

December 13, 1996

Hamlet of Baker Lake
Works Department
Box 149
Baker Lake, NWT
XOC OAO

Attention: Hugh Ikoe
Director Municipal Services

Interpretation of Soil and Surface Water Test Results

This letter is in response to your request of November 26, 1996 for Dillon to review analytical results of soil and surface water sampling completed by the Hamlet of Baker Lake down gradient of the decommissioned Northwest Territories Power Corporation (NWTPC) diesel-electric power generating station.

Background

From the information provided by the Hamlet of Baker Lake, Dillon understands that:

- Soil and surface water sampling was initiated in the area of the former diesel-electric generating station in response to visual observations of 'fuel' believed to be originating from this source.
- A total of two (2) soil and two (2) surface water samples were recovered by Hamlet staff on August 27, 1996 as follows:
 - Water sample PHD-1, and soil sample BHD-2 were collected from a ditch running alongside the roadway immediately south of the Northwest Territories Power Corporation site. The soil sample was reportedly recovered from surficial soils. The Hamlet of Baker Lake indicated that these samples may have been collected from an area within assumed NWTPC property lines.
 - Water sample B1 and soil sample B1-1 were collected near the shoreline of Baker Lake. It was reported by the Hamlet that sample B1 was collected from a local depression which had accumulated water that had 'leached' from the area soils.

The approximate locations of these samples are shown on a site sketch prepared by the Hamlet for Dillon's purposes.

continued...


DILLON
CONSULTING

5102
51st Street
Suite 201
Yellowknife, N.T.
Canada
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Dillon Consulting
Limited

Page 2
Hamlet of Baker Lake
December 13, 1996

- Samples were forwarded by the Hamlet to Envirotech Laboratories of Edmonton, Alberta for Benzene, Toluene, Ethyl benzene, Xylenes (together referred to as BTEX compounds), Total Volatile Hydrocarbons, and Total Extractable Hydrocarbons analysis.

Data Results

To evaluate potential environmental impacts to soil and water, test results are compared to appropriate criteria levels. Selected criteria levels represent concentrations of specific compounds (or groups of compounds) above which mitigation may be required. Existing criteria levels have been established on the basis of the type of land use and on the basis of the use for water.

For the specific purpose of reviewing the test results obtained by the Hamlet of Baker Lake, Dillon considered the following guidelines for the establishment of appropriate criteria levels:

- 1) **Soil** The Government of the Northwest Territories, Department of Resource, Wildlife, and Economic Development (GNWT) "Environmental Guidelines for Site Remediation". Commercial/industrial criteria levels are considered appropriate for soil located on NWTPC property and residential/parkland criteria are considered appropriate for areas outside and down gradient of the said property.
- 2) **Water** The Canadian Council of Ministers of the Environment (CCME) "Interim Canadian Environmental Guidelines for Contaminated Sites" - 1991, and Quebec Ministry of Environment "Summary of Contaminant Rehabilitation Policy" - 1988. Quebec Level C criteria has been established for industrial sites and as such, it is considered appropriate that surface water located on NWTPC property meet this guideline. For surface water down gradient of the NWTPC site, CCME Guidelines for Freshwater Aquatic Life are considered appropriate.

Analytical results obtained for review from the Hamlet are appended to this letter and summarized in the following Table Nos. 1 and 2.

As shown in Table No. 1, test results from the two soil samples show:

- BTEX compounds in both samples are below selected criteria levels for commercial/industrial and residential/parkland sites.
- Total Petroleum Hydrocarbon (TPH) levels in sample BHD-2 (closest to former diesel-electric generator location) exceeding selected criteria for both residential/parkland

and commercial/industrial sites. The TPH concentration in this sample was measured at 15,007 parts per million in comparison to the selected commercial/industrial criteria level of 2,500 parts per million.

- A TPH concentration in sample B1-1 of 26.6 parts per million. This concentration is below the selected criteria level of 500 parts per million for this location.

As shown in Table No. 2, test results from the two water samples show:

- BTEX compounds in both samples below selected criteria levels for commercial/industrial and residential/parkland sites.
- Total Petroleum Hydrocarbon (TPH) levels in sample PHD-1 exceeding selected criteria for industrial sites. The TPH concentration in this sample was measured at 22,000 parts per billion in comparison to the selected criteria level of 5,000 parts per billion.
- A TPH concentration in sample B1 of 6,300 parts per billion. This concentration is above the criteria level of 5,000 parts per billion for industrial sites. Criteria levels have not been established for residential/commercial sites.

Conclusions and Recommendations

From the information presented to Dillon by the Hamlet of Baker Lake, there are indications that on August 27, 1996, hydrocarbon based compounds were present in soils and surface water down gradient of the former diesel-electric generator installation in quantities exceeding selected levels.

Based on these results, it is recommended that:

- A historic spill search be conducted of the Department of Resource, Wildlife and Economic Development database.
- Area land use be reviewed to identify potential sources of hydrocarbon product release to this area.
- Information is solicited from NWTPC with respect to any reports that are available on the closure of the former diesel-electric power generating station.
- Additional intrusive investigations are initiated to:
 - Estimate quantities of impacted soil (area and volume) above selected criteria levels.

