AGAT® Laboratories

HYDROCARBON LIQUID ANALYSIS

CONTAINER IDENTIFICATION: AGAT 17688

LABORATORY NUMBER: CF41946A

OPERATOR NAME: PARAMOUNT RESOURCES LTD.

UNIQUE WELL IDENTIFIER:

WELL NAME: PARAMOUNT et al LAIRD

ELEVATIONS KB m: GRD m:

FIELD OR AREA: LAIRD

POOL OR ZONE:

NAME OF SAMPLER: RF

COMPANY: AGAT

TEST TYPE:

NO:

TEST RECOVERY:

TEST INTERVAL OR PERFS:

SAMPLING POINT: TEST SEPARATOR

* Bubble Point

	SEPARATOR	TREATER	RESERVOIR	SOURCE	SAMPLED	RECEIVED
GAUGE PRESSURE kPa				4413	4413	3800*
TEMPERATURE °C				24	24	20*

DATE SAMPLED (Y-M-D): 99-08-19

DATE RECEIVED (Y-M-D): 99-08-21

DATE REPORTED (Y-M-D): 99-08-21

ANALYST: MH NCO

OTHER INFORMATION: F-36

COMP	MOLE FRACTION	MASS FRACTION	VOLUME FRACTION
N_2	0.0001	0.0000	0.0000
CO_2	0.0044	0.0017	0.0015
H_2S	0.0000	0.0000	0.0000
C_1	0.1500	0.0204	0.0519
C_2	0.0170	0.0043	0.0093
C_3	0.0131	0.0049	0.0074
IC_4	0.0054	0.0027	0.0036
NC_4	0.0089	0.0044	0.0058
IC_5	0.0083	0.0051	0.0062
NC_5	0.0085	0.0052	0.0063
C_6	0.0254	0.0183	0.0209
C_{7+}	0.7589	0.9330	0.8871
C_8			
C_9			
C_{10}			
C_{11}			
C_{12+}			
TOTAL	1.0000	1.0000	1.0000

OBSERVED PROPERTIES OF C_{7+} RESIDUE (15/15° C)

DENSITY	RELATIVE DENSITY	API @ 15.5° C
802.5 kg/m³	0.8032	44.5

RELATIVE MOLECULAR MASS: 145.1

CALCULATED PROPERTIES OF TOTAL SAMPLE (15/15° C)

DENSITY	RELATIVE DENSITY	API @ 15.5° C
763.6 kg/m³	0.7643	53.5

RELATIVE MOLECULAR MASS: 118.0

REMARKS:

Calculations for C6 and C7 are based on Boiling Point Grouping. If Carbon Number Grouping had been done, the mole fractions would be C_6 0.0822 C_{7+} 0.7007

File No. : CF41946A
Company : PARAMOUNT RESOURCES LTD.
Well No. :

