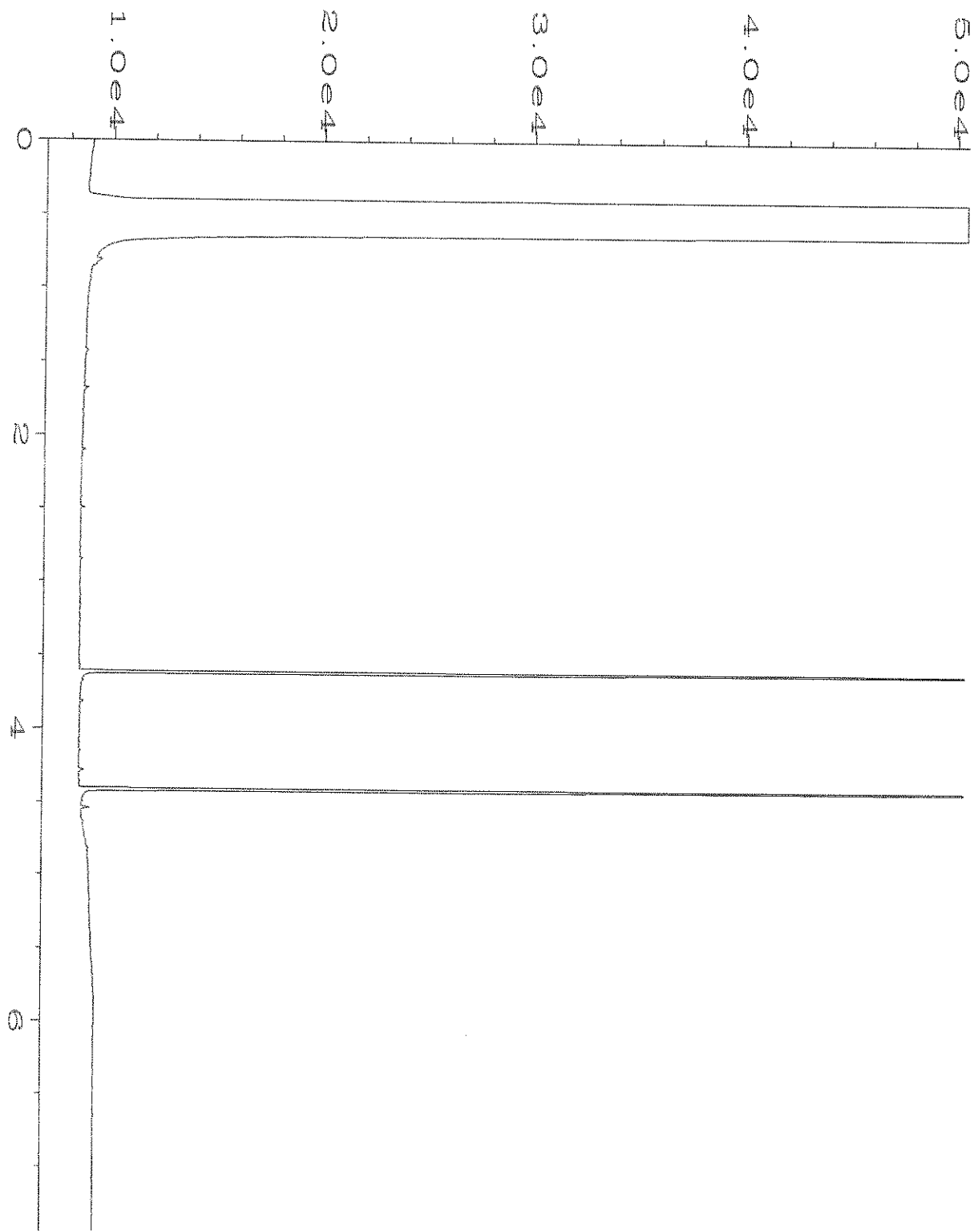
Data File Name	: C:\HPCHEM\1\DATA\12-20-19\010F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 10
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912340-01	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 10:52 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