TABLE 2
PETROLEUM HYDROCARBON RESULTS (WATER)

Identification	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Volatile Hydrocarbons (TVH)	Total Extractable Hydrocarbons (TEH)	Total Petroleum Hydrocarbons
PHD-1	BMDL	BMDL	BMDL	4.6	BMDL	22,000	22,000
B1	0.6	BMDL	BMDL	BMDL	BMDL	6,300	6,300
CCME Remediation Criteria							
Freshwater Aquatic Life	300	300	700	—	—	—	—
Quebec Criteria Level C, Industrial Sites	5	100	150	60	3,000*	—	5,000**

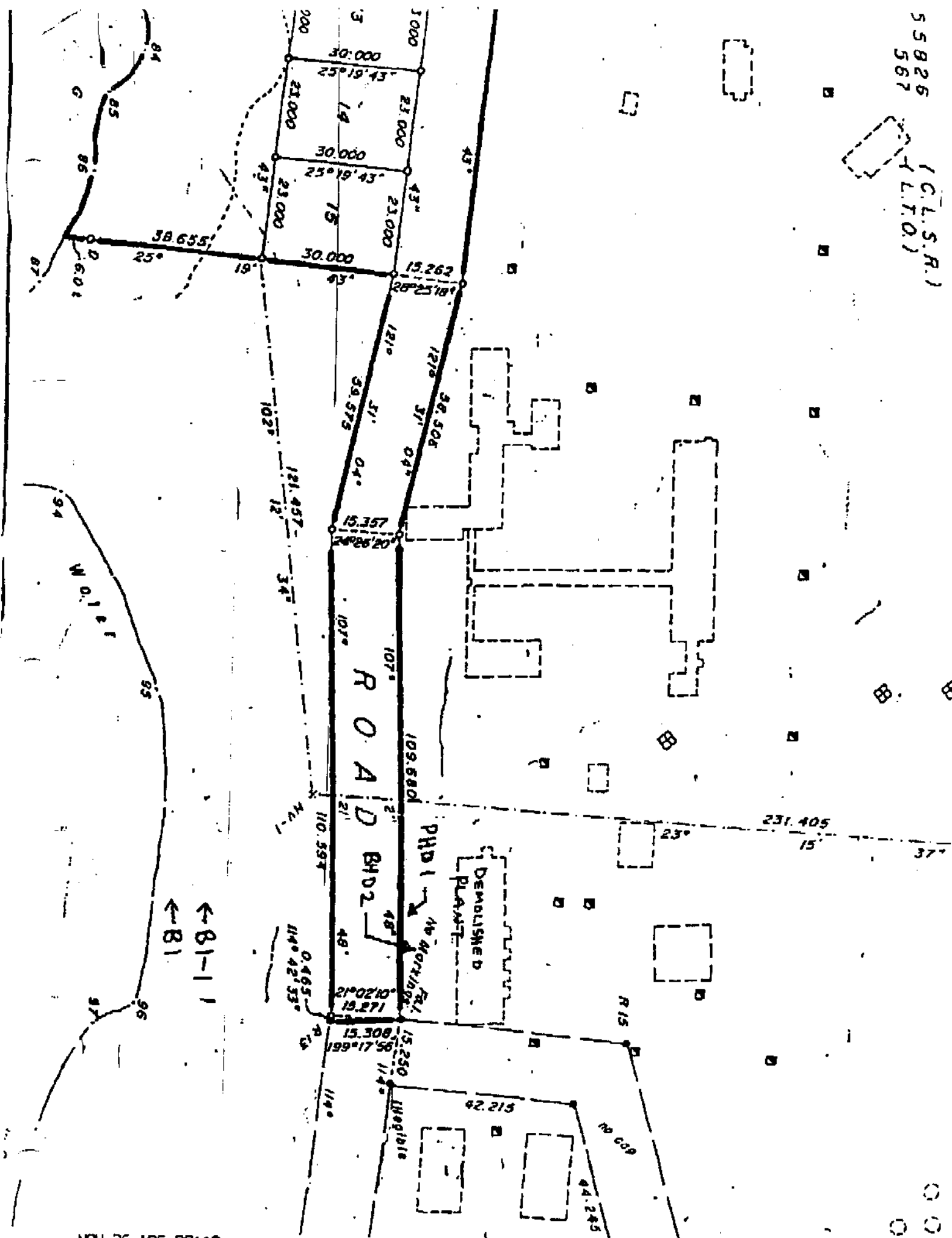
Notes:

1. All concentrations are presented in ug/l or parts per billion (ppb).
2. Total Petroleum Hydrocarbon is the sum of TVH and TEH concentrations.
3. — No criteria established.
BMDL - Below laboratory detection limit.

* Gasoline
** Mineral Oil and Grease

55826
567

(C.L.S.R.)
(L.T.O.)



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8197932251

PAGE 04

4033606369; 817/18

CHEMICAL ANALYSIS REPORT

HAMLET OF BAKER LAKE
BAKER LAKE
NT X0C 0A0

DATE: September 10, 1996

ATTN: H. IKOE

Lab Work Order #: E609016

Sampled By: H. IKOE

Project Reference: NOT SUBMITTED

Date Received: 08/31/96

Project P.O.#: 149

Comments:

APPROVED BY:



Ron Minks
Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE
ADDITIONAL SAMPLE STORAGE TIME.

ACCREDITATIONS: STANDARDS COUNCIL OF CANADA (SCC), IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR
ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL); FOR SPECIFIC TESTS AS REGISTERED BY THE
COUNCIL (EDMONTON, CALGARY)
AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA); FOR INDUSTRIAL HYGIENE ANALYSIS (EDMONTON)
AGRICULTURE CANADA: UNDER THE CANADIAN FERTILIZER QUALITY ASSURANCE PROGRAM (SASKATOON)