PROPERTIES OF C6+ FRACTION

BOILING POINT RANGE (C)	COMPONENT	MOLE FRACTION	MASS FRACTION	VOLUME FRACTION
36.1- 68.9	HEXANES----------C6	0.0240	0.0175	0.0201
68.9- 98.3	HEPTANES----------C7	0.0418	0.0385	0.0401
98.3-125.6	OCTANES----------C8	0.0739	0.0776	0.0787
125.6-150.6	NONANES----------C9	0.0746	0.0879	0.0873
150.6-173.9	DECANES----------C10	0.1151	0.1503	0.1468
173.9-196.1	UNDECANES----------C11	0.0908	0.1304	0.1258
196.1-215.0	DODECANES----------C12	0.0548	0.0857	0.0818
215.0-235.0	TRIDECANES----------C13	0.0311	0.0526	0.0497
235.0-252.2	TETRADECANES----------C14	0.0199	0.0362	0.0341
252.2-270.6	PENTADECANES----------C15	0.0190	0.0371	0.0345
270.6-287.8	HEXADECANES----------C16	0.0092	0.0193	0.0178
287.8-302.8	HEPTADECANES----------C17	0.0055	0.0120	0.0111
302.8-317.2	OCTADECANES----------C18	0.0022	0.0051	0.0046
317.2-330.0	NONADECANES----------C19	0.0008	0.0020	0.0018
330.0-344.4	EICOSANES----------C20	0.0002	0.0005	0.0005
344.4-357.2	HENEICOSANES----------C21	0.0001	0.0002	0.0002
357.2-369.4	DOCOSANES----------C22	0.0001	0.0003	0.0003
369.4-380.0	TRICOSANES----------C23	0.0001	0.0002	0.0002
380.0-391.1	TETRACOSANES----------C24	0.0000	0.0001	0.0001
391.1-401.7	PENTACOSANES----------C25	0.0001	0.0002	0.0002
401.7-412.2	HEXACOSANES----------C26	0.0000	0.0000	0.0000
412.2-422.2	HEPTACOSANES----------C27	0.0000	0.0000	0.0000
422.2-431.7	OCTACOSANES----------C28	0.0000	0.0000	0.0000
431.7-441.1	NONACOSANES----------C29	0.0000	0.0000	0.0000
441.1 PLUS	TRIACONTANES PLUS-------C30+	0.0000	0.0000	0.0000
	AROMATICS			
80.0	BENZENES----------C6	0.0049	0.0035	0.0029
110.6	TOLUENE----------C7	0.0270	0.0228	0.0189
136.2	ETHYLBENZENE----------C8	0.0090	0.0088	0.0072
138.4-144.4	XYLENES----------C8	0.0542	0.0527	0.0436
168.9	1,2,4 TRIMETHYLBENZENE--C9	0.0178	0.0197	0.0160
	NAPHTHENES			
48.9	CYCLOPENTANE----------CC5	0.0014	0.0008	0.0008
72.2	METHYLCYCLOPENTANE------MCC5	0.0149	0.0115	0.0109
81.1	CYCLOHEXANE----------CC6	0.0370	0.0285	0.0262
101.1	METHYLCYCLOHEXANE-------MCC6	0.0548	0.0493	0.0458

The above hexanes plus values are based upon a measured mass fraction and a calculated mole fraction, and assume a total hydrocarbon recovery from the chromatographic system.

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HYDROCARBON LIQUID ANALYSIS

CONTAINER IDENTIFICATION: PB #1

LABORATORY NUMBER: CF41946B

OPERATOR NAME: PARAMOUNT RESOURCES LTD.

UNIQUE WELL IDENTIFIER:

WELL NAME: PARAMOUNT et al LAIRD

ELEVATIONS KB m: GRD m:

FIELD OR AREA: LAIRD

POOL OR ZONE:

NAME OF SAMPLER: RF

COMPANY: AGAT

TEST TYPE:

NO:

TEST RECOVERY:

TEST INTERVAL OR PERFS:

SAMPLING POINT: TEST SEPARATOR

* Bubble Point

	SEPARATOR	TREATER	RESERVOIR	SOURCE	SAMPLED	RECEIVED
GAUGE PRESSURE kPa						*
TEMPERATURE °C						*

DATE SAMPLED (Y-M-D): 99-08-19

DATE RECEIVED (Y-M-D): 99-08-21

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ANALYST: MH NCO

OTHER INFORMATION: F-36

COMP	MOLE FRACTION	MASS FRACTION	VOLUME FRACTION
N_2	0.0000	0.0000	0.0000
CO_2	0.0000	0.0000	0.0000
H_2S	0.0000	0.0000	0.0000
C_1	0.0006	0.0001	0.0002
C_2	0.0011	0.0002	0.0005
C_3	0.0031	0.0010	0.0015
IC_4	0.0028	0.0012	0.0016
NC_4	0.0062	0.0025	0.0035
IC_5	0.0090	0.0046	0.0059
NC_5	0.0101	0.0052	0.0065
C_6	0.0371	0.0224	0.0267
C_{7+}	0.9300	0.9628	0.9536
C_8			
C_9			
C_{10}			
C_{11}			
C_{12+}			
TOTAL	1.0000	1.0000	1.0000

OBSERVED PROPERTIES OF C_7+ RESIDUE (15/15° C)

