



CHEMICAL & GEOLOGICAL LABORATORIES LTD.

EDMONTON — FORT ST. JOHN — CALGARY



CONTAINER IDENTITY

— WATER ANALYSIS —

LABORATORY NUMBER
F77-1738-3

OPERATOR NAME AND ADDRESS

COLUMBIA GAS DEVELOPMENT OF CANADA LTD.

SAMPLE LOCATION

60° 10' 124° 00'

WELL OR SAMPLE LOCATION NAME

COLUMBIA GAS ETAL KOTONEELEE H-38

ELEVATIONS

KB 2275' GRD. 2255'

FIELD OR AREA

KOTONEELEE

POOL OR ZONE

NAHANNI

NAME OF SAMPLER

COMPANY

JOHNSTON TESTERS

TEST TYPE C. NO.

DST 5

TEST RECOVERY

802'

TEST INTERVAL OR PERFS

11625' - 11890'

POINT OF SAMPLE

BOTTOM

AMT. & TYPE OF CUSHION

MUD RESISTIVITY

TYPE OF PRODUCTION

PUMPING

FLOWING

GAS LIFT

SWAB

PRODUCTION RATES

WATER

BBLS/D.

OIL

BBLS/D.

GAS

MCF/D.

PRESSURES - PSIG

TEMPERATURES (°F)

SEPARATOR TREATER

RESERVOIR

CONTAINER

WHEN SAMPLED

WHEN RECEIVED

SEPARATOR TREATER

CONTAINER

WHEN SAMPLED

WHEN RECEIVED

DATE SAMPLED (D/M/Y)

04/10/77

DATE RECEIVED (D/M/Y)

05/10/77

DATE ANALYZED (D/M/Y)

06/10/77

ANALYST

G.G. L.F.

REMARKS

ION	MG/L	MG%	MEQ/L	ION	MG/L	MG%	MEQ/L
Na	20330	40.19	884.34	Cl	18817	37.19	530.64
K				Br			
Ca	5	0.01	0.27	I			
Mg	1	0.00	0.06	HCO ₃	NIL		
Ba				SO ₄	4182	8.27	86.98
Sr				CO ₃	6257	12.37	208.36
Fe	NIL			OH	998	1.97	58.69
				H ₂ S	NIL		