E809016 CONT...
PAGE 2**ENVIRO-TEST CHEMICAL ANALYSIS REPORT**

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	EXTRACTED	ANALYZED	
E809016-01 PHD-1 Sample Type:WATER Collected:08/27/96		BTEX, TVH and TEH in Water BTEX and TVH in Water Benzene Toluene Ethylbenzene Xylenes Total Volatiles Total Extractables (Water)	< 0.5 < 0.5 < 0.5 4.8 < 100 22000	0.5 0.5 0.5 0.5 100 50	ug/L (ppb) ug/L (ppb) ug/L (ppb) ug/L (ppb) ug/L (ppb) ug/L (ppb)	09/05/96 09/05/96 09/05/96 09/05/96 09/05/96 09/05/96	09/05/96 09/05/96 09/05/96 09/05/96 09/05/96 09/07/96	CAS CAS CAS CAS CAS CAS
E809016-02 B-1 Sample Type:WATER Collected:08/27/96		BTEX, TVH and TEH in Water BTEX and TVH in Water Benzene Toluene Ethylbenzene Xylenes Total Volatiles Total Extractables (Water)	0.6 < 0.5 < 0.5 < 0.5 < 100 6300	0.5 0.5 0.5 0.5 100 50	ug/L (ppb) ug/L (ppb) ug/L (ppb) ug/L (ppb) ug/L (ppb) ug/L (ppb)	09/05/96 09/05/96 09/05/96 09/05/96 09/05/96 09/05/96	09/05/96 09/05/96 09/05/96 09/05/96 09/05/96 09/07/96	CAS CAS CAS CAS CAS CAS
E809016-03 B1-1 Sample Type:SOIL Collected:08/27/96		BTEX, TVH and TEH in Soil BTEX and TVH in Soil Benzene Toluene Ethylbenzene Xylenes Total Volatiles % Moisture Total Extractables (Soil)	< 0.005 < 0.005 < 0.005 < 0.005 0.6 21.8 28	0.005 0.005 0.005 0.005 0.1 5.0	ug/g (ppm) ug/g (ppm) ug/g (ppm) ug/g (ppm) ug/g (ppm) % ug/g (ppm)	09/06/96 09/06/96 09/06/96 09/06/96 09/06/96 09/06/96 09/06/96	09/06/96 09/06/96 09/06/96 09/06/96 09/06/96 09/07/96 09/06/96	QV. QVP QVP QVP QVP SVN QVP
E809016-04 BHD-2 Sample Type:SOIL Collected:08/27/96		BTEX, TVH and TEH in Soil BTEX and TVH in Soil Benzene Toluene Ethylbenzene Xylenes Total Volatiles % Moisture Total Extractables (Soil)	< 0.005 < 0.005 0.047 0.18 7.4 28.6 15000	0.005 0.005 0.005 0.005 0.1 5.0	ug/g (ppm) ug/g (ppm) ug/g (ppm) ug/g (ppm) ug/g (ppm) % ug/g (ppm)	09/06/96 09/06/96 09/06/96 09/06/96 09/06/96 09/06/96 09/06/96	09/06/96 09/06/96 09/06/96 09/06/96 09/06/96 09/07/96 09/06/96	QVP QVP QVP QVP QVP SVN QVP
N.D. - NOT DETECTED, LESS THAN THE DETECTION LIMIT THIS IS THE FINAL PAGE OF THE REPORT								

NOV 26 '96 09:40

4033606369; 81/6#

SENT BY: NUNAVUT WATER BOARD; 2-11-97 12:04PM; 819 793 2332 =>

11:27:27 11/26/96

20:50:07

Appendix A Test Methodologies**BTEX and TVH in Soil**

NOTE: All results reported on dry weight basis.

Total Volatiles: This semi-quantitative result is a summation from the C3 to C10 carbon range (including benzene, toluene, ethylbenzene, and xylenes) and is calculated against a gasoline standard.

BTEX METHOD REFERENCE: Modified EPA SW-846 Method-5021/8015 and 8020.

QA/QC SUMMARY FOR BTEX:

TEST	ACCURACY	PRECISION
BTEX (Soil)	98%	± 15%

NOTE: Accuracy is expressed as the average % recovery and Precision as the relative standard deviation (RSD) of fortifications made using certified standards (BTEX).

BTEX and TVH in Water

Total Volatiles: This semi-quantitative result is a summation from the C3 to C10 carbon range (including benzene, toluene, ethylbenzene, and xylenes) and is calculated against a calibrated gasoline standard.

BTEX METHOD REFERENCE: Modified EPA SW-846 Method-5030/8015 and 8020.

QA/QC FOR BTEX:

TEST	ACCURACY	PRECISION
BTEX (Water)	95%	± 8%

NOTE: Accuracy is expressed as the average % recovery and Precision as the relative standard deviation (RSD) of fortifications made using certified standards (BTEX).

% Moisture

Preparation Method: Sample is oven dried at 105 degrees C
Instrumental Method: Gravimetric analysis

Total Extractables (Soil)

NOTE: All results reported on dry weight basis.

Total Extractables: This result is a summation of the hydrocarbon concentration from the C11 to C30 carbon range (excluding benzene, toluene, ethylbenzene, and xylenes) and is calculated against a calibrated diesel standard.

TOTAL EXTRACTABLES METHOD REFERENCE: Modified EPA SW-846 Method-3550 or 3580/8000

QA/QC FOR TEH:

TEST	ACCURACY	PRECISION
Total Extractables (Soil)	115%	± 18%

NOTE: Accuracy is expressed as the average % recovery and Precision as the relative standard deviation (RSD) of fortifications made using in house standards (total extractables).

Appendix A Test Methodologies**Total Extractables (Water)**

Total Extractables: This result is a summation of the hydrocarbon concentration from the C11 to C30 carbon range (excluding benzene, toluene, ethylbenzene, and xylenes) and is calculated against a calibrated diesel standard.

TOTAL EXTRACTABLES METHOD REFERENCE: Modified EPA SW-846 Method-3510/8000

QA/QC FOR TEH:

TEST	ACCURACY	PRECISION
Total Extractables (Water)	84%	± 22%

NOTE: Accuracy is expressed as the average % recovery and Precision as the relative standard deviation (RSD) of fortifications made using in house standards (total extractables).