803.9	0.8046	44.2
DENSITY kg/m³	RELATIVE DENSITY	API @ 15.5° C

146.2

RELATIVE MOLECULAR MASS

CALCULATED PROPERTIES OF TOTAL SAMPLE (15/15° C)

796.8	0.7975	45.8
DENSITY kg/m³	RELATIVE DENSITY	API @ 15.5° C

141.2

RELATIVE MOLECULAR MASS

REMARKS:

Calculations for C6 and C7 are based on Boiling Point Grouping. If Carbon Number Grouping had been done, the mole fractions would be C_6 0.1027 C_{7+} 0.8623

File No. : CF41946B
Company : PARAMOUNT RESOURCES LTD.
Well No. :

PROPERTIES OF C6+ FRACTION

BOILING POINT RANGE (C)	COMPONENT	MOLE FRACTION	MASS FRACTION	VOLUME FRACTION
36.1- 68.9	HEXANES----------C6	0.0350	0.0214	0.0256
68.9- 98.3	HEPTANES----------C7	0.0506	0.0382	0.0416
98.3-125.6	OCTANES----------C8	0.0876	0.0754	0.0799
125.6-150.6	NONANES----------C9	0.0806	0.0779	0.0809
150.6-173.9	DECANES----------C10	0.1183	0.1266	0.1290
173.9-196.1	UNDECANES----------C11	0.1012	0.1192	0.1201
196.1-215.0	DODECANES----------C12	0.0783	0.1005	0.1002
215.0-235.0	TRIDECANES----------C13	0.0599	0.0832	0.0820
235.0-252.2	TETRADECANES----------C14	0.0417	0.0624	0.0613
252.2-270.6	PENTADECANES----------C15	0.0265	0.0425	0.0412
270.6-287.8	HEXADECANES----------C16	0.0147	0.0252	0.0243
287.8-302.8	HEPTADECANES----------C17	0.0073	0.0133	0.0128
302.8-317.2	OCTADECANES----------C18	0.0023	0.0043	0.0041
317.2-330.0	NONADECANES----------C19	0.0005	0.0011	0.0011
330.0-344.4	EICOSANES----------C20	0.0001	0.0003	0.0003
344.4-357.2	HENEICOSANES----------C21	0.0000	0.0001	0.0001
357.2-369.4	DOCOSANES----------C22	0.0000	0.0000	0.0000
369.4-380.0	TRICOSANES----------C23	0.0000	0.0000	0.0000
380.0-391.1	TETRACOSANES----------C24	0.0000	0.0000	0.0000
391.1-401.7	PENTACOSANES----------C25	0.0000	0.0000	0.0000
401.7-412.2	HEXACOSANES----------C26	0.0000	0.0000	0.0000
412.2-422.2	HEPTACOSANES----------C27	0.0000	0.0000	0.0000
422.2-431.7	OCTACOSANES----------C28	0.0000	0.0000	0.0000
431.7-441.1	NONACOSANES----------C29	0.0000	0.0000	0.0000
441.1 PLUS	TRIACONTANES PLUS-------C30+	0.0000	0.0000	0.0000

AROMATICS

80.0	BENZENES----------C6	0.0057	0.0033	0.0028
110.6	TOLUENE----------C7	0.0307	0.0213	0.0183
136.2	ETHYLBENZENE----------C8	0.0124	0.0099	0.0085
138.4-144.4	XYLENES----------C8	0.0627	0.0501	0.0433
168.9	1,2,4 TRIMETHYLBENZENE--C9	0.0259	0.0234	0.0200

NAPHTHENES

48.9	CYCLOPENTANE----------CC5	0.0021	0.0010	0.0011
72.2	METHYLCYCLOPENTANE------MCC5	0.0173	0.0110	0.0109
81.1	CYCLOHEXANE----------CC6	0.0426	0.0270	0.0258
101.1	METHYLCYCLOHEXANE-------MCC6	0.0631	0.0466	0.0451

The above hexanes plus values are based upon a measured mass fraction and a calculated mole fraction, and assume a total hydrocarbon recovery from the chromatographic system.