	<b>TECHNICAL REPORT</b>		No. <b>RL-9560.00-6521-940-NTS-005</b>
	CLIENT: <b>PETROBRAS</b>		PAGE: <b>1 de 23</b>
	AREA: <b>PAULINIA-JACUTINGA TRANSPORT SYSTEM</b>		
NOVA TRANSPORTADORA DO SUDESTE S.A.	TITLE: <b>THERMAL HYDRAULIC SIMULATION REPORT GASPAJ</b>		

### REVISIONS INDEX

R E V .	DESCRIPTION AND/OR ACHIEVED SHEETS
0	Original Issue.
A	ANP Official Letter No. 08/2018 / SIM-CSM

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	01/07/2018	08/04/2019							
PROJECT	NTS	NTS							
EXECUTION	TIAGO NÉRY	TIAGO NÉRY							
VERIFICATION	PHILIFE KRAUSE	PHILIFE KRAUSE							
APPROVAL	LAURO CAMPOS	LAURO CAMPOS							

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**1. 385326(**

7K1SXUSRVHRIW UHSRUW W SUHVHQW VFHQDULR RIW FXUUHQW DQVSRUW DSDFLWXIORZ  
 DVVRFLDWGZWDXOtQLD-DFXWQJDDV3LSHOLQH1DWUDODV7UDQVSRUW HUYLHF\$UHHPHQW  
 VLJQHG EHQ 1RYD 7UDQVSRUDGRUD GR 6XGHVW6\$176 DQG 3HWyoHR WDVLOHLUR 6\$  
 37525\$HYDOXDHWGRXJKWDGVDMMUPREUDXOLFVLPXODWRQ

**2. DESCRIÇÃO DO SISTEMA**

O sistema de transporte referente ao Contrato do GASPAJ compreende um ponto de entrega (PE) e um ponto de recebimento (PR) distribuídos no estado de São Paulo e Minas Gerais.

A figura 1 apresenta o esquemático deste sistema.

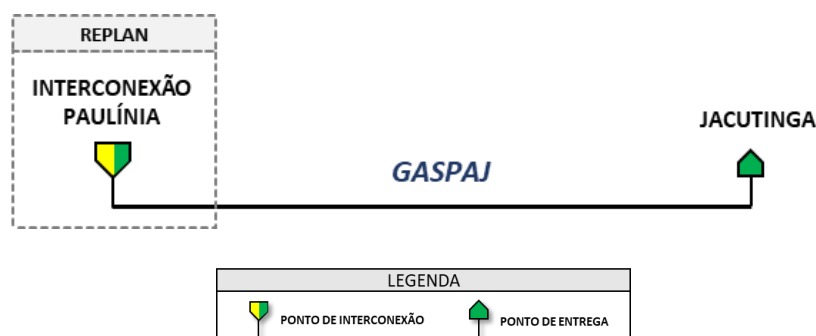


Figura 1 – Fluxograma do GASPAJ

As características técnicas do gasoduto, PR e PE integrantes do Contrato GASPAJ são apresentadas nas tabelas a seguir.

Tabela 1 – Características do gasoduto GASPAJ

GASODUTO / RAMAL	UF	DIÂMETRO NOMINAL (pol)	EXTENSÃO DESENVOLVIDA (km)	PMOA (kgf/cm <sup>2</sup> g)
GASPAJ (PAULÍNIA - JACUTINGA)	SP/MG	14	93,8	98,0

Tabela 2 – Características dos pontos de recebimento

PONTO DE RECEBIMENTO	UF	VAZÃO MÁXIMA (mil m <sup>3</sup> /d)	VAZÃO MÍNIMA (mil m <sup>3</sup> /d)	PRESSÃO MÁXIMA (kgf/cm <sup>2</sup> g)	PRESSÃO MÍNIMA (kgf/cm <sup>2</sup> g)
PTR INTERCONEXÃO PAULÍNIA	SP	5.000	50	100	65,0

