

DAPIU.QL  
No. 7.367  
[Signature]

Survey QC – Vertical Continuous Analysis Sheet

gyrodata

SURVEY QUALITY CONTROL – SPECIFICATION DATA

PRE-JOB CALIBRATION VERIFICATION (ROLL TEST)

System Parameter	dGx	dGy	dmbo	Mean Gravity Error	Stdev Gravity Error
Standard Deviation	0.006	0.006	0.006	0.00014	0.00001
Tolerance	0.033	0.033	0.087	0.00591	0.00720

CALIBRATION

Tool Number	FA088	Calibration Date	06 Jan 2016
-------------	-------	------------------	-------------

OPERATING TEMPERATURE

Calibration range	From	30.03	To	120.04	
Gyro operating range for Job	From	63.04	To	64.32	In-Spec if +/- 2.5 °C of Calibration

INCLINATION DIFFERENCE TEST

Chi-square test value	3.0
Tolerance	34.4
Number of overlapping survey stations used	15

CO-ORDINATE DIFFERENCE TEST

	North	East	Vertical
Chi-square test value	14.6	18.5	0.4
Tolerance	34.4	34.4	34.4
Number of overlapping survey stations used	15	15	15


**Parte 6**  
**Relatório Cronológico**  
**da Operação**

ORIGINAL  
Fto. 7.369  
01

**6.0 RELATÓRIO CRONOLÓGICO DA OPERAÇÃO**

**06 de abril de 2019**

- 06:50 Chegada da equipe mina 27
- 07:20 Conexão gyrodata/flodim
- 08:00 Início de corrida mina 27
- 12:25 Desmontagem de equipamentos
- 13:00 Saida mina 27
- 13:30 Pós calibração