THIS IS THE LAST PAGE OF THE METHODOLOGY APPENDIX.

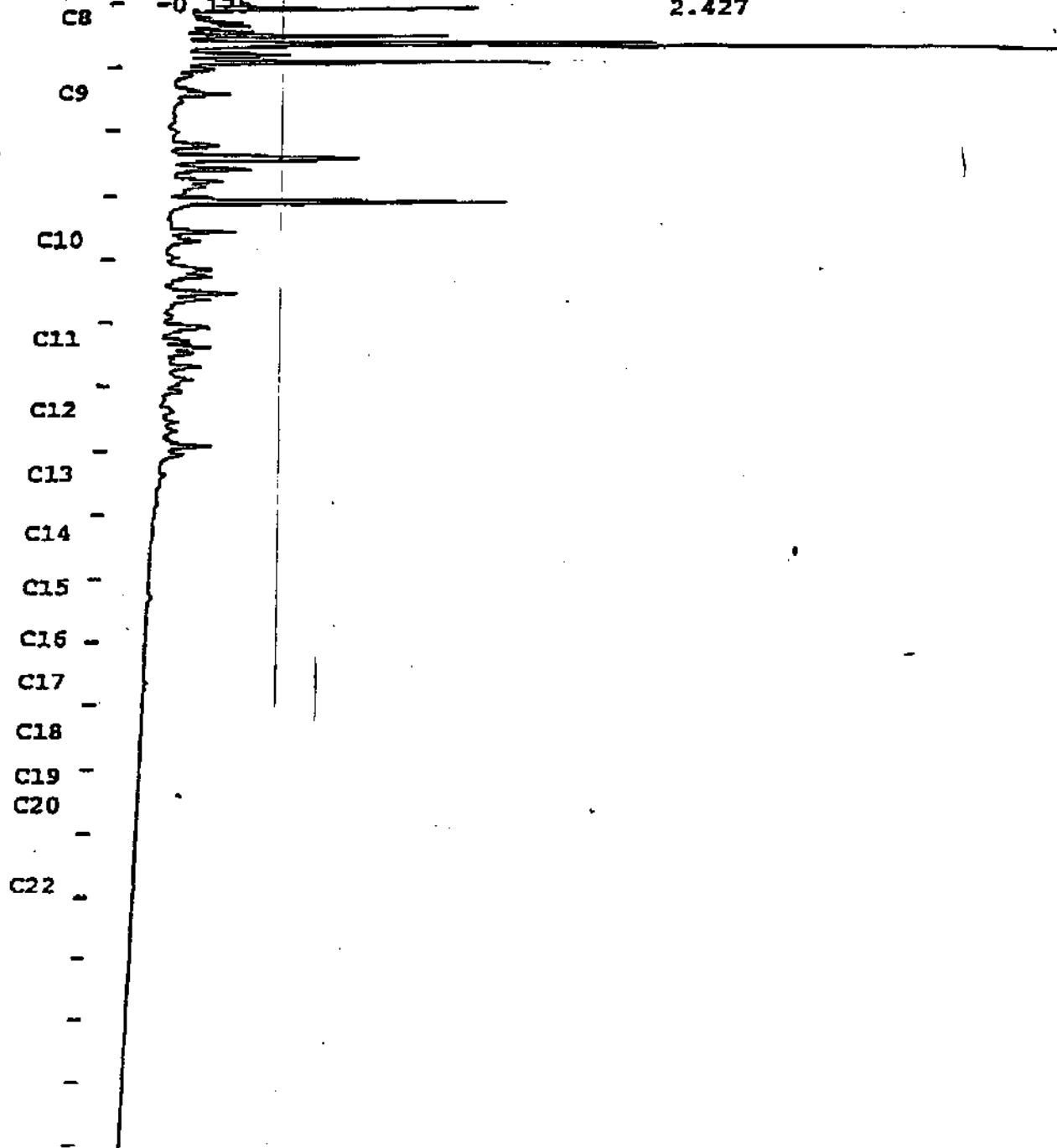
File : Total Extractable Hydrocarbons
 Run File : G:\STAR\MODULE16\auga243.RUN
 Method File : G:\STAR\C-RANGEA.MTH
 Sample ID : GAS STD

Injection Date: 6-SEP-96 5:55 PM Calculation Date: 6-SEP-96 6:21 PM

Operator : UST Group Detector Type: ADCB (10 Volts)
 Workstation: SYS Bus Address : 16
 Instrument : Varian 3600 "A" Sample Rate : 10.00 Hz
 Channel : A = A 10-12 Run Time : 26.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 1.03 cm/min Attenuation = 1988 Zero Offset = 2%
 Start Time = 1.850 min, End Time = 21.000 min Min./Tick = 1.00
 Volts = -0.125 2.427



Title : Total Extractable Hydrocarbons
in File : G:\STAR\MODULE16\auga252.RUN
Method File : G:\STAR\C-RANGEA.MTH
Sample ID : Diesel std 742 ppm