TOTAL SOLIDS Mg/L

BY EVAPORATION

52740 @ 110°C

BY EVAPORATION

@ 180°C

AT IGNITION

44690

CALCULATED

50590

ORGANIC MATTER: MUCH

SPECIFIC GRAVITY

1.035 @ 60°F

REFRACTIVE INDEX

1.3415 @ 25°C

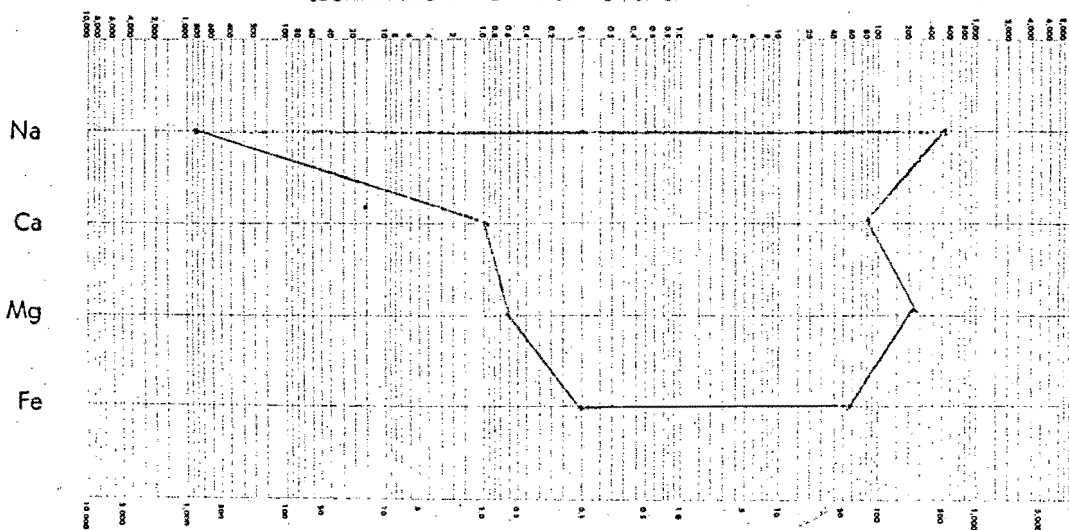
OBSERVED PH

11.0 @ 67°F

RESISTIVITY (Ohm/meter)

0.145 @ 25°C

LOGARITHMIC PATTERN MEQ PER LITER



Remarks and Conclusions

Sample consisted of muddy water with a brown colored filtrate. Ammonia present in sample.

HCO₃

SO₄

CO₃

Continued...

COLUMBIA GAS DEVELOPMENT OF CANADA LTD.

LABORATORY REPORT NUMBER: F77-1738

F77-1738-1: SAMPLED FROM TOP

RESISTIVITY: 0.195 Ohm/meters @ 25°C

Sample consisted of muddy water with a brown colored filtrate.
Ammonia present in sample.

F77-1738-2: SAMPLED FROM MIDDLE

RESISTIVITY: 0.173 Ohm/meters @ 25°C

Sample consisted of muddy water with a brown colored filtrate.
Ammonia present in sample.

F77-1738-4: DOWNHOLE SAMPLER #561

Johnston Testers downhole sampler #561 was received under atmospheric pressure. No recoverable gas or fluid present.

F77-1738-5: DOWNHOLE SAMPLER #556

Johnston Testers downhole sampler #556 was received under a pressure of 520 psig. Contained in the sample chamber was gas only. Gas analysis to follow.



CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA



DST CHAMBER #521

GAS ANALYSIS

7012-7943A

CONTAINER IDENTITY

LABORATORY NUMBER

Columbia Gas Development of Canada Ltd.

1 of 2

OPERATOR

PAGE

60° 7' N.L. 124° 6' W.L. Columbia et al Kotaneelee YT H-38

2275'

2250'

LOCATION

WELL OR SAMPLE LOCATION NAME

KB ELEV.

GRD. ELEV.

Kotaneelee, Yukon Territories

POOL OR ZONE

Johnston Testers

FIELD OR AREA

SAMPLER

DST #1

Tool: 500 mls Muddy Water

TEST TYPE & NO.

TEST RECOVERY

Down Hole MFE Chamber #521

@

OF

POINT OF SAMPLE

AMT. & TYPE CUSHION

MUD RESISTIVITY

7725' - 7920'

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

BBLS/D.

OIL

BBLS/D.

GAS

MFC/D.

TEST INTERVALS OR PERFS.

SEPARATOR RESERVOIR

@ OF

725 @ 78°F

SEPARATOR

CONTAINER WHEN SAMPLED

CONTAINER WHEN RECEIVED

PRESSURES, PSIG

TEMPERATURES, °F

Aug 10/77

Sept 7/77

Sept 7/77

OR

DATE SAMPLED (D/M/Y)

DATE RECEIVED (D/M/Y)

DATE ANALYSED (D/M/Y)

ANALYST

REMARKS

COMPONENT	MOL % AIR FREE AS REC'D	MOL % AIR FREE ACID GAS FREE	CON. G.P.M. AIR FREE AS REC'D
H ₂	0.01		
He	0.02		
N ₂	0.46		
CO ₂	0.12		
H ₂ S	0.00		
C ₁	99.07		
C ₂	0.31		
C ₃	0.01		0.003
iC ₄	0.00		0.000
C ₄	0.00		0.000
iC ₅	0.00		0.000
C ₅	0.00		0.000
C ₆	0.00		0.000
C ₇₊	0.00		0.000
TOTAL	100.00		0.003
		C ₅₊	0.000