ORIGINAL  
Fis. 7.370  


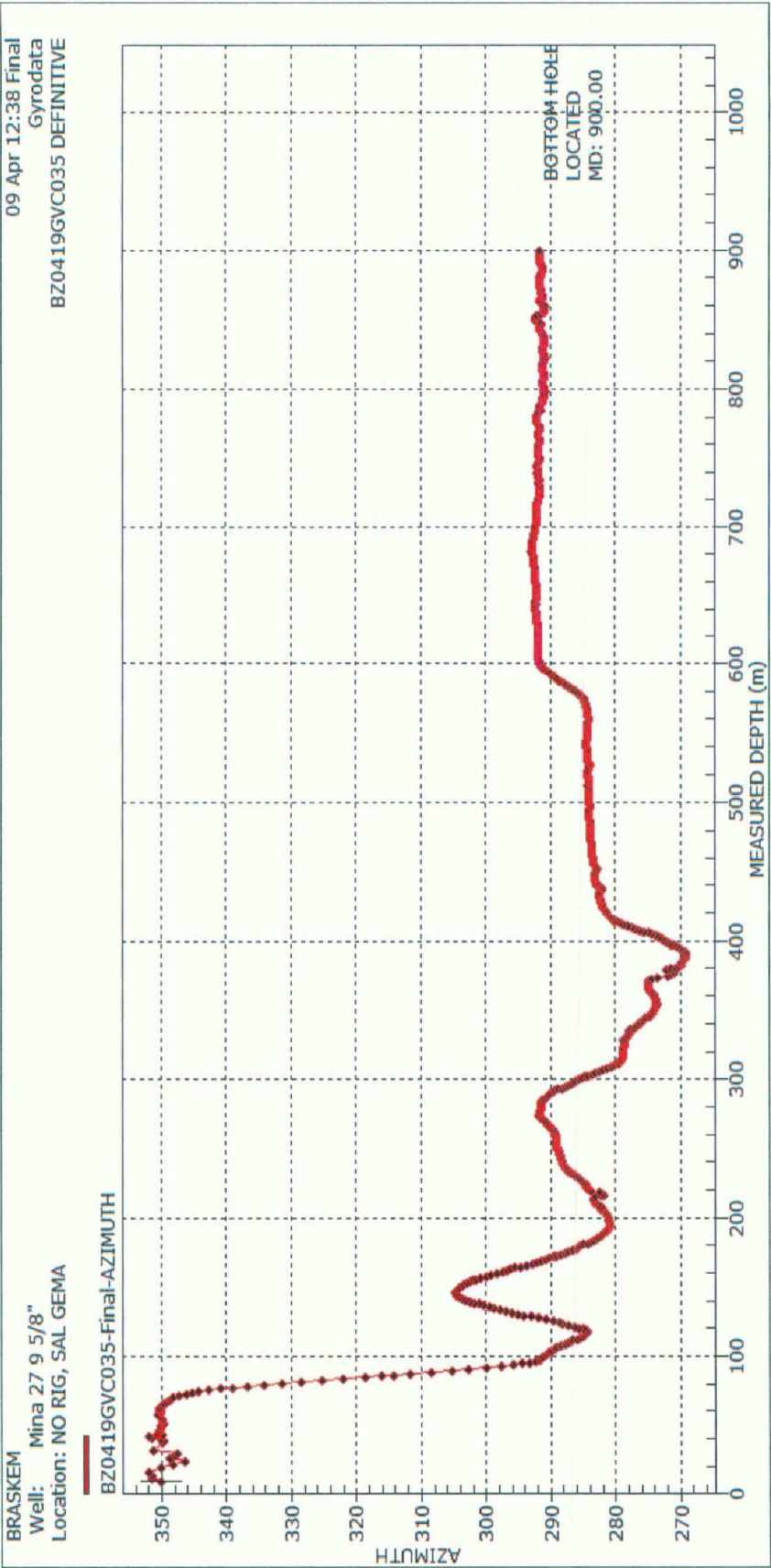
**Parte 7**  
**Gráficos**




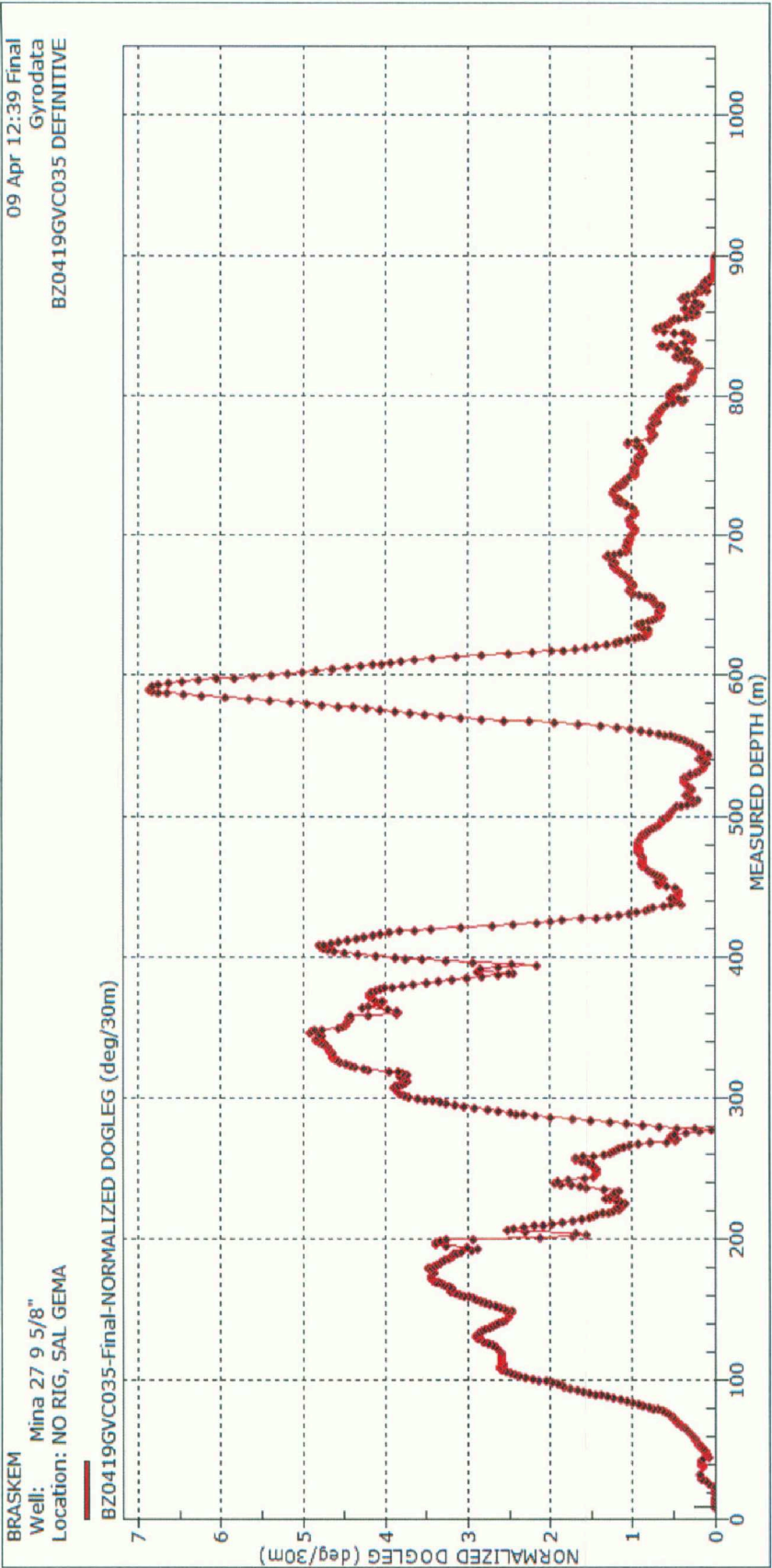
ORIGINAL  
FEB. 7.371  
*[Signature]*



ORIGINAL  
Fis. 2.972  


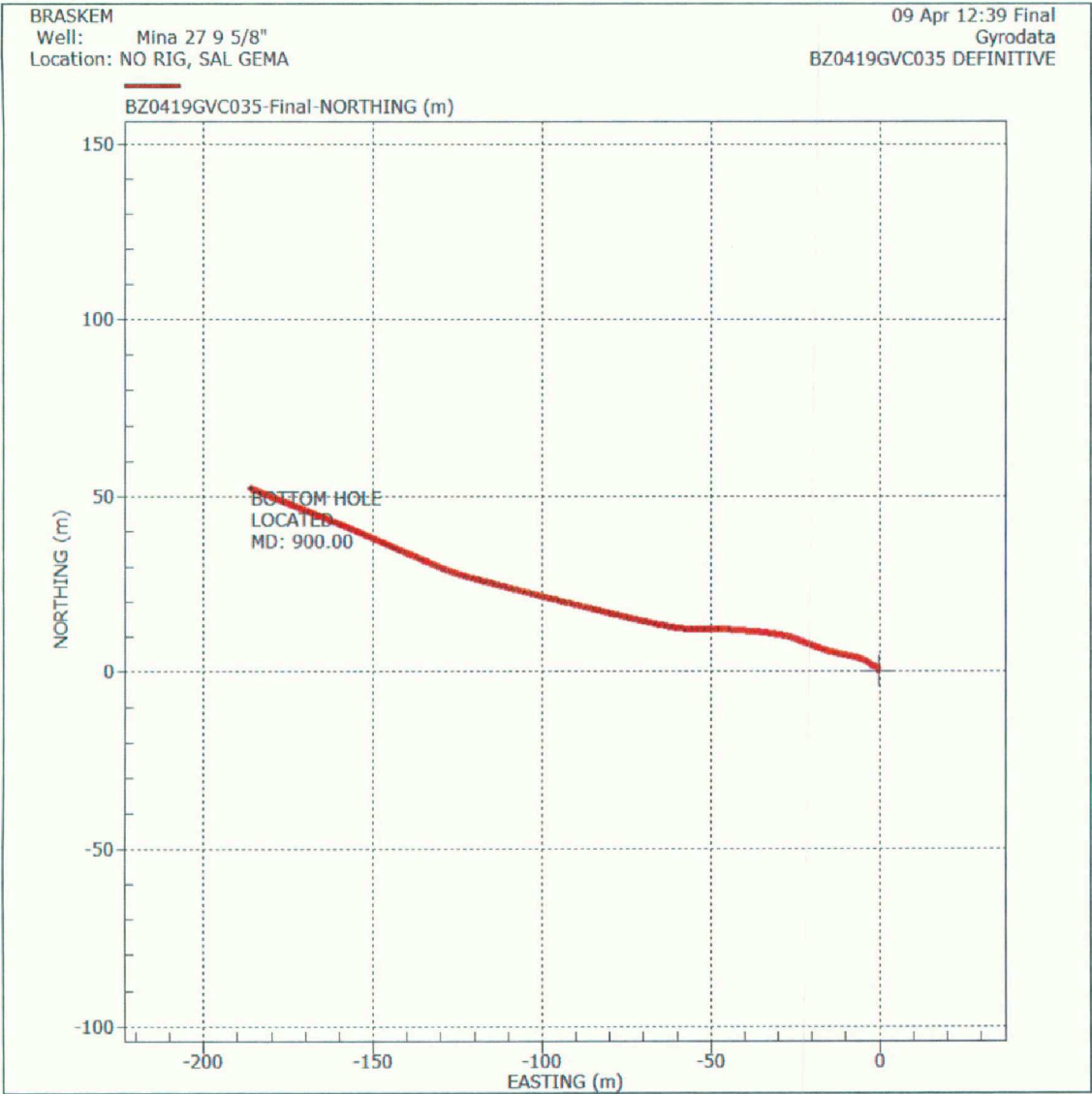



ORIGINAL  
File: Y.373  






ORIGINAL  
Fig. 7.374  
*[Signature]*



ORIGINAL  
Fto. 7.375  




**Braskem**


Campo: Sal Gema

Poço: Mina 02

Gyro Multshot Contínuo

Data da Amostragem: 6 de Abril de 2019

**Número de Trabalho: BZ0419GVC036**

DUPICAL  
FOL. 7.376  


**ÍNDICE**

1.0	Discussão .....	3
2.0	Página de Certificado da Amostragem .....	5
3.0	Detalhes da Amostragem .....	7
4.0	Listagem Definitiva da Amostragem .....	9
5.0	Controle de Qualidade.....	18
6.0	Relatório Cronológico da Operação.....	20
7.0	Gráficos.....;	22






**Parte 1**  
**Discussão**


DATA: 01/04/2014  
FOL. 7378  


**1.0 DISCUSSÃO**

O Giroscópio FA088 foi utilizado para fazer uma amostragem na Mina 02.  
A amostragem foi coletada da superfície até 245.00m.  
Todas as Profundidades estão referenciadas à cabeça do poço.  
A referência ao norte é Norte Verdadeiro.  
Todas as Profundidades foram tomadas do cabo de perfilagem da unidade Flodim.

ORIGINAL  
Fis. 2.377  


**Parte 2**  
**Página de Certificado da Amostragem**

ORIGINAL  
Fis. 2.380  


**2.0 PÁGINA DE CERTIFICADO DA AMOSTRAGEM**

Os dados e cálculos para esta amostragem foram obtidos e atuados por mim de acordo com padrões e procedimentos da Gyrodata do Brasil LTDA, são verdadeiros e corretos pelo meu melhor conhecimento.

Lúcio Oliveira / Leonardo Gomes

**Data: 06 de Abril de 2019**

Os dados e cálculos para esta amostragem foram checados por mim e conforme os padrões e procedimentos da Gyrodata do Brasil LTDA.


Este relatório representa uma amostragem direcional do poço baseado nos dados originais obtidos na localização do poço.

Checado por :

Operations Manager

**Lucas Assad**

**Data: 06 de Abril de 2019**

DUPM/AL  
Fb. 2.381  



**Parte 3**  
**Detalhes da Amostragem**

ORIGINAL  
Fis. 7.382  
du

3.0     DETALHES DA AMOSTRAGEM

Cliente	:	Braskem
Sonda	:	N/A
Campo	:	Sal Gema
Poço	:	Mina 02
Latitude	:	9.630589 deg. S
Longitude	:	35.746543 deg. W
Data da amostragem	:	6 de Abril de 2019
Tipo de amostragem	:	Gyro Multishot Contínuo
Referência de profundidade	:	Ground
Max. Profundidade da amostragem	:	245.00 metros
Origem da seção vertical	:	-
Azimute da seção vertical	:	-
Referência Norte	:	Norte Verdadeiro
Grid Correction	:	-
Método de cálculo	:	Mínima Curvatura
Surveyors	:	Lúcio Oliveira / Leonardo Gomes



ORIGINAL  
Fis. 2.383  


**Parte 4**  
**Listagem Definitiva da Amostragem**

**4.0 LISTAGEM DEFINITIVA DA AMOSTRAGEM**

ORIGINAL  
No. 7.384  
[Signature]

A Gyrodata Directional Survey

for

**BRASKEM**

Well: **Mina 02**,  
Location: RIGLESS, SAL GEMA

Job Number: BZ0419GVC036

Run Date: 06 Apr 2019

Calculation Method: MINIMUM CURVATURE

Survey Latitude: 9.630589 deg. S

Longitude: 35.746543 deg. W

Azimuth Correction:

Gyro: Bearings are Relative to True North

Depth Reference: Ground

Vertical Section Calculated from Well Head Location

Closure Calculated from Well Head Location

Horizontal Coordinates Calculated from Well Head Location


DUPICAL  
No. 7.385  
01

A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
0.00	0.00	0.00	0.00	0.00	0.00 N	0.00 E
30.00	0.45	128.25	30.00	0.00	0.07 S	0.09 E
31.00	0.43	125.81	31.00	0.00	0.08 S	0.10 E
32.00	0.41	128.83	32.00	0.00	0.08 S	0.10 E
33.00	0.40	127.18	33.00	0.00	0.09 S	0.11 E
34.00	0.39	126.71	34.00	0.00	0.09 S	0.11 E
35.00	0.37	124.47	35.00	0.00	0.09 S	0.12 E
36.00	0.36	124.53	36.00	0.00	0.10 S	0.12 E
37.00	0.35	122.80	37.00	0.00	0.10 S	0.13 E
38.00	0.34	121.59	38.00	0.00	0.10 S	0.14 E
39.00	0.33	119.27	39.00	0.00	0.11 S	0.14 E
40.00	0.32	116.79	40.00	0.00	0.11 S	0.15 E
41.00	0.31	115.21	41.00	0.00	0.11 S	0.15 E
42.00	0.30	113.44	42.00	0.00	0.11 S	0.15 E
43.00	0.30	111.29	43.00	0.00	0.12 S	0.16 E
44.00	0.29	108.93	44.00	0.00	0.12 S	0.16 E
45.00	0.28	107.96	45.00	0.19	0.12 S	0.17 E
46.00	0.28	107.58	46.00	0.19	0.12 S	0.17 E
47.00	0.28	107.58	47.00	0.16	0.12 S	0.18 E
48.00	0.28	108.31	48.00	0.15	0.12 S	0.18 E
49.00	0.27	109.61	49.00	0.15	0.13 S	0.19 E
50.00	0.28	112.14	50.00	0.13	0.13 S	0.19 E
51.00	0.28	114.74	51.00	0.12	0.13 S	0.20 E
52.00	0.27	116.88	52.00	0.12	0.13 S	0.20 E
53.00	0.27	119.17	53.00	0.11	0.13 S	0.21 E
54.00	0.27	122.54	54.00	0.10	0.14 S	0.21 E
55.00	0.26	126.05	55.00	0.10	0.14 S	0.21 E
56.00	0.26	128.43	56.00	0.09	0.14 S	0.22 E
57.00	0.26	130.43	57.00	0.10	0.14 S	0.22 E
58.00	0.25	132.30	58.00	0.11	0.15 S	0.22 E
59.00	0.26	133.67	59.00	0.13	0.15 S	0.23 E
60.00	0.25	134.50	60.00	0.15	0.15 S	0.23 E
61.00	0.25	134.65	61.00	0.17	0.16 S	0.23 E
62.00	0.25	134.67	62.00	0.19	0.16 S	0.24 E
63.00	0.25	134.59	63.00	0.21	0.16 S	0.24 E
64.00	0.25	134.33	64.00	0.22	0.16 S	0.24 E




ORIGINAL  
7.386  


A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
65.00	0.24	133.98	65.00	0.24	0.17 S	0.25 E
66.00	0.24	133.55	66.00	0.25	0.17 S	0.25 E
67.00	0.24	132.37	67.00	0.24	0.17 S	0.25 E
68.00	0.24	130.97	68.00	0.22	0.18 S	0.25 E
69.00	0.24	130.09	69.00	0.19	0.18 S	0.26 E
70.00	0.24	129.07	70.00	0.14	0.18 S	0.26 E
71.00	0.24	128.95	71.00	0.09	0.18 S	0.26 E
72.00	0.24	130.13	72.00	0.06	0.19 S	0.27 E
73.00	0.25	132.27	73.00	0.03	0.19 S	0.27 E
74.00	0.27	135.13	74.00	0.02	0.19 S	0.27 E
75.00	0.28	137.95	75.00	0.04	0.20 S	0.28 E
76.00	0.29	141.17	76.00	0.07	0.20 S	0.28 E
77.00	0.31	144.50	77.00	0.09	0.20 S	0.28 E
78.00	0.32	147.92	78.00	0.11	0.21 S	0.29 E
79.00	0.34	151.47	79.00	0.11	0.21 S	0.29 E
80.00	0.35	154.79	80.00	0.12	0.22 S	0.29 E
81.00	0.36	157.73	81.00	0.12	0.23 S	0.29 E
82.00	0.36	159.08	82.00	0.12	0.23 S	0.30 E
83.00	0.36	158.22	83.00	0.12	0.24 S	0.30 E
84.00	0.34	155.19	84.00	0.12	0.24 S	0.30 E
85.00	0.33	150.29	85.00	0.13	0.25 S	0.30 E
86.00	0.31	145.06	86.00	0.13	0.25 S	0.31 E
87.00	0.30	140.07	87.00	0.14	0.26 S	0.31 E
88.00	0.28	135.59	88.00	0.17	0.26 S	0.31 E
89.00	0.26	130.58	89.00	0.19	0.26 S	0.32 E
90.00	0.25	124.60	90.00	0.22	0.27 S	0.32 E
91.00	0.23	118.78	91.00	0.24	0.27 S	0.32 E
92.00	0.21	113.88	92.00	0.27	0.27 S	0.33 E
93.00	0.21	109.49	93.00	0.29	0.27 S	0.33 E
94.00	0.20	106.58	94.00	0.32	0.27 S	0.33 E
95.00	0.20	104.42	95.00	0.35	0.27 S	0.34 E
96.00	0.21	103.47	96.00	0.36	0.27 S	0.34 E
97.00	0.20	102.90	97.00	0.37	0.28 S	0.35 E
98.00	0.20	101.79	98.00	0.37	0.28 S	0.35 E
99.00	0.20	99.57	99.00	0.35	0.28 S	0.35 E
100.00	0.20	97.27	100.00	0.32	0.28 S	0.36 E


ORIGINAL  
Fts. 7.381  


A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
101.00	0.20	95.58	101.00	0.29	0.28 S	0.36 E
102.00	0.20	93.92	102.00	0.27	0.28 S	0.36 E
103.00	0.21	91.80	103.00	0.25	0.28 S	0.37 E
104.00	0.21	89.85	104.00	0.22	0.28 S	0.37 E
105.00	0.21	87.75	105.00	0.19	0.28 S	0.37 E
106.00	0.21	86.59	106.00	0.16	0.28 S	0.38 E
107.00	0.21	85.94	107.00	0.13	0.28 S	0.38 E
108.00	0.21	85.34	108.00	0.11	0.28 S	0.38 E
109.00	0.20	83.89	109.00	0.09	0.28 S	0.39 E
110.00	0.20	82.82	110.00	0.08	0.28 S	0.39 E
111.00	0.20	82.32	111.00	0.08	0.28 S	0.39 E
112.00	0.20	81.65	112.00	0.07	0.28 S	0.40 E
113.00	0.20	81.05	113.00	0.06	0.27 S	0.40 E
114.00	0.19	80.21	114.00	0.04	0.27 S	0.40 E
115.00	0.19	79.20	115.00	0.03	0.27 S	0.41 E
116.00	0.19	78.32	116.00	0.02	0.27 S	0.41 E
117.00	0.19	77.05	117.00	0.01	0.27 S	0.41 E
118.00	0.18	75.35	118.00	0.02	0.27 S	0.42 E
119.00	0.18	74.01	119.00	0.03	0.27 S	0.42 E
120.00	0.18	74.17	120.00	0.05	0.27 S	0.42 E
121.00	0.17	75.40	121.00	0.06	0.27 S	0.43 E
122.00	0.17	77.05	122.00	0.07	0.27 S	0.43 E
123.00	0.17	78.53	123.00	0.08	0.27 S	0.43 E
124.00	0.17	79.71	124.00	0.09	0.27 S	0.44 E
125.00	0.16	81.38	125.00	0.10	0.27 S	0.44 E
126.00	0.16	83.27	126.00	0.11	0.27 S	0.44 E
127.00	0.16	85.47	127.00	0.12	0.27 S	0.44 E
128.00	0.17	87.80	128.00	0.13	0.27 S	0.45 E
129.00	0.17	90.25	129.00	0.14	0.27 S	0.45 E
130.00	0.17	92.70	130.00	0.15	0.27 S	0.45 E
131.00	0.18	94.32	131.00	0.16	0.27 S	0.46 E
132.00	0.19	95.32	132.00	0.17	0.27 S	0.46 E
133.00	0.20	96.18	133.00	0.18	0.27 S	0.46 E
134.00	0.22	97.32	134.00	0.19	0.27 S	0.47 E
135.00	0.23	98.36	135.00	0.20	0.27 S	0.47 E
136.00	0.24	99.23	136.00	0.21	0.27 S	0.47 E