Tabela 3 – Características dos pontos de entrega

PONTO DE ENTREGA	UF	VAZÃO MÁXIMA (mil m <sup>3</sup> /d)	VAZÃO MÍNIMA (mil m <sup>3</sup> /d)	PRESSÃO MÁXIMA (kgf/cm <sup>2</sup> g)	PRESSÃO MÍNIMA (kgf/cm <sup>2</sup> g)	ΔP (kgf/cm <sup>2</sup> g)
PTE JACUTINGA	MG	1.250	50	38,0	33,0	5,0



### 3. DADOS BÁSICOS DE SIMULAÇÃO

#### 3.1 CONDIÇÕES DE SIMULAÇÃO

Os seguintes dados básicos foram utilizados na simulação termo-hidráulica:

- Software utilizado: PipelineStudio, versão 4.2.1.0
- Regime de escoamento: permanente
- Condições de referência de vazão: 20 °C e 1 atm
- Coeficiente global de transferência de calor: 1,9 kcal/hm<sup>2</sup>-°C
- Temperatura ambiente média (verão): 26 °C
- Equação de fator de atrito: Colebrook
- Equação de estado do gás: BWRS
- Equação de viscosidade do gás: LGE

#### 3.2 COMPOSIÇÃO QUÍMICA DO GÁS NATURAL

As seguintes composições químicas foram adotadas de acordo com a origem do gás, conforme tabela abaixo.

Tabela 4 – Composições nos pontos de recebimento

PONTO DE RECEBIMENTO	N <sub>2</sub>	CO <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	nC <sub>4</sub>	iC <sub>4</sub>	nC <sub>5</sub>	iC <sub>5</sub>	C <sub>6+</sub>
PTR INTERCONEXÃO PAULÍNIA	0,65	1,51	89,09	6,00	1,86	0,49	0,40	0,00	0,00	0,00

#### 3.3 GÁS PARA USO DO SISTEMA

O volume de gás utilizado no aquecedor do ponto de entrega pode ser considerado desprezível em relação ao volume movimentado e, portanto, não foi considerado.

#### 3.4 MARGEM OPERACIONAL E PERDAS DE CARGA

A simulação considerou uma margem operacional de 3,5% da capacidade de transporte do gasoduto GASPAJ, aplicada ao modelo termohidráulico como ineficiência do duto.

Sobre o recebimento de gás no gasoduto, considerou-se uma perda de carga de 1 kgf/cm<sup>2</sup>g na saída do ponto de recebimento, devido à perda de carga nas tubulações e nos equipamentos existentes nessas instalações (medidores de vazão, gás coolers, controles contra sobrepressão, etc.).

Para o PE Jacutinga, foi considerada uma perda de carga 5 kgf/cm<sup>2</sup>g, conforme as instalações existentes neste ponto (1 kgf/cm<sup>2</sup>g para cada subsistema da estação - filtragem, aquecimento, regulagem, medição e tubulações).



### 3.5 DADOS BÁSICOS DO GASODUTO

Para as simulações adotou-se a rugosidade indicada na tabela 5.

Tabela 5 – Rugosidade do gasoduto

GASODUTO	RUGOSIDADE (MICRONS)
GASPAJ (PAULÍNIA - JACUTINGA)	9

O perfil de elevação foi obtido a partir dos dados de georreferenciamento do gasoduto e está representado na figura 2 abaixo.