GROSS HEATING VALUE BTU/FT ³ @ 60°F & 14.65 PSIA			
(MOISTURE & ACID GAS FREE)			
1004.6		0.0	
MEASURED	CALCULATED	DEW POINT	VAPOUR PRESS. PENTANES PLUS

SPECIFIC GRAVITY			
MOISTURE FREE AS SAMPLED		MOISTURE AND ACID GAS FREE	
0.558			
MEASURED	CALCULATED	MEASURED	CALCULATED

PSEUDOCRITICAL PROPERTIES (CALCULATED)				
AS SAMPLED		ACID GAS FREE		
672.7	343.6	OR		
p _{Pc}	PSIA	p _{Tc}	p _{Pc}	PSIA
				p _{Tc}

REMARKS



CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA



CG 5395 SS
CONTAINER IDENTITY

GAS ANALYSIS

7012-7943
LABORATORY NUMBER

Columbia Gas Development of Canada Ltd.

1 of 3
PAGE

60° 7' N.L. 124° 6' W.L. Columbia et al Kotaneelee YT H-38
LOCATION WELL OR SAMPLE LOCATION NAME

2275' 2250'
RS ELEV. GRD. ELEV.

Kotaneelee, Yukon Territories
FIELD OR AREA

Johnston Testers Ltd.
SAMPLER

DST #1
TEST TYPE & NO.

1150'
POOL OR ZONE

Flareline
POINT OF SAMPLE

AMT. & TYPE CUSHION MUD RESISTIVITY
OF

7725' - 7921'
TEST INTERVALS OR PERFS.

PUMPING FLOWING GAS LIFT SWAB

WATER BBLS/D. OIL BBLS/D. GAS MFC/D.

<u>SEPARATOR</u>	<u>RESERVOIR</u>	<u>CONTAINER WHEN SAMPLED</u>	<u>CONTAINER WHEN RECEIVED</u>	<u>SEPARATOR</u>
		<u>40</u>	<u>80</u>	
		<u>PSIG</u>	<u>°F</u>	<u>TEMPERATURES, °F</u>

Aug 11/77 Aug 19/77 Aug 19/77 OR
DATE SAMPLED (D/M/Y) DATE RECEIVED (D/M/Y) DATE ANALYSED (D/M/Y) ANALYST

REMARKS

COMPONENT	MOL % AIR FREE AS REC'D	MOL % AIR FREE ACID GAS FREE	CDN. G.P.M. AIR FREE AS REC'D
H ₂	0.00		
He	0.02		
N ₂	1.08		
CO ₂	1.52		
H ₂ S	0.00		
C ₁	97.06		
C ₂	0.30		
C ₃	0.02		0.004
iC ₄	Trace		0.000
C ₄	Trace		0.001
iC ₅	0.00		0.000
C ₅	0.00		0.000
C ₆	0.00		0.000
C ₇₊	0.00		0.000
TOTAL	100.00		0.005
		C ₅₊	0.000

GROSS HEATING VALUE BTU/FT ³ @ 60°F & 14.65 PSIA			
(MOISTURE & ACID GAS FREE)			
<u>MEASURED</u>	<u>998.5</u>	<u>DEW POINT</u>	<u>0.0</u>
	<u>CALCULATED</u>		<u>VAPOUR PRESS. PENTANES PLUS</u>

SPECIFIC GRAVITY			
<u>MOISTURE FREE AS SAMPLED</u>		<u>MOISTURE AND ACID GAS FREE</u>	
<u>MEASURED</u>	<u>0.575</u>	<u>MEASURED</u>	<u>CALCULATED</u>
	<u>CALCULATED</u>		

PSEUDOCRITICAL PROPERTIES (CALCULATED)					
<u>AS SAMPLED</u>			<u>ACID GAS FREE</u>		
<u>677.2</u>	<u>PSIA</u>	<u>345.8</u>	<u>OR</u>	<u>PSIA</u>	<u>°F</u>
<u>PFC</u>		<u>PFC</u>		<u>PFC</u>	<u>PTC</u>

REMARKS



CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA



6445 SS

GAS ANALYSIS

7012-7113^a

CONTAINER IDENTITY

LABORATORY NUMBER

Columbia Gas Development of Canada Ltd.