Injection Date: 7-SEP-96 0:32 AM

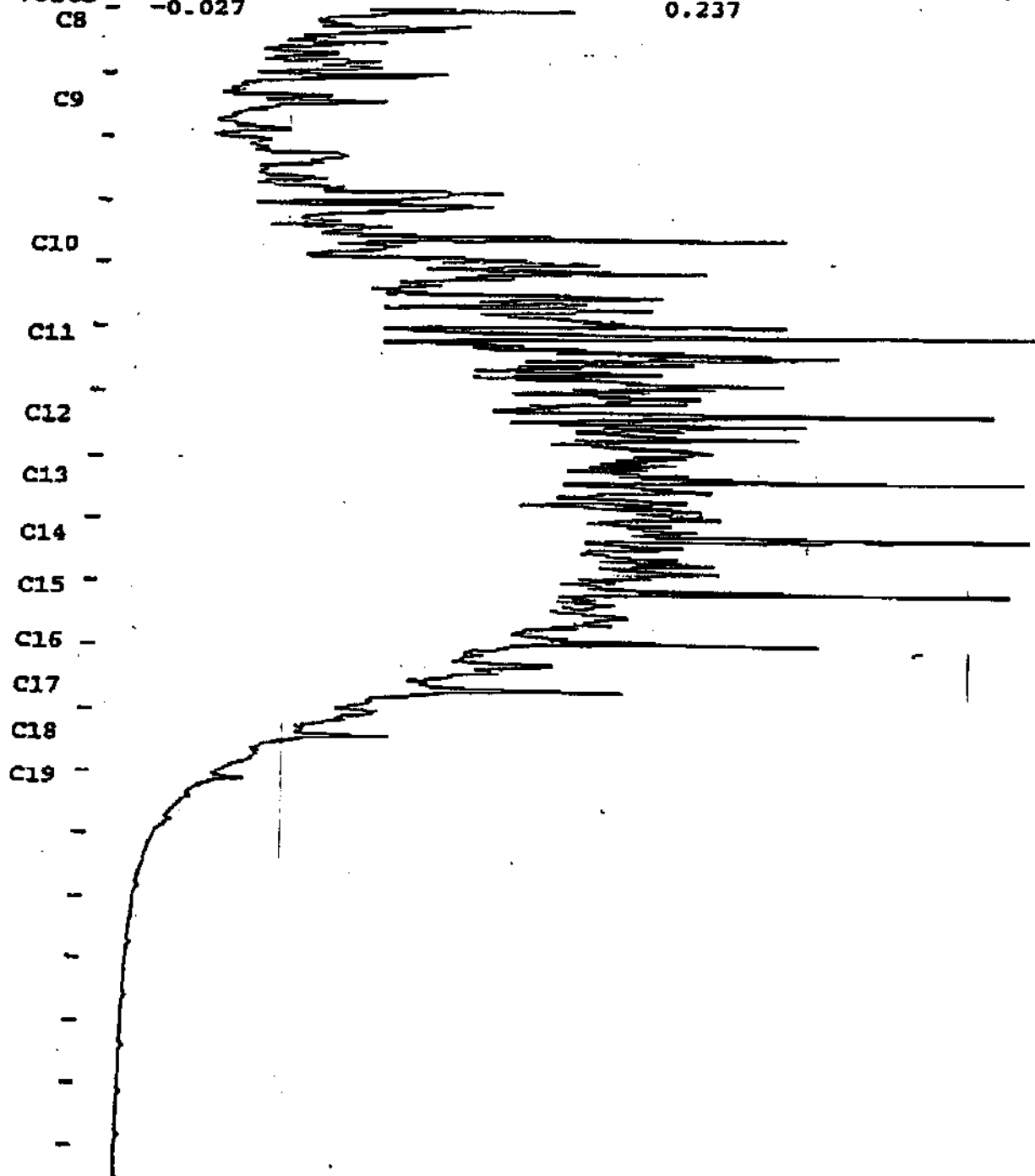
Calculation Date: 7-SEP-96 0:58 AM

Operator : UST Group
Workstation: SYS
Instrument : Varian 3600 "A"
Channel : A = A 10-12

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 26.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 1.03 cm/min Attenuation = 193 Zero Offset = 52
Start Time = 1.850 min End Time = 21.000 min Min./Tick = 1.00
Volts -0.027 0.237



Title : Total Extractable Hydrocarbons
 Run File : G:\STAR\MODULE18\augb267.RUN
 Method File : G:\STAR\C-RANGE8.MTH
 Sample ID : E609016-01-2