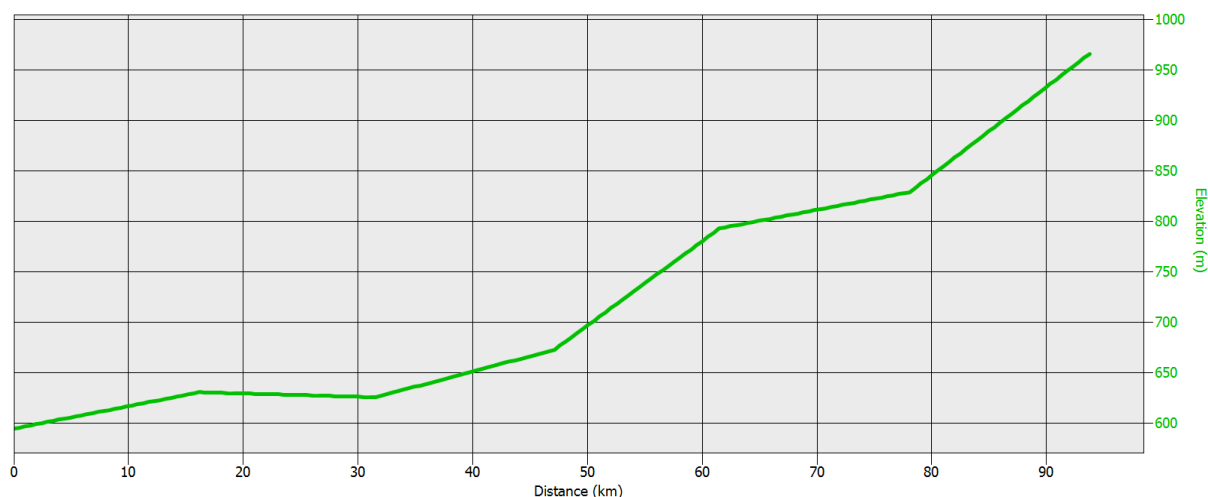


Figura 2 – Perfil de elevação do gasoduto GASPAJ

## 4. CENÁRIOS E RESULTADOS

Os cenários adotados para o escoamento da capacidade contratada do GASPAJ consideraram o atendimento aos pontos de entrega atuais e futuros.

### 4.1 CENÁRIO 1

O cenário 1 considera o atendimento à vazão máxima do atual PE Jacutinga.

As tabelas a seguir apresentam o cenário de oferta e consumo adotado.

Tabela 6 – Tabela de distribuição de vazão no ponto de recebimento

PONTO DE RECEBIMENTO	VAZÃO (mil m <sup>3</sup> /d)
PTR INTERCONEXÃO PAULÍNIA	1.250



Tabela 7 – Tabela de distribuição de vazão no ponto de entrega

PONTO DE ENTREGA	VAZÃO (mil m <sup>3</sup> /d)
PTE JACUTINGA	1.250

#### 4.1.1 RESULTADO CENÁRIO 1

A seguir são apresentados os valores resultantes de vazão e pressão na saída do ponto de recebimento e na entrada do ponto de entrega.

Tabela 8 – Tabela da vazão e pressão resultante no ponto de recebimento

PONTO DE RECEBIMENTO	VAZÃO (mil m <sup>3</sup> /d)	PRESSÃO (kgf/cm <sup>2</sup> g)
PTR INTERCONEXÃO PAULÍNIA	1.250	97,0

Tabela 9 – Tabela da vazão e pressão resultante no ponto de entrega

PONTO DE ENTREGA	VAZÃO (mil m <sup>3</sup> /d)	PRESSÃO (kgf/cm <sup>2</sup> g)
PTE JACUTINGA	1.250	91,2

A seguir são apresentados os perfis resultantes de pressão e vazão do gasoduto, obtidos na simulação termohidráulica.