ORIGINAL  
Fb. 7388  


A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
137.00	0.25	99.86	137.00	0.22	0.27 S	0.48 E
138.00	0.26	99.93	138.00	0.23	0.27 S	0.48 E
139.00	0.26	100.00	139.00	0.24	0.27 S	0.49 E
140.00	0.27	100.11	140.00	0.26	0.27 S	0.49 E
141.00	0.28	100.33	141.00	0.27	0.27 S	0.50 E
142.00	0.29	99.99	142.00	0.28	0.27 S	0.50 E
143.00	0.30	99.26	143.00	0.28	0.27 S	0.51 E
144.00	0.31	98.71	144.00	0.28	0.27 S	0.51 E
145.00	0.31	98.18	145.00	0.28	0.28 S	0.52 E
146.00	0.32	97.62	146.00	0.28	0.28 S	0.52 E
147.00	0.33	97.29	147.00	0.28	0.28 S	0.53 E
148.00	0.34	97.37	148.00	0.28	0.28 S	0.53 E
149.00	0.35	97.17	149.00	0.29	0.28 S	0.54 E
150.00	0.35	96.90	150.00	0.30	0.28 S	0.55 E
151.00	0.36	96.74	151.00	0.33	0.28 S	0.55 E
152.00	0.37	96.93	152.00	0.36	0.28 S	0.56 E
153.00	0.38	97.65	153.00	0.42	0.28 S	0.56 E
154.00	0.39	98.46	154.00	0.45	0.28 S	0.57 E
155.00	0.41	99.58	155.00	0.52	0.28 S	0.58 E
156.00	0.42	100.87	156.00	0.55	0.29 S	0.59 E
157.00	0.43	102.25	157.00	0.57	0.29 S	0.59 E
158.00	0.44	103.28	158.00	0.58	0.29 S	0.60 E
159.00	0.44	104.06	159.00	0.56	0.29 S	0.61 E
160.00	0.45	105.04	160.00	0.52	0.29 S	0.62 E
161.00	0.46	107.10	161.00	0.48	0.29 S	0.62 E
162.00	0.46	110.92	162.00	0.42	0.30 S	0.63 E
163.00	0.46	116.24	163.00	0.37	0.30 S	0.64 E
164.00	0.47	122.14	164.00	0.29	0.30 S	0.64 E
165.00	0.48	128.84	165.00	0.24	0.31 S	0.65 E
166.00	0.50	135.12	166.00	0.16	0.31 S	0.66 E
167.00	0.51	141.67	167.00	0.11	0.32 S	0.66 E
168.00	0.53	150.57	168.00	0.07	0.33 S	0.67 E
169.00	0.54	157.26	169.00	0.05	0.34 S	0.67 E
170.00	0.56	165.77	170.00	0.06	0.35 S	0.68 E
171.00	0.56	172.15	171.00	0.10	0.36 S	0.68 E
172.00	0.57	176.60	172.00	0.14	0.37 S	0.68 E




ORIGINAL  
Fb. 7.387  
[Signature]

A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036


MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
173.00	0.56	177.59	173.00	0.19	0.38 S	0.68 E
174.00	0.55	173.71	174.00	0.26	0.38 S	0.68 E
175.00	0.54	167.85	175.00	0.31	0.39 S	0.68 E
176.00	0.53	160.42	176.00	0.35	0.40 S	0.68 E
177.00	0.50	153.13	177.00	0.37	0.41 S	0.69 E
178.00	0.49	145.33	178.00	0.38	0.42 S	0.69 E
179.00	0.47	135.12	179.00	0.37	0.43 S	0.70 E
180.00	0.46	127.57	180.00	0.34	0.43 S	0.70 E
181.00	0.43	117.98	181.00	0.29	0.44 S	0.71 E
182.00	0.42	111.44	182.00	0.22	0.44 S	0.72 E
183.00	0.42	106.05	183.00	0.15	0.44 S	0.72 E
184.00	0.41	104.52	184.00	0.15	0.44 S	0.73 E
185.00	0.40	107.99	185.00	0.22	0.44 S	0.74 E
186.00	0.39	114.23	186.00	0.25	0.45 S	0.74 E
187.00	0.39	121.54	187.00	0.28	0.45 S	0.75 E
188.00	0.38	129.46	188.00	0.28	0.45 S	0.75 E
189.00	0.39	139.68	189.00	0.23	0.46 S	0.76 E
190.00	0.39	147.57	190.00	0.18	0.46 S	0.76 E
191.00	0.39	154.96	191.00	0.14	0.47 S	0.77 E
192.00	0.38	162.30	192.00	0.15	0.48 S	0.77 E
193.00	0.39	168.31	193.00	0.22	0.48 S	0.77 E
194.00	0.39	172.65	194.00	0.30	0.49 S	0.77 E
195.00	0.39	173.48	195.00	0.37	0.50 S	0.77 E
196.00	0.40	170.96	196.00	0.45	0.50 S	0.77 E
197.00	0.40	166.21	197.00	0.52	0.51 S	0.78 E
198.00	0.40	161.22	198.00	0.54	0.52 S	0.78 E
199.00	0.39	156.36	199.00	0.52	0.52 S	0.78 E
200.00	0.38	151.96	200.00	0.46	0.53 S	0.78 E
201.00	0.37	151.15	201.00	0.38	0.53 S	0.79 E
202.00	0.37	151.46	202.00	0.29	0.54 S	0.79 E
203.00	0.38	152.25	203.00	0.21	0.55 S	0.79 E
204.00	0.38	154.25	204.00	0.16	0.55 S	0.79 E
205.00	0.38	157.50	205.00	0.15	0.56 S	0.80 E
206.00	0.39	162.21	206.00	0.19	0.56 S	0.80 E
207.00	0.39	166.85	207.00	0.24	0.57 S	0.80 E
208.00	0.40	170.49	208.00	0.28	0.58 S	0.80 E

CAPITAL  
Fto. 7.370  


A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
209.00	0.40	174.20	209.00	0.31	0.58 S	0.80 E
210.00	0.41	177.99	210.00	0.32	0.59 S	0.80 E
211.00	0.41	183.12	211.00	0.32	0.60 S	0.80 E
212.00	0.41	188.03	212.00	0.30	0.61 S	0.80 E
213.00	0.40	189.22	213.00	0.27	0.61 S	0.80 E
214.00	0.38	186.94	214.00	0.24	0.62 S	0.80 E
215.00	0.36	182.19	215.00	0.19	0.63 S	0.80 E
216.00	0.33	175.87	216.00	0.16	0.63 S	0.80 E
217.00	0.31	168.97	217.00	0.14	0.64 S	0.80 E
218.00	0.28	162.21	218.00	0.12	0.64 S	0.80 E
219.00	0.26	155.85	219.00	0.11	0.65 S	0.81 E
220.00	0.23	149.11	220.00	0.13	0.65 S	0.81 E
221.00	0.21	141.60	221.00	0.16	0.65 S	0.81 E
222.00	0.19	133.92	222.00	0.19	0.66 S	0.81 E
223.00	0.17	127.77	223.00	0.23	0.66 S	0.81 E
224.00	0.16	123.63	224.00	0.29	0.66 S	0.82 E
225.00	0.16	121.41	225.00	0.36	0.66 S	0.82 E
226.00	0.17	121.85	226.00	0.40	0.66 S	0.82 E
227.00	0.17	125.36	227.00	0.43	0.66 S	0.82 E
228.00	0.17	127.53	228.00	0.42	0.67 S	0.83 E
229.00	0.18	132.33	229.00	0.48	0.67 S	0.83 E
230.00	0.20	138.15	230.00	0.55	0.67 S	0.83 E
231.00	0.21	145.24	231.00	0.00	0.67 S	0.83 E
232.00	0.24	153.25	232.00	0.00	0.68 S	0.83 E
233.00	0.26	161.41	233.00	0.00	0.68 S	0.84 E
234.00	0.30	168.91	234.00	0.00	0.69 S	0.84 E
235.00	0.34	177.01	235.00	0.00	0.69 S	0.84 E
236.00	0.39	185.47	236.00	0.00	0.70 S	0.84 E
237.00	0.44	192.71	237.00	0.00	0.71 S	0.84 E
238.00	0.49	197.35	238.00	0.00	0.71 S	0.83 E
239.00	0.56	203.96	239.00	0.00	0.72 S	0.83 E
240.00	0.63	211.61	240.00	0.00	0.73 S	0.83 E
241.00	0.73	210.00	241.00	0.00	0.74 S	0.82 E
242.00	0.76	212.56	242.00	0.00	0.75 S	0.81 E
243.00	0.74	214.83	243.00	0.00	0.76 S	0.81 E
244.00	0.78	215.84	244.00	0.00	0.77 S	0.80 E

ORIGINAL  
Fts. 7.391  


A Gyrodata Directional Survey

BRASKEM  
Well: Mina 02  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC036

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
245.00	0.81	216.15	245.00	0.00	0.78 S	0.79 E