1 of 4

OPERATOR

PAGE

Columbia et al Kotaneelee YT H-38

2250'

2225'

LOCATION

WELL OR SAMPLE LOCATION NAME

KB ELEV.

GRO. ELEV.

Kotaneelee, Yukon Territories

Nahanni

Johnston Testers

FIELD OR AREA

POOL OR ZONE

SAMPLER

DST #2

755' Liquid

TEST TYPE & NO.

TEST RECOVERY

Flareline

@ OF

POINT OF SAMPLE

AMT. & TYPE CUSHION

MUD RESISTIVITY

11630' - 11690'

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

BBLS/D.

OIL

BBLS/D.

GAS

MFC/D.

TEST INTERVALS OR PERFS.

44 @ 80 OF

SEPARATOR RESERVOIR

CONTAINER WHEN SAMPLED

CONTAINER WHEN RECEIVED

SEPARATOR

PRESSURES, PSIG

TEMPERATURES, °F

Sept. 28/77

Oct. 11/77

Oct. 11/77

OR

DATE SAMPLED (D/M/Y)

DATE RECEIVED (D/M/Y)

DATE ANALYSED (D/M/Y)

ANALYST

REMARKS

COMPONENT	MOL % AIR FREE AS REC'D	MOL % AIR FREE ACID GAS FREE	CDN. G.P.M. AIR FREE AS REC'D
H ₂	0.06		
He	0.04		
N ₂	4.43		
CO ₂	1.99		
H ₂ S	0.00		
C ₁	93.46		
C ₂	0.02		
C ₃	0.00		0.000
iC ₄	0.00		0.000
C ₄	0.00		0.000
iC ₅	0.00		0.000
C ₅	0.00		0.000
C ₆	0.00		0.000
C ₇ ⁺	0.00		0.000
TOTAL	100.00		0.000
		C ₅ ⁺	0.000

GROSS HEATING VALUE BTU/FT ³ @ 60°F & 14.65 PSIA (MOISTURE & ACID GAS FREE) 960.9 MEASURED CALCULATED		0.0 DEW POINT VAPOUR PRES. PENTANES PLUS	
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SPECIFIC GRAVITY			
MOISTURE FREE AS SAMPLED 0.591 MEASURED CALCULATED		MOISTURE AND ACID GAS FREE MEASURED CALCULATED	

PSEUDOCRITICAL PROPERTIES (CALCULATED)			
AS SAMPLED 672.5 342.0 pPC pPC OR pPC pPC		ACID GAS FREE pPC pPC	

REMARKS



CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA



DST CHAMBER #103421

GAS ANALYSIS

7012-71139

CONTAINER IDENTITY

LABORATORY NUMBER

Columbia Gas Development of Canada Ltd.

2 of 4

OPERATOR

PAGE

Columbia et al Kotaneelee YT H-38

2250' KB ELEV.

2225' GRD. ELEV.

LOCATION

WELL OR SAMPLE LOCATION NAME

Kotaneelee, Yukon Territories

Nahanni

Johnston Testers

FIELD OR AREA

POOL OR ZONE

SAMPLER

DST #2

DST: 755' Liquid TOOL: No Fluid Recovered

TEST TYPE & NO.

TEST RECOVERY

MFE Chamber 103421

POINT OF SAMPLE

AMT. & TYPE CUSHION

MUD RESISTIVITY

11630' - 11690'

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

BBLS/D.

OIL

BBLS/D.

GAS

MFC/D.

TEST INTERVALS OR PERFS.