Injection Date: 7-SEP-96 2:45 PM

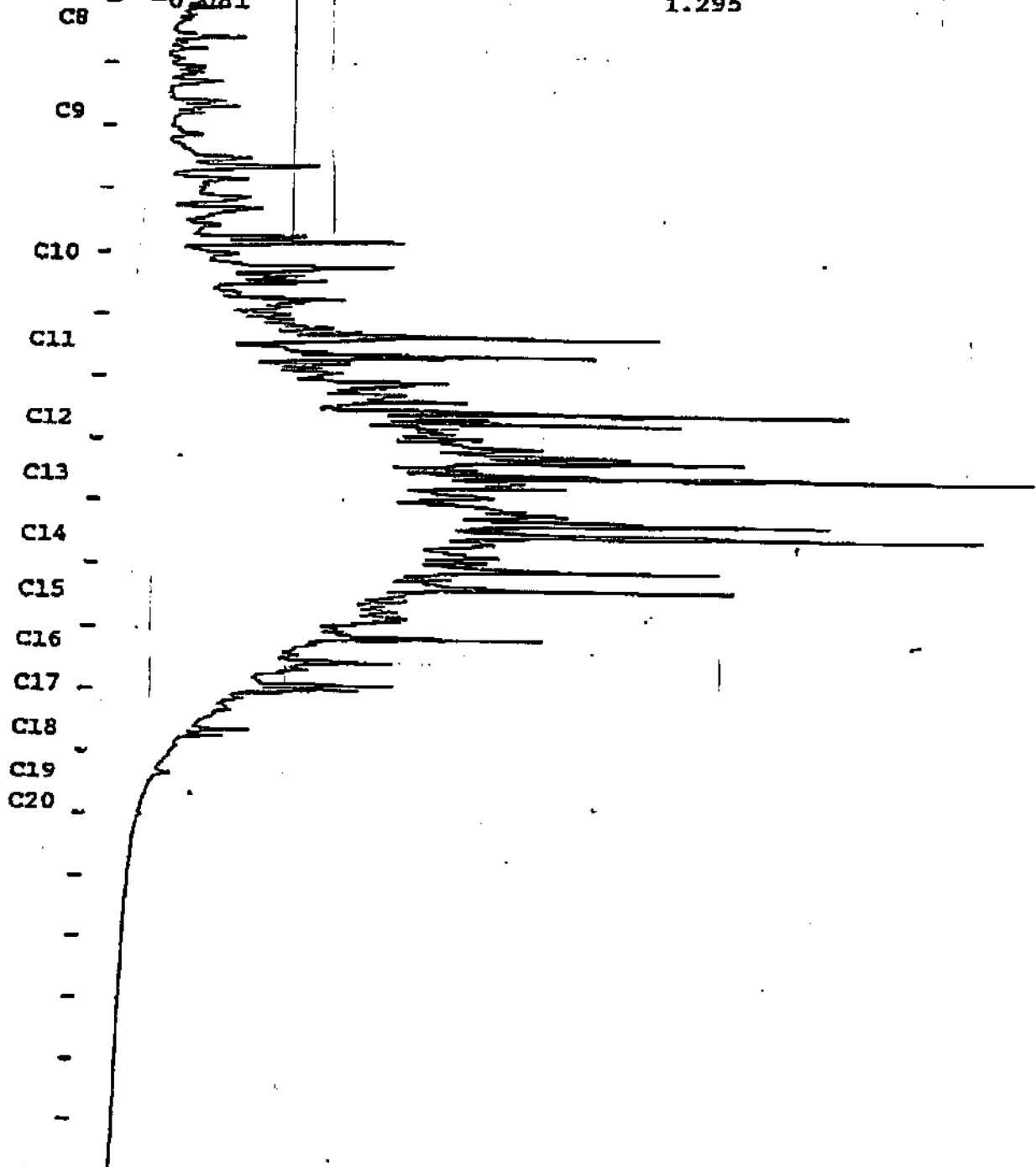
Calculation Date: 7-SEP-96 3:13 PM

Operator : UST Group
 Workstation: SYS
 Instrument : Varian 3600 "B"
 Channel : A - FID 10-12

Detector Type: ADCB (10 Volts)
 Bus Address : 18
 Sample Rate : 10.00 Hz
 Run Time : 28.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 1.03 cm/min Attenuation = 1060 Zero Offset = 31
 Start Time = 11.700 min End Time = 21.000 min Min./Tick = 1.00
 Volts -0.081 1.295



NOV 26 '96 09:41

403 437 2311

PAGE 08

#14/18 403606369;

SENT BY: NONAVUT WATER BOARD; 2-11-97 12:07PM; 819 793 2332 ->

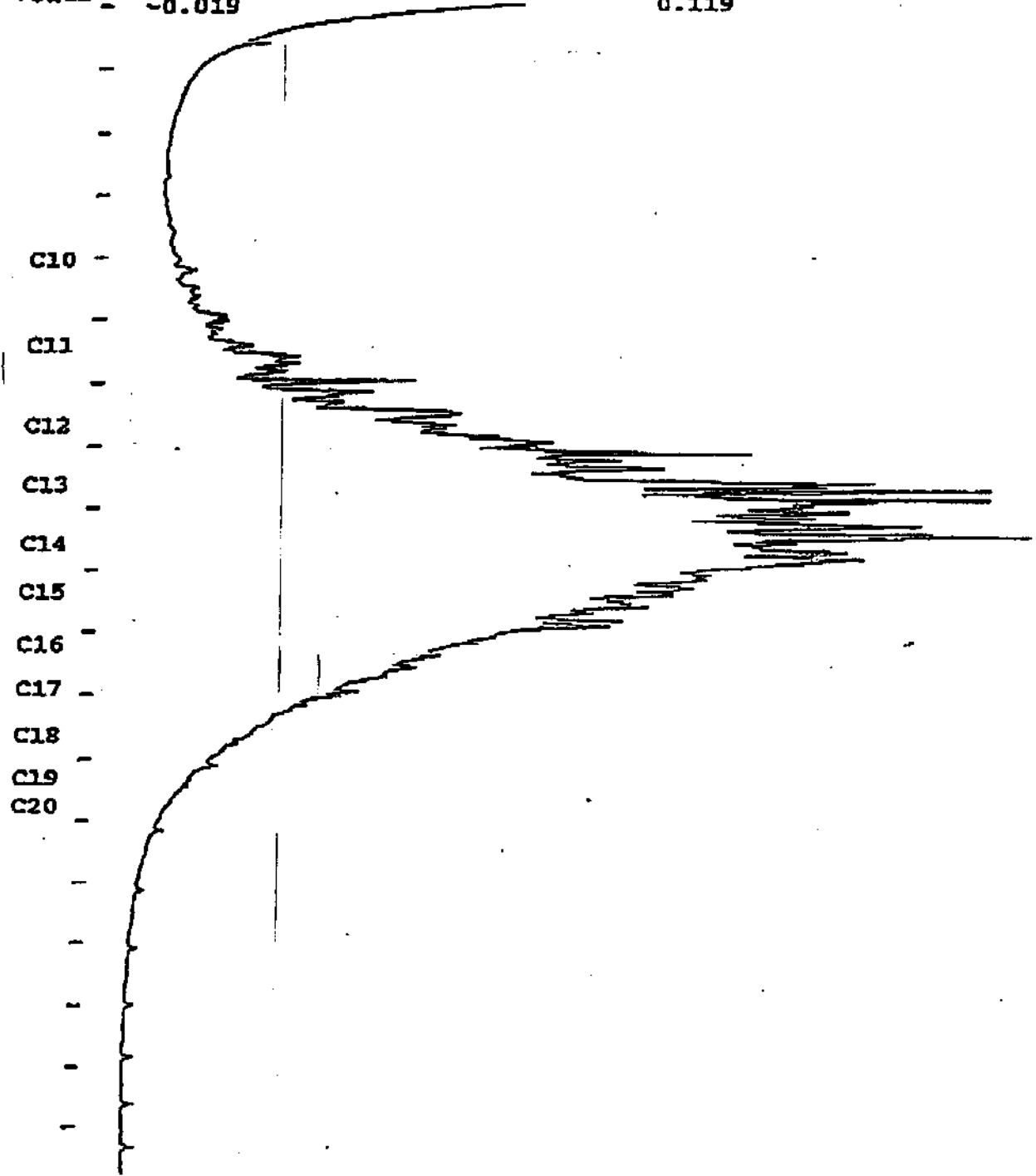
Title : Total Extractable Hydrocarbons
In File : G:\STAR\MODULE18\augh268.RUN
Method File : G:\STAR\C-RANGE.MTH
Sample ID : E609016-02-4