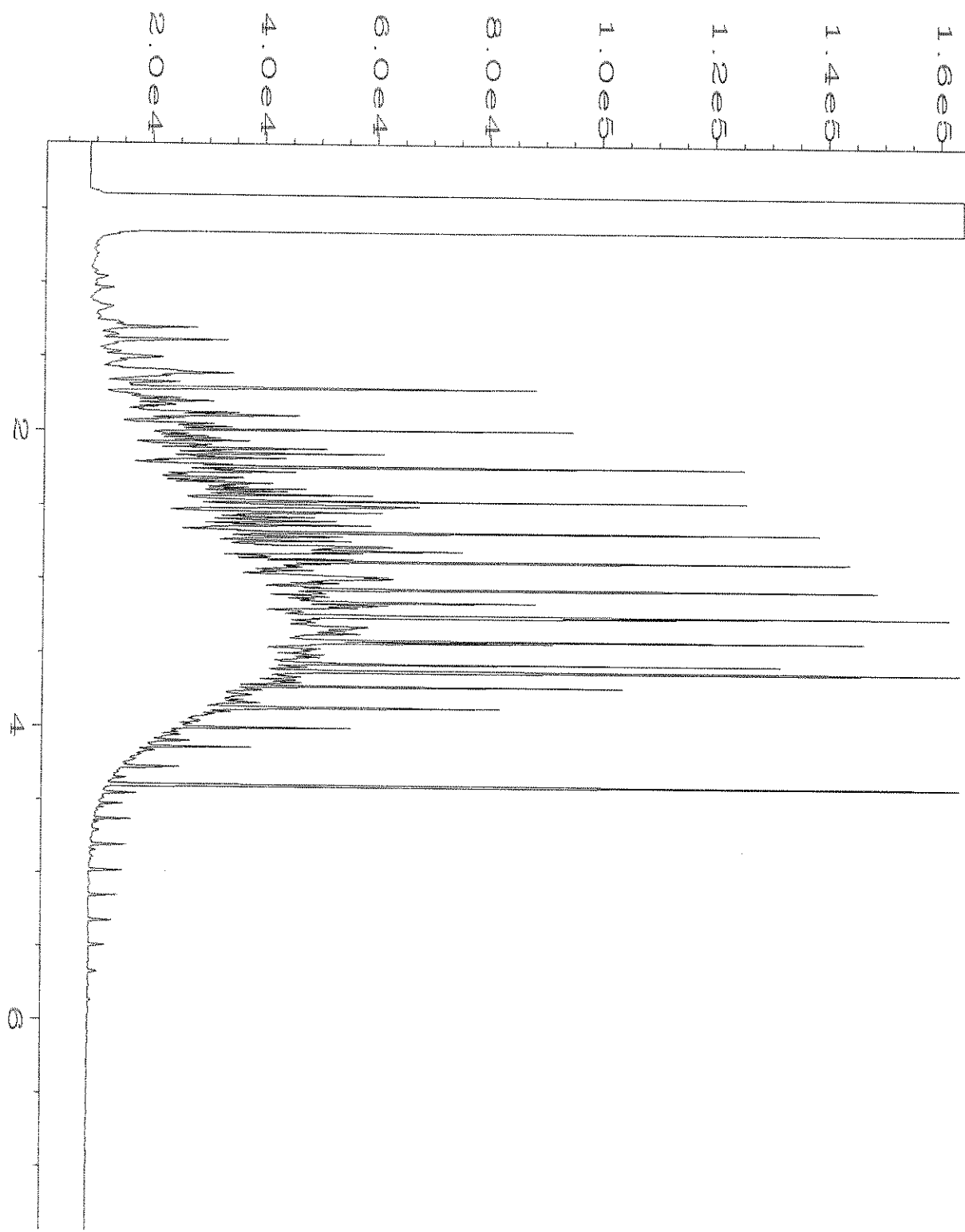
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Operator	: TL	Vial Number	: 11
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912340-02	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 11:03 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-20-19\012F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 12
Instrument	: GC1	Injection Number	: 1
Sample Name	: 912340-03	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 12:46 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-20-19\006F0301.D	Page Number	: 1
Operator	: TL	Vial Number	: 6
Instrument	: GC1	Injection Number	: 1
Sample Name	: 09-3089 mb	Sequence Line	: 3
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 10:08 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:14 AM		



Data File Name	: C:\HPCHEM\1\DATA\12-20-19\003F0201.D	Page Number	: 1
Operator	: TL	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 Dx 58-146B	Sequence Line	: 2
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 20 Dec 19 05:54 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	23 Dec 19 10:13 AM		

312235-912842
B

SAMPLE CHAIN OF CUSTODY ME 12/18/19

Page # 05-24 of 201


Report To Angie Goodwin

Company _____

Address _____

City, State, ZIP _____


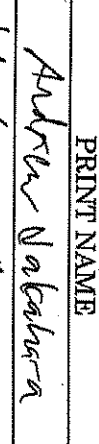
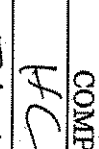
Phone _____ Email _____

SAMPLERS (signature) 		PROJECT NAME <u>Camis</u>	PO # _____
REMARKS _____		INVOICE TO _____	
Project specific RIs? - Yes / No			

Standard turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED						Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270		PCBs EPA 8082	
UB-1	51A-E	12/18	928	Soil	5	X	X			X	X			
UB-2	021	↓	935	↓	↓	X	X			X	X			
UB-3	031	↓	948	↓	↓	X	X			X	X			

Relinquished by: 		SIGNATURE	
Received by: 		PRINT NAME <u>Andrew Nakahara</u>	
Relinquished by: _____		COMPANY <u>ATC</u>	
Received by: 		DATE <u>12/18/19</u>	
Relinquished by: _____		TIME <u>18:29</u>	
Received by: _____		Samples received at <u>60C</u>	

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 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282