**Final Station Closure: Distance: 1.11 m Az: 134.79 deg.**



CAPITAL  
Fis. 7392  
*[Handwritten signature]*

**Parte 5**  
**Controle de Qualidade**




**Parte 6**  
**Relatório Cronológico**  
**da Operação**



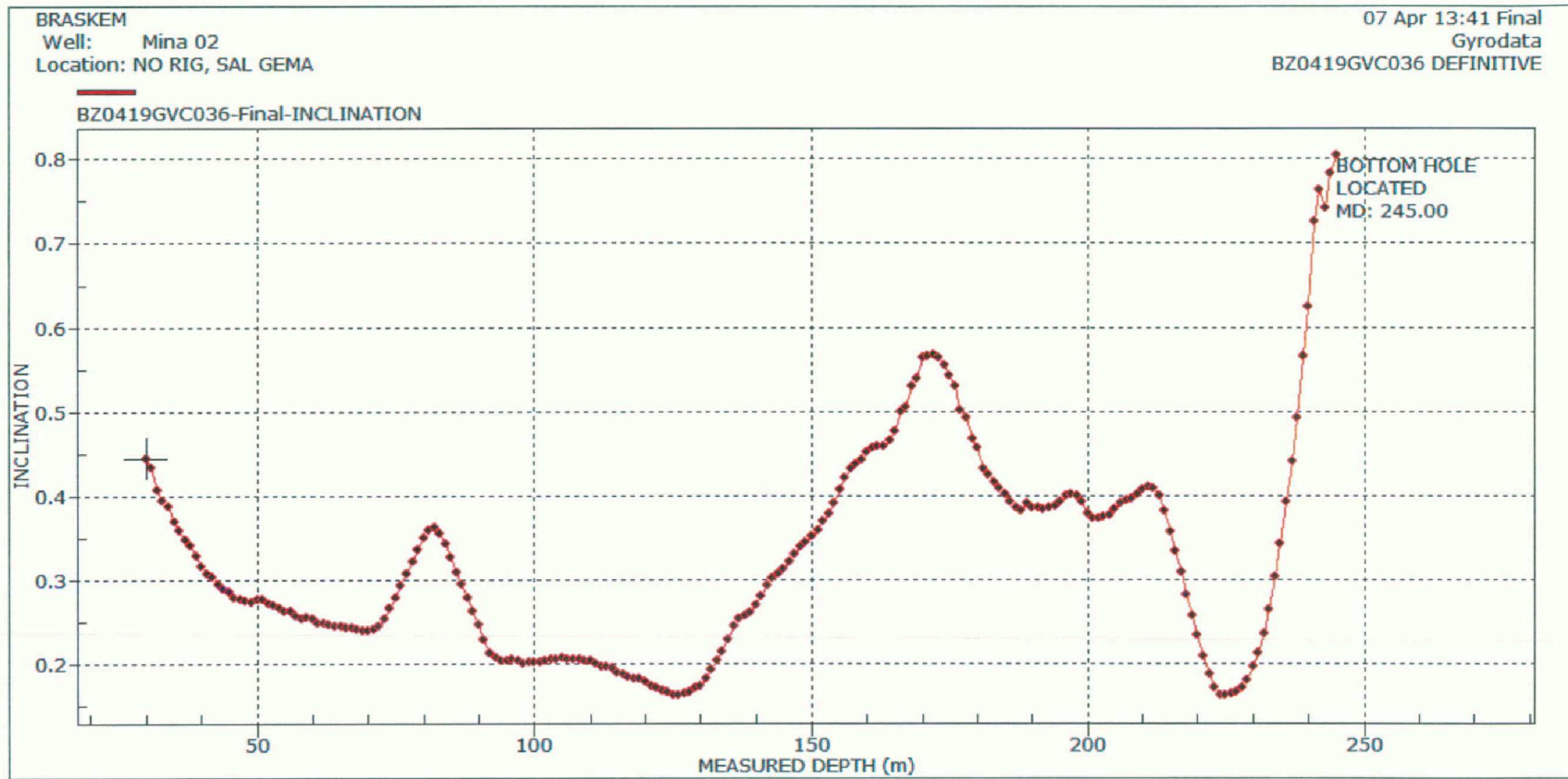
**6.0 RELATÓRIO CRONOLÓGICO DA OPERAÇÃO**

**06 de abril de 2019**

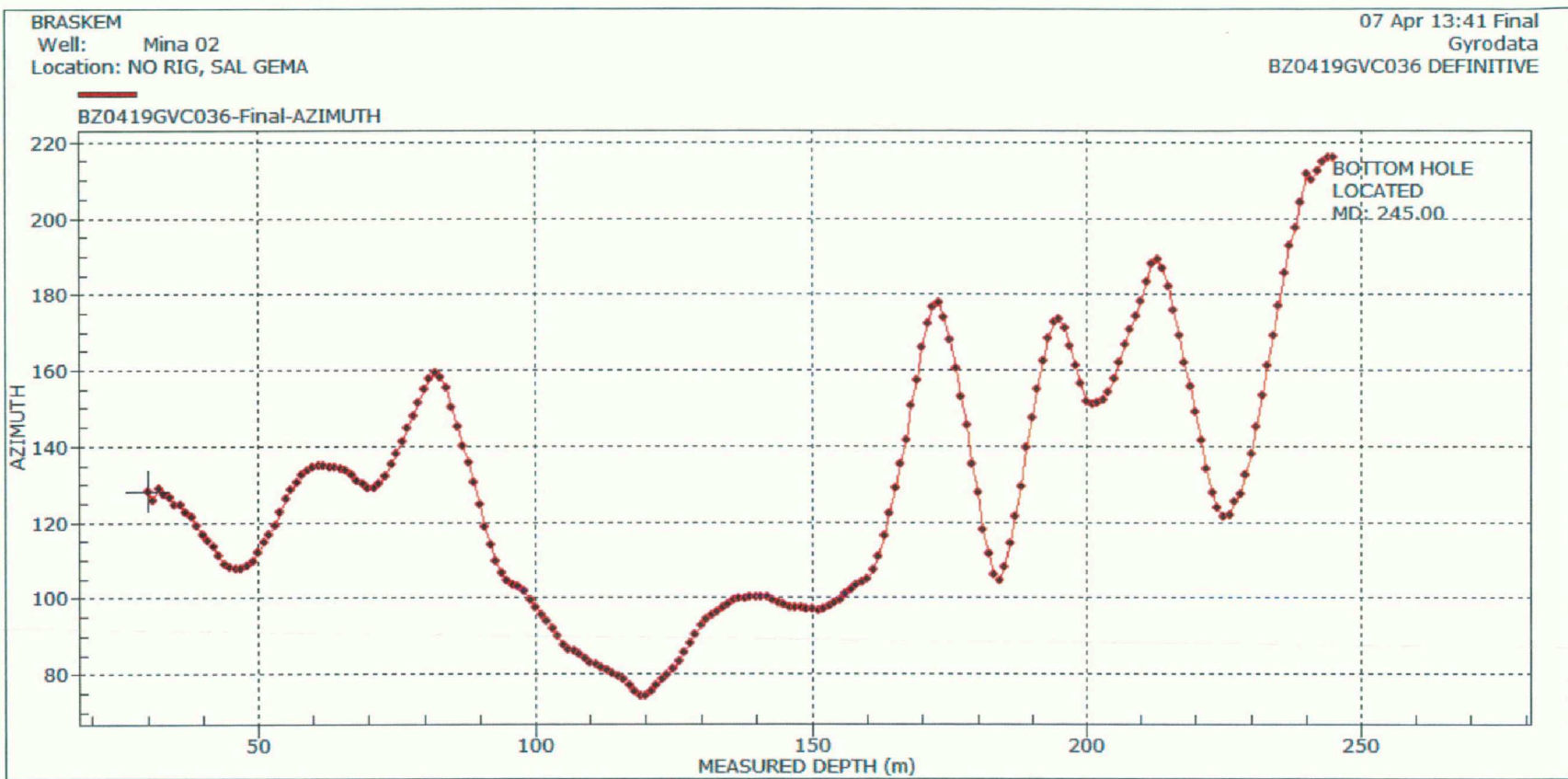
15:00 Chegada da equipe mina 02  
16:00 Conexão gyrodata/flodim  
17:00 Início corrida mina 02  
18:00 Desmontagem de equipamentos  
18:30 Saída da equipe mina 02  
19:00 Pós Calibração  
20:00 Chegada na mina 06 / Cancelado devido condições  
21:00 Saída da equipe mina 06