Injection Date: 7-SEP-96 3:30 PM Calculation Date: 7-SEP-96 3:58 PM

Operator : UST Group Detector Type: ADCB (10 Volts)
Workstation: SYS Bus Address : 18
Instrument : Varian 3600 "B" Sample Rate : 10.00 Hz
Channel : A = FID 10-12 Run Time : 28.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 1.03 cm/min Attenuation = 97 Zero Offset = 8%
Start Time = 1.700 min End Time = 21.000 min Min./Tick = 1.00
Volts = -0.019 0.119



Title : Total Extractable Hydrocarbons
Run File : G:\STAR\MODULE16\auga255.RON
Method File : G:\STAR\C-RANGEA.MTH
Sample ID : E609016-03-10

Injection Date: 7-SEP-96 2:44 AM

Calculation Date: 7-SEP-96 3:11 AM

Operator : UST Group
Workstation: SYS
Instrument : Varian 3600 "A"
Channel : A = A 10-12

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 26.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 1.03 cm/min Attenuation = 34 Zero Offset = 15%
Start Time = 1.850 min, End Time = 21.000 min, Min./Tick = 1.00
Volts = -0.013 0.042

C13
C14
C15
C16
C17
C18
C19

Title : Total Extractable Hydrocarbons
In File : G:\STAR\MODULE16\auga256.RUN
Method File : G:\STAR\C-RANGEA.MTH
Sample ID : E609016-04-10

Injection Date: 7-SEP-96 3:29 AM

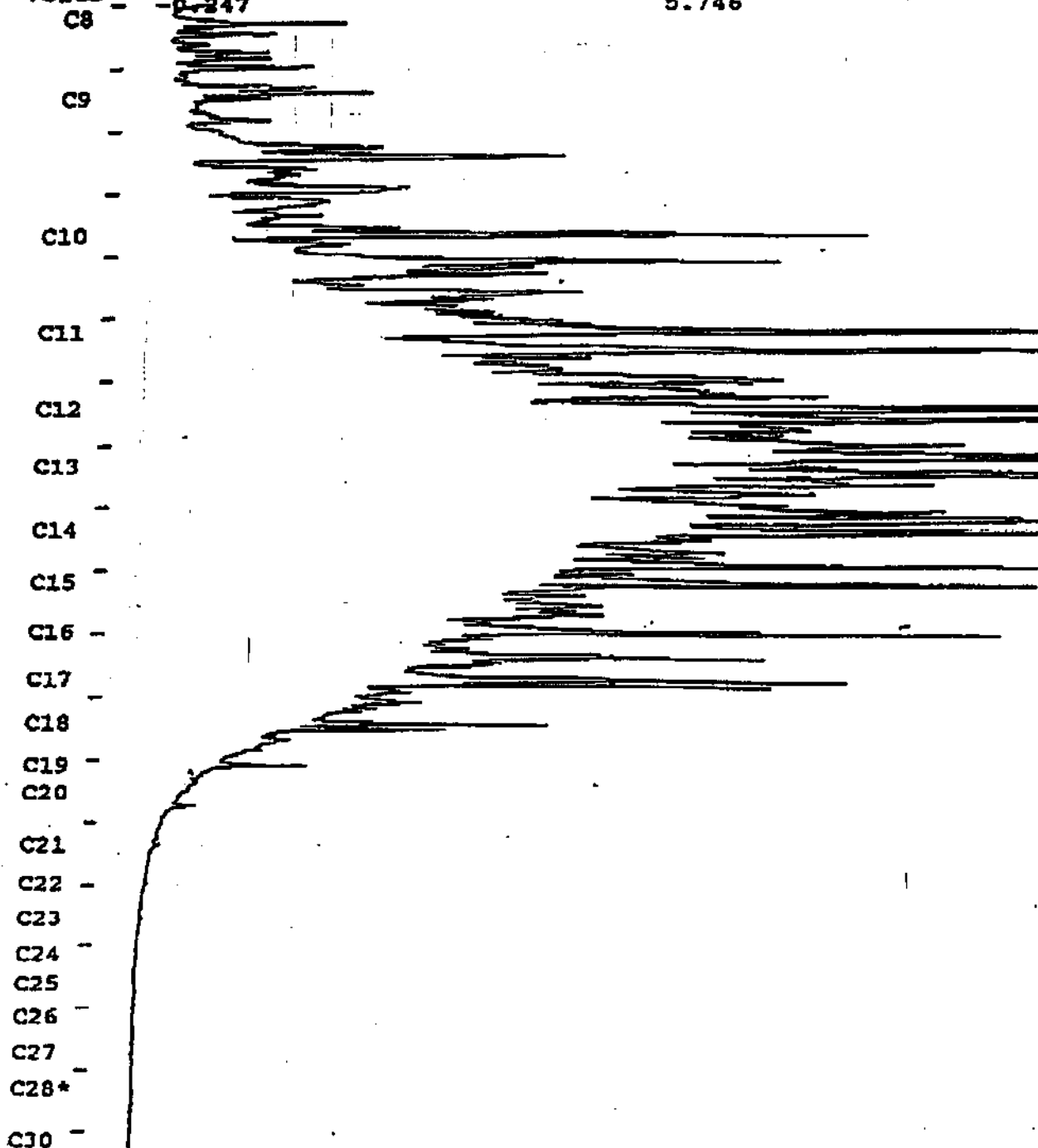
Calculation Date: 7-SEP-96 3:55 AM

Operator : UST Group
Workstation: SYS
Instrument : Varian 3600 "A"
Channel : A = A-10-12