SEPARATOR RESERVOIR

CONTAINER WHEN SAMPLED

1 @ 76 OF CONTAINER WHEN RECEIVED

SEPARATOR

PRESSURES, PSIG

TEMPERATURES, °F

Sept. 28/77

Oct. 11/77

Oct. 13/77

OR

DATE SAMPLED (D/M/Y)

DATE RECEIVED (D/M/Y)

DATE ANALYSED (D/M/Y)

ANALYST

REMARKS

COMPONENT	MOL % AIR FREE AS REC'D	MOL % AIR FREE ACID GAS FREE	CDN. G.P.M. AIR FREE AS REC'D
H ₂	0.60		
He	0.04		
N ₂	12.36		
CO ₂	1.87		
H ₂ S	0.00		
C ₁	85.11		
C ₂	0.02		
C ₃	0.00		0.000
iC ₄	0.00		0.000
C ₄	0.00		0.000
iC ₅	0.00		0.000
C ₅	0.00		0.000
C ₆	0.00		0.000
C ₇₊	0.00		0.000
TOTAL	100.00		0.000
		C ₅₊	0.000

GROSS HEATING VALUE 8TU/FT ³ @ 60°F & 14.65 PSIA (MOISTURE & ACID GAS FREE) 875.9 MEASURED CALCULATED		0.0 DEW POINT VAPOUR PRESS. PENTANES PLUS	
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SPECIFIC GRAVITY			
MOISTURE FREE AS SAMPLED		MOISTURE AND ACID GAS FREE	
0.620			
MEASURED	CALCULATED	MEASURED	CALCULATED

PSEUDOCRITICAL PROPERTIES (CALCULATED)			
AS SAMPLED		ACID GAS FREE	
655.1	331.0		
PPC	PSIA	PTC	OR PSIA PTC

REMARKS



CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA



DST CHAMBER #110267

GAS ANALYSIS

7012-71139

CONTAINER IDENTITY

LABORATORY NUMBER

Columbia Gas Development of Canada Ltd.

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OPERATOR

PAGE

Columbia et al Kotaneelee YT H-38

2250'

2225'

LOCATION

WELL OR SAMPLE LOCATION NAME

KB ELEV.

GRO. ELEV.

Kotaneelee, Yukon Territories

Nahanni

Johnston Testers

FIELD OR AREA

POOL OR ZONE

SAMPLER

DST #2

DST: 755' Liquid

TOOL: No Fluid Recovered

TEST TYPE & NO.

TEST RECOVERY

MFE Chamber 110267

@ OF

POINT OF SAMPLE

AMT. & TYPE CUSHION

MUD RESISTIVITY

11630' - 11690'

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

BBLS/D.

OIL

BBLS/D.

GAS

MFC/D.

TEST INTERVALS OR PERFS.

SEPARATOR RESERVOIR

@ OF CONTAINER WHEN SAMPLED

40 @ 80 OF CONTAINER WHEN RECEIVED

SEPARATOR

PRESSURES, PSIG

TEMPERATURES, °F

Sept. 28/77

Oct. 11/77

Oct. 12/77

OR

DATE SAMPLED (D/M/Y)

DATE RECEIVED (D/M/Y)

DATE ANALYSED (D/M/Y)

ANALYST

REMARKS

COMPONENT	MOL % AIR FREE AS REC'D	MOL % AIR FREE ACID GAS FREE	CON. G.P.M. AIR FREE AS REC'D
H ₂	0.92		
He	0.05		
N ₂	3.24		
CO ₂	13.70		
H ₂ S	0.14		
C ₁	81.94		
C ₂	0.01		
C ₃	0.00		0.000
iC ₄	0.00		0.000
C ₄	0.00		0.000
iC ₅	0.00		0.000
C ₅	0.00		0.000
C ₆	0.00		0.000
C ₇₊	0.00		0.000
TOTAL	100.00		0.000
		C ₅₊	0.000

GROSS HEATING VALUE BTU/FT ³ @ 60°F & 14.65 PSIA			
(MOISTURE & ACID GAS FREE)			
MEASURED	961.3	DEW POINT	0.0
	CALCULATED	VAPOUR PRESS. PENTANES PLUS	