2011/AL  
Fis. 7.396  


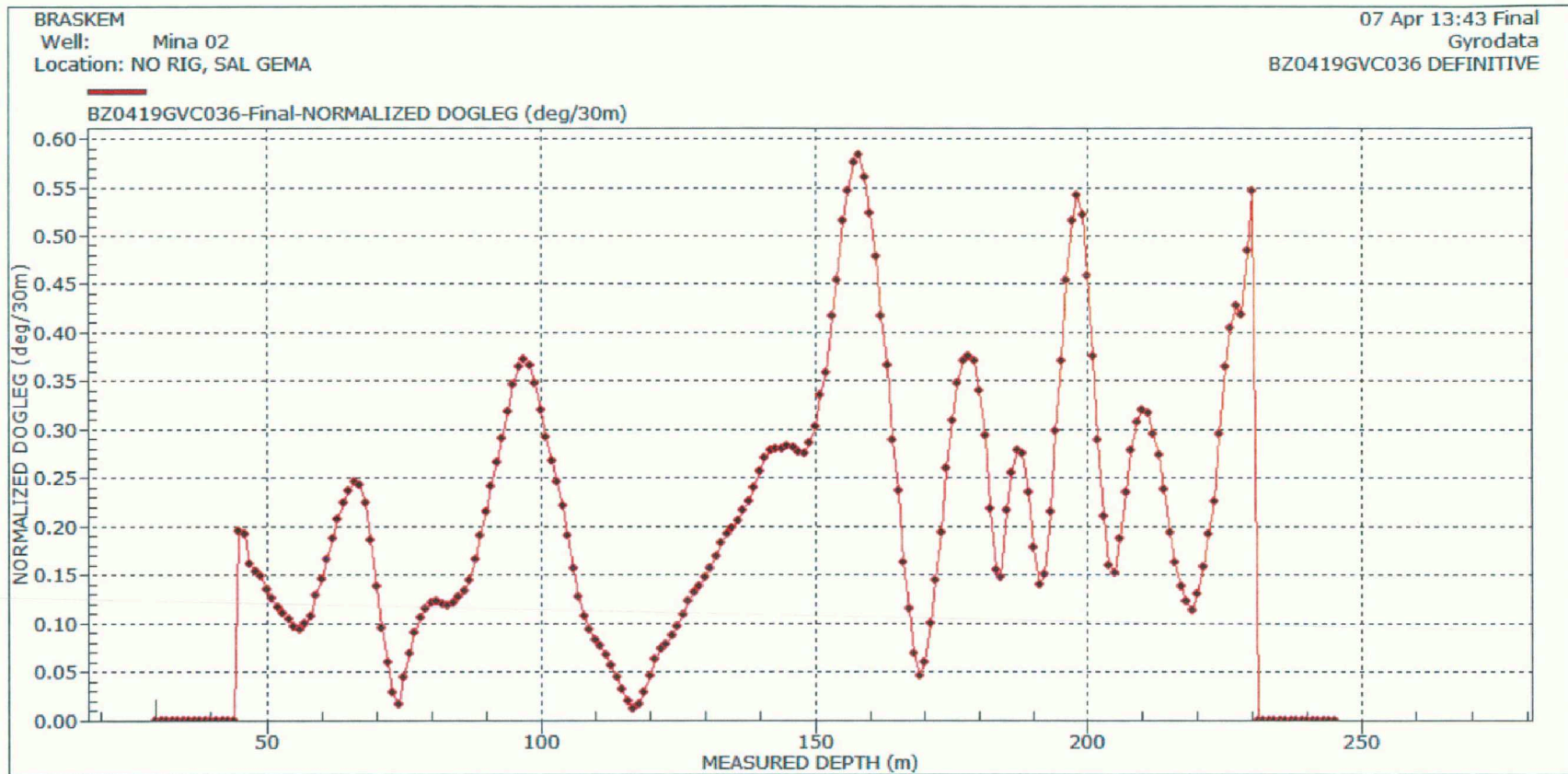
**Parte 7**  
**Gráficos**



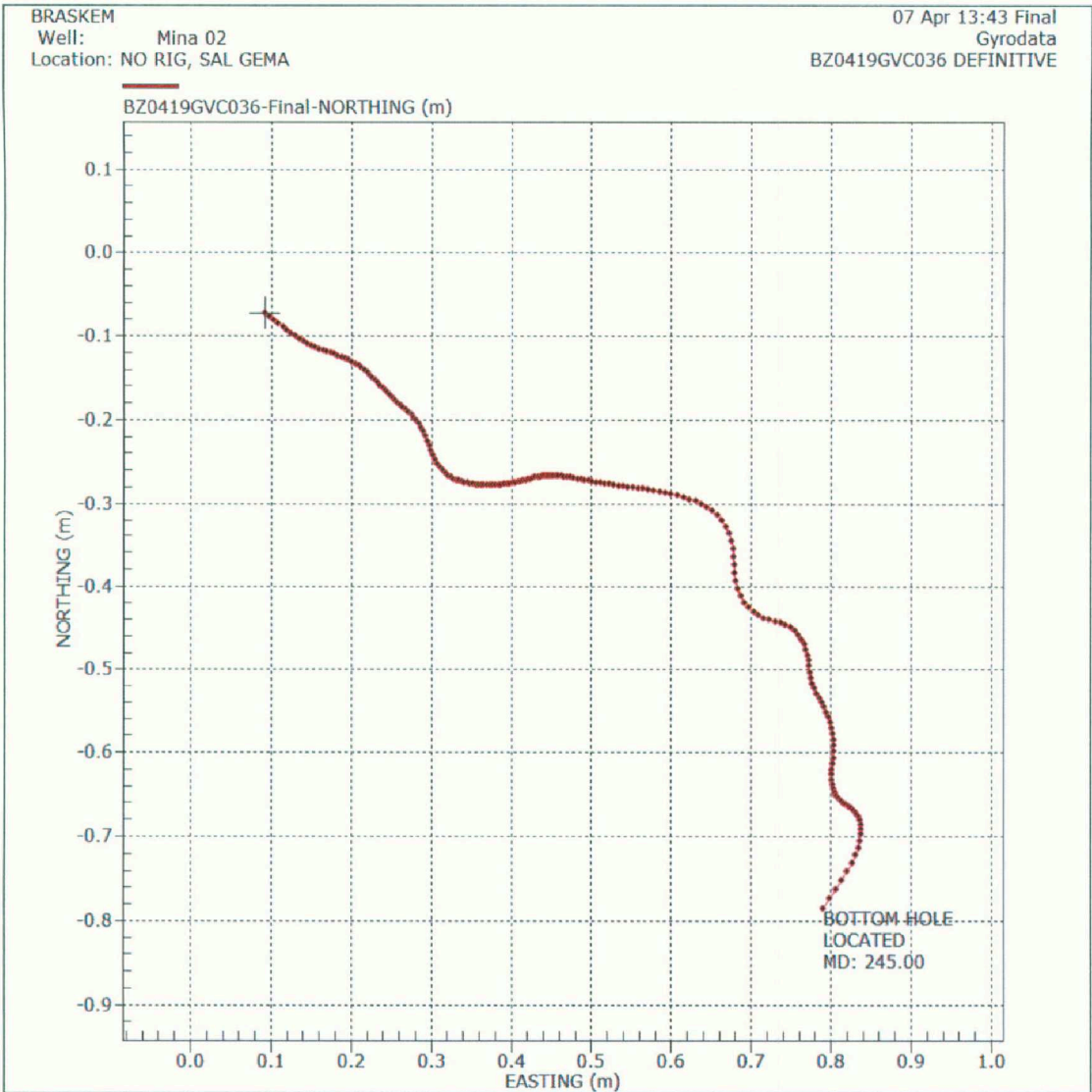
ENCARTE  
Pg. 73/81  
[Signature]







25 de 26



ORIGINAL  
No. 7.401  
[assinatura]



**Braskem**

Campo: Sal Gema

Poço: Mina 15

Gyro Multshot Contínuo

Data da Amostragem: 7 de Abril de 2019

**Número de Trabalho: BZ0419GVC037**

ORIGINAL  
Fis. 7.402  
[Signature]

**ÍNDICE**

1.0      Discussão ..... 3

2.0      Página de Certificado da Amostragem ..... 5

3.0      Detalhes da Amostragem..... 7

4.0      Listagem Definitiva da Amostragem ..... 9

5.0      Controle de Qualidade.....21

6.0      Relatório Cronológico da Operação.....23

7.0      Gráficos.....25



ORIGINAL  
Fls. 7403  
[Signature]

**Parte 1**  
**Discussão**

ORIGINAL  
Fis. 7.404  
EN

## 1.0 DISCUSSÃO

O Giroscópio FA088 foi utilizado para fazer uma amostragem na Mina 15.  
A amostragem foi coletada da superfície até 350.00m.  
Todas as Profundidades estão referenciadas à cabeça do poço.  
A referência ao norte é Norte Verdadeiro.  
Todas as Profundidades foram tomadas do cabo de perfilagem da unidade Flodim.

CNPJ 00.000.000/0000-00  
No. 7.405  
[Assinatura]

**Parte 2**  
**Página de Certificado da Amostragem**

ORIGINAL  
Fto. 7.406  
[assinatura]

**2.0 PÁGINA DE CERTIFICADO DA AMOSTRAGEM**

Os dados e cálculos para esta amostragem foram obtidos e atuados por mim de acordo com padrões e procedimentos da Gyrodata do Brasil LTDA, são verdadeiros e corretos pelo meu melhor conhecimento.