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 26.002 min

***** Star Chromatography Software ***** Version 4.0 *****

Chart Speed = 1.03 cm/min Attenuation = 4707 Zero Offset = 22
Start Time = 1.850 min, End Time = 21.000 min Min./Tick = 1.00
Volts = -0.247 5.746



EFL Enviro-Test LABORATORIES

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

ANALYSIS REQUESTED:
BY: Paula D. 04/03/96

REG. - 278/Amelia, Edmonton, Alberta T6E 0T6
Edmonton, Tool Free Ltd.
1313 - 44 Avenue NE, Calgary, Alberta T2E 6L5
General Manager: Doug - 12501 Highway Road, Stouffville, Ont. L8A 3B3
1001 Barton Street, Thirder Bay, Ont. L7B 5H2

Telephone: (403) 413-3227 Fax: (403) 423-3211
Telephone: (403) 413-3227 Fax: (403) 423-3211
Telephone: (403) 281-6877 Fax: (403) 281-6877
Telephone: (403) 281-6877 Fax: (403) 281-6877
Telephone: (403) 281-6877 Fax: (403) 281-6877

DATE SUBMITTED: 04/03/96
SERVICE REQUESTED: REGULAR
☐ PRIORITY (50% SURCHARGE)
☐ EMERGENCY (100% SURCHARGE)

DATE REQUIRED: 04/03/96
QUOTE #:

SAMPLE ID	SAFED BY	DATE / TIME SAMPLED	SAMPLE TYPE	LAB SAMPLE NO.
PHD 1	H. Koe	960827	WATER	0609016
PHD 1	H. Koe	960827	WATER	
PHD 1	H. Koe	960827	WATER	
B 1	H. Koe	960827	WATER	
B 1	H. Koe	960827	WATER	
B 1	H. Koe	960827	WATER	
B 1-1	H. Koe	960827	WATER	
BHD-2	H. Koe	960827	SOIL	

NOTES & CONDITIONS:
1. Date & number must be provided in active proper position.
2. Surrounding area with any dependent on complexity of sample & lab included in line of extraction. Please mention the lab to confirm (overseas) time.
3. All hazardous samples submitted must be labeled in sample with W-4115 regulations. This includes the name of the hazard, as well as a contact name and phone number that the lab can contact for further information.

NOTE: Failure to properly complete all portions of this form may delay analysis.

CLIENT: Head of Baker Lake NO. SAMPLES SUBMITTED: 8
CONTACT: H. Koe
REPORT ADDRESS: Baker Lake
PHONE: 819 793 2881
FAX: 11 793 2251

RELINQUISHED BY: DATE: 08/31/96
RECEIVED BY: DATE: 08/31/96
TIME: 1803

SAMPLE CONDITION UPON RECEIPT:
FROZEN: COOL AMBIENT: AMBIENT

OTHER REMARKS, LEAKAGE, ETC.: NO

NO ADDRESS: Head of B.L.
JOB NO: 149

DE COPY: 04/03/96
YET: 04/03/96

EnviroTest

CHIEF OF QUARTERS/ANALYTICAL REQUEST FORM

SABA - Lab

16 DEC 04/13/96

ANALYSIS REQUESTED:

1313 44 Avenue NE, Calgary, Alberta T2E 6E5
 General Phone: 403.271.1111
 Fax: 403.271.1111
 1411 17th Street NW, Suite 100, Calgary, Alberta T2M 0K1
 Fax: 403.271.1111

1313 44 Avenue NE, Calgary, Alberta T2E 6E5
 General Phone: 403.271.1111
 Fax: 403.271.1111
 1411 17th Street NW, Suite 100, Calgary, Alberta T2M 0K1
 Fax: 403.271.1111

DATE SUBMITTED: 11/13/96

DATE REQUIRED: 11/13/96

SERVICE REQUESTED: ANALYSIS

QDS: 11/13/96

SAMPLE ID	SAMPLE BY	DATE/TIME SAMPLED	SAMPLE TYPE	ANALYSIS REQUESTED
PHD 1	H. KRAE	960827	WATER	
PHD 1	H. KRAE	960827	WATER	
PHD 1	H. KRAE	960827	WATER	
B 1	H. KRAE	960827	WATER	
B 1	H. KRAE	960827	WATER	
B 1-1	H. KRAE	960827	WATER	
BHD-2	H. KRAE	960827	SOIL	

NOTES: 1. Occurrence of this problem is related to the use of the equipment. 2. The equipment used is not certified for the use of this equipment. 3. The equipment used is not certified for the use of this equipment.

CLIENT: Bank of Montreal NO. SAMPLES SUBMITTED: 8

CONTACT: H. KRAE NO. COPIES/REPORT: 1

REPORT ADDRESS: Box 12 PHONE: 819 793 2881

DATE: 11/13/96

ANALYSIS ADDRESS: Box 12 PHONE: 819 793 2881

DATE: 11/13/96

ANALYSIS ADDRESS: Box 12 PHONE: 819 793 2881

DATE: 11/13/96

ANALYSIS ADDRESS: Box 12 PHONE: 819 793 2881

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