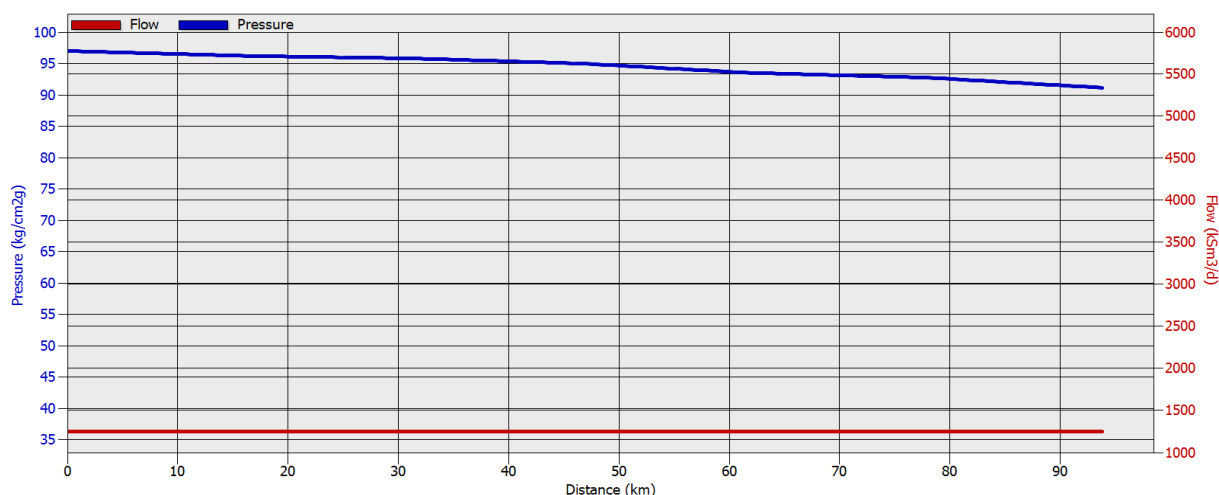


Figura 3 – Perfis de vazão e pressão do gasoduto GASPAJ

#### 4.2 CENÁRIO 2

O cenário 2 considera o atendimento as vazões máximas do atual PE Jacutinga e do futuro PE Jacutinga II.



TITLE:

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GASPAJ

As tabelas a seguir apresentam o cenário de oferta e consumo adotado.

Tabela 10 – Tabela de distribuição de vazão no ponto de recebimento

PONTO DE RECEBIMENTO	VAZÃO (mil m <sup>3</sup> /d)
PTR INTERCONEXÃO PAULÍNIA	1.250

Tabela 11 – Tabela de distribuição de vazão nos pontos de entrega

PONTO DE ENTREGA	VAZÃO (mil m <sup>3</sup> /d)
PTE JACUTINGA	1.250
PTE JACUTINGA II *	3.750

\* A vazão estudada considerou um ponto de entrega futuro de 3.750 mil m<sup>3</sup>/d, totalizando a vazão diária contratada de 5.000 mil m<sup>3</sup>/d

#### 4.2.1 RESULTADO CENÁRIO 2

A seguir são apresentados os valores resultantes de vazão e pressão na saída do ponto de recebimento e na entrada dos pontos de entregas.

Tabela 12 – Tabela da vazão e pressão resultante no ponto de entrega

PONTO DE RECEBIMENTO	VAZÃO (mil m <sup>3</sup> /d)	PRESSÃO (kgf/cm <sup>2</sup> g)
PTR INTERCONEXÃO PAULÍNIA	5.000	97,0

Tabela 13 – Tabela da vazão e pressão resultante no ponto de entrega

PONTO DE ENTREGA	VAZÃO (mil m <sup>3</sup> /d)	PRESSÃO (kgf/cm <sup>2</sup> g)
PTE JACUTINGA	1.250	37,7
PTE JACUTINGA II *	3.750	37,7

\* A vazão estudada considerou um ponto de entrega futuro de 3.750 mil m<sup>3</sup>/d, totalizando a vazão diária contratada de 5.000 mil m<sup>3</sup>/d

A seguir são apresentados os perfis resultantes de pressão e vazão do gasoduto, obtidos na simulação termohidráulica.