Lúcio Oliveira / Leonardo Gomes

Data: 07 de Abril de 2019

Os dados e cálculos para esta amostragem foram checados por mim e conforme os padrões e procedimentos da Gyrodata do Brasil LTDA.

Este relatório representa uma amostragem direcional do poço baseado nos dados originais obtidos na localização do poço.


Checado por :

Operations Manager

Lucas Assad

Data: 07 de Abril de 2019



CAPITAL  
Fib. 7.407  


**Parte 3**  
**Detalhes da Amostragem**

ORIGINAL  
Fis. 7.408  


**3.0    DETALHES DA AMOSTRAGEM**

Cliente	:	Braskem
Sonda	:	N/A
Campo	:	Sal Gema
Poço	:	Mina 15
Latitude	:	9.638784 deg. S
Longitude	:	35.747184 deg. W
Data da amostragem	:	7 de Abril de 2019
Tipo de amostragem	:	Gyro Multishot Contínuo
Referência de profundidade	:	Ground
Max. Profundidade da amostragem	:	350.00 metros
Origem da seção vertical	:	-
Azimute da seção vertical	:	-
Referência Norte	:	Norte Verdadeiro
Grid Correction	:	-
Método de cálculo	:	Mínima Curvatura
Surveyors	:	Lúcio Oliveira / Leonardo Gomes

CADENAL  
Fto. 7.409  
[Signature]

**Parte 4**  
**Listagem Definitiva da Amostragem**

**4.0 LISTAGEM DEFINITIVA DA AMOSTRAGEM**

A Gyrodata Directional Survey

for

**BRASKEM**

Well: **Mina 15**,  
Location: RIGLESS, SAL GEMA

Job Number: BZ0419GVC037

Run Date: 07 Apr 2019

Calculation Method: MINIMUM CURVATURE

Survey Latitude: 9.638784 deg. S

Longitude: 35.747184 deg. W

Azimuth Correction:

Gyro: Bearings are Relative to True North

Depth Reference: Ground

Vertical Section Calculated from Well Head Location

Closure Calculated from Well Head Location

Horizontal Coordinates Calculated from Well Head Location



ORIGINAL  
FIG. 7.411  
EN

A Gyrodata Directional Survey

BRASKEM  
Well: Mina 15  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC037

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
0.00	0.00	0.00	0.00	0.00	0.00 N	0.00 E
7.02	1.07	51.75	7.02	0.00	0.04 N	0.05 E
9.02	1.03	47.96	9.02	0.00	0.06 N	0.08 E
9.99	1.03	47.31	9.99	0.00	0.08 N	0.09 E
11.00	1.02	44.26	11.00	0.00	0.09 N	0.11 E
12.01	1.03	45.43	12.01	0.00	0.10 N	0.12 E
12.94	0.99	43.31	12.94	0.00	0.11 N	0.13 E
13.99	0.99	45.26	13.99	0.00	0.13 N	0.14 E
14.99	0.97	42.68	14.99	0.00	0.14 N	0.15 E
16.00	0.97	44.33	16.00	0.00	0.15 N	0.17 E
16.99	0.96	43.63	16.99	0.00	0.16 N	0.18 E
18.01	0.95	43.63	18.01	0.00	0.18 N	0.19 E
19.00	0.92	41.87	19.00	0.00	0.19 N	0.20 E
19.99	0.89	43.89	19.99	0.00	0.20 N	0.21 E
20.99	0.84	41.02	20.99	0.00	0.21 N	0.22 E
22.01	0.81	46.50	22.01	0.00	0.22 N	0.23 E
22.98	0.78	45.14	22.98	0.41	0.23 N	0.24 E
24.02	0.76	49.07	24.02	0.39	0.24 N	0.25 E
24.98	0.73	47.16	24.98	0.39	0.25 N	0.26 E
26.01	0.73	49.91	26.01	0.41	0.26 N	0.27 E
26.93	0.72	48.93	26.93	0.41	0.26 N	0.28 E
28.01	0.71	50.46	28.01	0.40	0.27 N	0.29 E
29.00	0.69	49.05	29.00	0.40	0.28 N	0.30 E
30.00	0.68	47.80	30.00	0.41	0.29 N	0.31 E
31.00	0.69	47.55	31.00	0.40	0.30 N	0.32 E
32.00	0.68	48.30	32.00	0.40	0.30 N	0.33 E
33.00	0.67	51.91	33.00	0.40	0.31 N	0.33 E
34.00	0.67	51.48	34.00	0.40	0.32 N	0.34 E
35.00	0.66	50.76	35.00	0.36	0.33 N	0.35 E
36.00	0.66	53.82	36.00	0.35	0.33 N	0.36 E
37.00	0.66	53.78	37.00	0.34	0.34 N	0.37 E
38.00	0.65	54.16	38.00	0.28	0.35 N	0.38 E
39.00	0.64	54.30	39.00	0.28	0.35 N	0.39 E
40.00	0.63	54.31	40.00	0.24	0.36 N	0.40 E
41.00	0.63	55.23	41.00	0.24	0.37 N	0.41 E
42.00	0.63	55.77	42.00	0.24	0.37 N	0.42 E

ORIGINAL  
Fis. 7.412  
[Signature]

A Gyrodata Directional Survey

BRASKEM  
Well: Mina 15  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC037

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
43.00	0.63	56.13	43.00	0.23	0.38 N	0.43 E
44.00	0.62	57.00	44.00	0.22	0.38 N	0.43 E
45.00	0.61	57.14	45.00	0.22	0.39 N	0.44 E
46.00	0.61	57.93	46.00	0.23	0.40 N	0.45 E
47.00	0.61	58.82	47.00	0.22	0.40 N	0.46 E
48.00	0.61	59.40	48.00	0.20	0.41 N	0.47 E
49.00	0.60	59.89	49.00	0.20	0.41 N	0.48 E
50.00	0.60	60.16	50.00	0.19	0.42 N	0.49 E
51.00	0.59	60.51	51.00	0.17	0.42 N	0.50 E
52.00	0.57	59.92	52.00	0.17	0.43 N	0.51 E
53.00	0.56	59.39	53.00	0.16	0.43 N	0.52 E
54.00	0.54	58.86	54.00	0.15	0.44 N	0.52 E
55.00	0.53	58.15	55.00	0.15	0.44 N	0.53 E
56.00	0.52	58.01	56.00	0.15	0.45 N	0.54 E
57.00	0.50	57.45	57.00	0.14	0.45 N	0.55 E
58.00	0.49	56.59	58.00	0.13	0.46 N	0.55 E
59.00	0.49	56.40	59.00	0.12	0.46 N	0.56 E
60.00	0.48	55.92	60.00	0.11	0.47 N	0.57 E
61.00	0.48	56.11	61.00	0.09	0.47 N	0.57 E
62.00	0.48	56.13	62.00	0.08	0.48 N	0.58 E
63.00	0.48	56.89	62.99	0.06	0.48 N	0.59 E
64.00	0.48	57.59	63.99	0.05	0.48 N	0.60 E
65.00	0.49	58.28	64.99	0.04	0.49 N	0.60 E
66.00	0.49	58.99	65.99	0.03	0.49 N	0.61 E
67.00	0.50	59.86	66.99	0.02	0.50 N	0.62 E
68.00	0.50	60.54	67.99	0.03	0.50 N	0.63 E
69.00	0.51	61.72	68.99	0.05	0.51 N	0.63 E
70.00	0.51	62.13	69.99	0.06	0.51 N	0.64 E
71.00	0.51	63.04	70.99	0.06	0.51 N	0.65 E
72.00	0.51	63.08	71.99	0.07	0.52 N	0.66 E
73.00	0.52	63.42	72.99	0.07	0.52 N	0.66 E
74.00	0.52	63.44	73.99	0.07	0.53 N	0.67 E
75.00	0.53	63.54	74.99	0.06	0.53 N	0.68 E
76.00	0.54	63.48	75.99	0.06	0.54 N	0.69 E
77.00	0.54	63.54	76.99	0.05	0.54 N	0.70 E
78.00	0.55	62.95	77.99	0.03	0.54 N	0.71 E



ORIGINAL  
FIG. 7.413  
ON

A Gyrodata Directional Survey

BRASKEM  
Well: Mina 15  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC037