SPECIFIC GRAVITY			
MOISTURE FREE AS SAMPLED		MOISTURE AND ACID GAS FREE	
MEASURED	0.696	MEASURED	
	CALCULATED	CALCULATED	

PSEUDOCRITICAL PROPERTIES (CALCULATED)			
AS SAMPLED		ACID GAS FREE	
718.1	PSIA	365.3	OR
PFC		PFC	PSIA
			PFC

REMARKS



CORE LABORATORIES - CANADA LTD.
 Petroleum Reservoir Engineering
 CALGARY ALBERTA



Plastic CONTAINER IDENTITY		7012-71139 LABORATORY NUMBER	
Columbia Gas Development of Canada Ltd. OPERATOR		4 of 4 PAGE	
Columbia et al Kotaneelee YT H-38 LOCATION		2250' KB ELEV.	2225' GRD. ELEV.
Kotaneelee, Yukon Territories FIELD OR AREA		Nahanni POOL OR ZONE	Johnston Testers SAMPLER
DST #2 TEST TYPE & NO.		755' Liquid TEST RECOVERY	
11630' - 11690' TEST INTERVALS OR PERFS.		PUMPING FLOWING GAS LIFT SWAB WATER BBL/D. OIL BBL/D. GAS MFC/D.	
SEPARATOR RESERVOIR		CONTAINER WHEN SAMPLED	CONTAINER WHEN RECEIVED
PRESSURES, PSIG		TEMPERATURES, °F	
Sept. 28/77 DATE SAMPLED (D/M/Y)	Oct. 11/77 DATE RECEIVED (D/M/Y)	Oct. 24/77 DATE ANALYSED (D/M/Y)	LES ANALYST
		REMARKS	

ANALYSIS

Resistivity = 0.0160 Ohm-meters @ 25°C

Chloride = 18,644 mg/liter

REMARKS: Insufficient sample to perform a routine analysis.



CHEMICAL & GEOLOGICAL LABORATORIES LTD.

EDMONTON — FORT ST. JOHN — CALGARY



— WATER ANALYSIS —

CONTAINER IDENTITY

LABORATORY NUMBER

F77-1738-3

OPERATOR NAME AND ADDRESS

COLUMBIA GAS DEVELOPMENT OF CANADA LTD.

SAMPLE LOCATION

60° 10' 124° 00'

WELL OR SAMPLE LOCATION NAME

COLUMBIA GAS ETAL KOTONEELEE H-38

ELEVATIONS

KB 2275' GRD 2255'

FIELD OR AREA

KOTONEELEE

POOL OR ZONE

NAHANNI

NAME OF SAMPLER

COMPANY

JOHNSTON

TEST TYPE C. NO.

DST 5

TEST RECOVERY

802'

TESTERS

TEST INTERVAL OR PERFS

11625' - 11890'

POINT OF SAMPLE

BOTTOM

AMT. & TYPE OF CUSHION

MUD RESISTIVITY

TYPE OF PRODUCTION

PUMPING

FLOWING

GAS LIFT

SWAB

PRODUCTION RATES

WATER

BBL/D

OIL

BBL/D

GAS

MCF/D

PRESSURES - PSIG

TEMPERATURES (°F)

SEPARATOR

TREATER

RESERVOIR

CONTAINER

WHEN SAMPLED

WHEN RECEIVED

SEPARATOR

TREATER

CONTAINER

WHEN SAMPLED

WHEN RECEIVED

DATE SAMPLED (D/M/Y)

04/10/77

DATE RECEIVED (D/M/Y)

05/10/77

DATE ANALYZED (D/M/Y)

06/10/77

ANALYST

G.G. L.F.