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
79.00	0.56	62.89	78.99	0.02	0.55 N	0.71 E
80.00	0.56	62.18	79.99	0.01	0.55 N	0.72 E
81.00	0.57	62.25	80.99	0.01	0.56 N	0.73 E
82.00	0.57	61.87	81.99	0.02	0.56 N	0.74 E
83.00	0.58	62.06	82.99	0.02	0.57 N	0.75 E
84.00	0.58	61.84	83.99	0.03	0.57 N	0.76 E
85.00	0.57	61.71	84.99	0.03	0.58 N	0.77 E
86.00	0.57	61.50	85.99	0.03	0.58 N	0.78 E
87.00	0.56	61.41	86.99	0.03	0.59 N	0.78 E
88.00	0.55	60.98	87.99	0.03	0.59 N	0.79 E
89.00	0.54	61.02	88.99	0.04	0.59 N	0.80 E
90.00	0.53	60.29	89.99	0.04	0.60 N	0.81 E
91.00	0.52	60.21	90.99	0.05	0.60 N	0.82 E
92.00	0.51	59.95	91.99	0.06	0.61 N	0.83 E
93.00	0.50	59.65	92.99	0.08	0.61 N	0.83 E
94.00	0.49	59.26	93.99	0.09	0.62 N	0.84 E
95.00	0.49	59.05	94.99	0.10	0.62 N	0.85 E
96.00	0.48	59.25	95.99	0.12	0.63 N	0.86 E
97.00	0.48	59.26	96.99	0.14	0.63 N	0.86 E
98.00	0.48	59.56	97.99	0.15	0.63 N	0.87 E
99.00	0.48	60.10	98.99	0.15	0.64 N	0.88 E
100.00	0.48	60.24	99.99	0.16	0.64 N	0.88 E
101.00	0.49	61.28	100.99	0.16	0.65 N	0.89 E
102.00	0.49	62.22	101.99	0.16	0.65 N	0.90 E
103.00	0.49	62.87	102.99	0.16	0.66 N	0.91 E
104.00	0.49	63.63	103.99	0.15	0.66 N	0.91 E
105.00	0.49	64.48	104.99	0.16	0.66 N	0.92 E
106.00	0.49	65.62	105.99	0.16	0.67 N	0.93 E
107.00	0.49	66.20	106.99	0.16	0.67 N	0.94 E
108.00	0.48	66.97	107.99	0.16	0.67 N	0.95 E
109.00	0.47	67.50	108.99	0.16	0.68 N	0.95 E
110.00	0.47	68.07	109.99	0.17	0.68 N	0.96 E
111.00	0.47	69.34	110.99	0.17	0.68 N	0.97 E
112.00	0.46	69.89	111.99	0.17	0.69 N	0.98 E
113.00	0.45	70.13	112.99	0.17	0.69 N	0.98 E
114.00	0.45	70.40	113.99	0.16	0.69 N	0.99 E

ORIGINAL  
Fis. 7.494  
[Signature]

## A Gyrodata Directional Survey

BRASKEM

Well: Mina 15

Location: RIGLESS, SAL GEMA

Job Number: 3Z0419GVC037

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
115.00	0.44	71.17	114.99	0.14	0.69 N	1.00 E
116.00	0.44	71.74	115.99	0.12	0.70 N	1.00 E
117.00	0.43	71.77	116.99	0.09	0.70 N	1.01 E
118.00	0.43	72.02	117.99	0.08	0.70 N	1.02 E
119.00	0.42	72.56	118.99	0.09	0.70 N	1.03 E
120.00	0.41	73.27	119.99	0.11	0.70 N	1.03 E
121.00	0.41	73.94	120.99	0.14	0.71 N	1.04 E
122.00	0.40	74.30	121.99	0.17	0.71 N	1.05 E
123.00	0.40	75.16	122.99	0.19	0.71 N	1.05 E
124.00	0.39	76.14	123.99	0.20	0.71 N	1.06 E
125.00	0.39	77.19	124.99	0.19	0.71 N	1.07 E
126.00	0.39	77.81	125.99	0.17	0.72 N	1.07 E
127.00	0.39	78.04	126.99	0.13	0.72 N	1.08 E
128.00	0.38	77.96	127.99	0.09	0.72 N	1.09 E
129.00	0.38	76.68	128.99	0.06	0.72 N	1.09 E
130.00	0.38	73.77	129.99	0.05	0.72 N	1.10 E
131.00	0.39	70.13	130.99	0.07	0.72 N	1.11 E
132.00	0.40	66.03	131.99	0.12	0.73 N	1.11 E
133.00	0.41	61.67	132.99	0.16	0.73 N	1.12 E
134.00	0.41	57.37	133.99	0.19	0.73 N	1.12 E
135.00	0.42	53.42	134.99	0.23	0.74 N	1.13 E
136.00	0.43	49.61	135.99	0.25	0.74 N	1.14 E
137.00	0.43	46.02	136.99	0.27	0.75 N	1.14 E
138.00	0.44	43.72	137.99	0.28	0.75 N	1.15 E
139.00	0.44	42.79	138.99	0.28	0.76 N	1.15 E
140.00	0.45	44.15	139.99	0.29	0.76 N	1.16 E
141.00	0.46	48.02	140.99	0.30	0.77 N	1.16 E
142.00	0.46	53.16	141.99	0.30	0.77 N	1.17 E
143.00	0.47	58.90	142.99	0.31	0.78 N	1.18 E
144.00	0.48	64.93	143.99	0.32	0.78 N	1.18 E
145.00	0.49	70.61	144.99	0.33	0.79 N	1.19 E
146.00	0.50	75.82	145.99	0.35	0.79 N	1.20 E
147.00	0.52	81.02	146.99	0.37	0.79 N	1.21 E
148.00	0.53	85.93	147.99	0.40	0.79 N	1.22 E
149.00	0.55	89.86	148.99	0.43	0.79 N	1.23 E
150.00	0.57	92.98	149.99	0.45	0.79 N	1.24 E



DIP/MAL  
Fig. 2.495  
01

A Gyrodata Directional Survey

BRASKEM  
Well: Mina 15  
Location: RIGLESS, SAL GEMA  
Job Number: BZ0419GVC037

MEASURED DEPTH meters	INCL deg.	AZIMUTH deg.	VERTICAL DEPTH meters	DOGLEG SEVERITY deg/30m	HORIZONTAL COORDINATES meters	
151.00	0.58	94.95	150.99	0.47	0.79 N	1.25 E
152.00	0.60	95.80	151.99	0.49	0.79 N	1.26 E
153.00	0.61	96.11	152.99	0.51	0.79 N	1.27 E
154.00	0.62	96.16	153.99	0.52	0.79 N	1.28 E
155.00	0.63	96.05	154.99	0.51	0.79 N	1.29 E
156.00	0.64	96.01	155.99	0.49	0.78 N	1.30 E
157.00	0.65	96.02	156.99	0.44	0.78 N	1.31 E
158.00	0.65	95.78	157.99	0.39	0.78 N	1.32 E
159.00	0.65	95.62	158.99	0.33	0.78 N	1.33 E
160.00	0.65	95.68	159.99	0.28	0.78 N	1.35 E
161.00	0.65	95.93	160.99	0.24	0.78 N	1.36 E
162.00	0.66	96.32	161.99	0.19	0.78 N	1.37 E
163.00	0.66	96.59	162.99	0.13	0.78 N	1.38 E
164.00	0.66	96.60	163.99	0.08	0.77 N	1.39 E
165.00	0.65	96.61	164.99	0.08	0.77 N	1.40 E
166.00	0.64	96.45	165.99	0.14	0.77 N	1.41 E
167.00	0.64	96.29	166.99	0.21	0.77 N	1.42 E
168.00	0.64	96.24	167.99	0.28	0.77 N	1.44 E
169.00	0.64	96.53	168.99	0.35	0.77 N	1.45 E
170.00	0.64	96.92	169.99	0.42	0.77 N	1.46 E
171.00	0.64	97.20	170.99	0.49	0.77 N	1.47 E
172.00	0.64	97.09	171.99	0.57	0.76 N	1.48 E
173.00	0.63	96.70	172.99	0.65	0.76 N	1.49 E
174.00	0.63	96.37	173.99	0.71	0.76 N	1.50 E
175.00	0.63	96.16	174.99	0.77	0.76 N	1.51 E
176.00	0.63	96.03	175.99	0.82	0.76 N	1.52 E
177.00	0.63	95.74	176.99	0.83	0.76 N	1.53 E
178.00	0.63	94.29	177.99	0.83	0.76 N	1.55 E
179.00	0.63	91.82	178.99	0.83	0.76 N	1.56 E
180.00	0.62	88.00	179.99	0.81	0.76 N	1.57 E
181.00	0.63	82.61	180.99	0.79	0.76 N	1.58 E
182.00	0.63	76.67	181.99	0.77	0.76 N	1.59 E
183.00	0.64	70.76	182.99	0.74	0.76 N	1.60 E
184.00	0.65	64.69	183.99	0.71	0.77 N	1.61 E
185.00	0.66	58.39	184.99	0.67	0.77 N	1.62 E
186.00	0.68	52.06	185.99	0.61	0.78 N	1.63 E