REMARKS

ION	MG/L	MG%	MEQ/L
Na	20330	40.19	884.34
K			
Ca	5	0.01	0.27
Mg	1	0.00	0.06
Ba			
Sr			
Fe	NIL		

ION	MG/L	MG%	MEQ/L
Cl	18817	37.19	530.64
Br			
I			
HCO ₃	NIL		
SO ₄	4182	8.27	86.98
CO ₃	6257	12.37	208.36
OH	998	1.97	58.69
H ₂ S	NIL		

TOTAL SOLIDS Mg/L

BY EVAPORATION

52740 @ 110°C

BY EVAPORATION

@ 180°C

AT IGNITION

44690

CALCULATED

50590

ORGANIC MATTER: MUCH

SPECIFIC GRAVITY

1.035 @ 60°F

REFRACTIVE INDEX

1.3415 @ 25°C

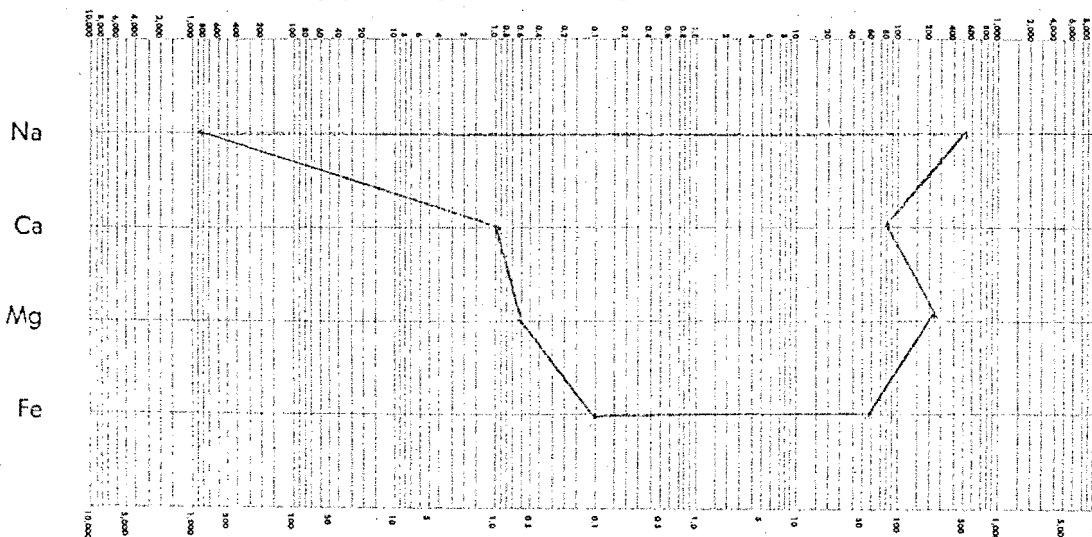
OBSERVED PH

11.0 @ 67°F

RESISTIVITY (ohm/meters)

0.145 @ 25°C

LOGARITHMIC PATTERN MEQ PER LITER



Remarks and Conclusions

Sample consisted of muddy water with a brown colored filtrate. Ammonia present in sample.

HCO₃

SO₄

CO₃

Continued...

2586

COLUMBIA GAS DEVELOPMENT OF CANADA LTD.

LABORATORY REPORT NUMBER: F77-1738

F77-1738-1: SAMPLED FROM TOP

RESISTIVITY: 0.195 Ohm/meters @ 25°C

Sample consisted of muddy water with a brown colored filtrate.
Ammonia present in sample.

F77-1738-2: SAMPLED FROM MIDDLE

RESISTIVITY: 0.173 Ohm/meters @ 25°C

Sample consisted of muddy water with a brown colored filtrate.
Ammonia present in sample.

F77-1738-4: DOWNHOLE SAMPLER #561

Johnston Testers downhole sampler #561 was received under atmospheric pressure. No recoverable gas or fluid present.

F77-1738-5: DOWNHOLE SAMPLER #556

Johnston Testers downhole sampler #556 was received under a pressure of 520 psig. Contained in the sample chamber was gas only. Gas analysis to follow.

2686