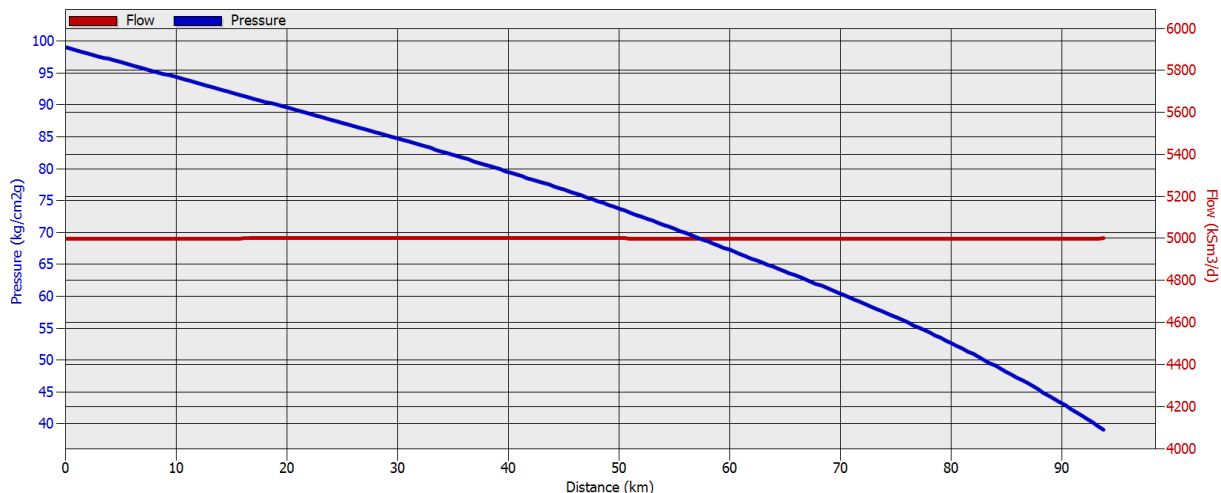


Figura 4 – Perfis de vazão e pressão do gasoduto GASPAJ

### 5. CONCLUSÃO

Para o cenário de transporte utilizado no presente relatório, com base nos resultados da simulação, o sistema integrante do Contrato GASPAJ possui capacidade técnica para movimentação da capacidade contratada de 5.000 mil m<sup>3</sup>/d.





TITLE:

THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

## ANNEX I - STEADY STATE REPORT

## CENÁRIO 1 – Steady State report

## Default Initial Values Selected

Pressure	97.000
Flow	1250.000
Temperature	26.001
% C1	89.091
% C2	6.002
% C3	1.861
% IC4	0.398
% NC4	0.488
% CO2	1.513
% N2	0.647

## Problem Size Report

Nodes	7
Pipes	6
Supplies	1
Deliveries	1
Compositional Fluids	8

## Reference Conditions Report

Reference Pressure	0.00 kg/cm2g
Reference Temperature	20.00 Deg C

## Mass Units Volumetric Units

	Tonn/h	kSm3/d
Total Input Flow	39.580	1250.000
Total Output Flow	39.580	1250.000
Network Flow Balance	0.000	0.000



TITLE: THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

Pipe Name:	GASPAJ_6	Upstream Node:	Node6	Downstream Node:	Node7
Length:	15.668 km	Inside Diameter:	13.440 in	Survey:	NONE
Maximum Pressure:	97.000 kg/cm2g	Milepost:	0.00	Time:	0.000 seconds
Minimum Pressure:	91.153 kg/cm2g	Milepost:	15.67	Time:	0.000 seconds
Maximum  Velocity :	1.486 m/s	Milepost:	15.67	Time:	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	829.00	92.75	97.00	92.75	82.67	1.45	1250.00	25.58	0.819	0.0136	26.00	1.90000
0.49	0.49	833.28	92.70	97.00	92.70	82.62	1.45	1249.99	25.57	0.819	0.0136	26.00	1.90000
0.98	0.98	837.56	92.65	97.00	92.65	82.58	1.45	1249.99	25.55	0.819	0.0136	26.00	1.90000
1.47	1.47	841.84	92.60	97.00	92.60	82.54	1.46	1249.99	25.54	0.819	0.0135	26.00	1.90000
1.96	1.96	846.13	92.55	97.00	92.55	82.49	1.46	1249.99	25.53	0.819	0.0135	26.00	1.90000
2.45	2.45	850.41	92.50	97.00	92.50	82.45	1.46	1249.99	25.51	0.819	0.0135	26.00	1.90000
2.94	2.94	854.69	92.45	97.00	92.45	82.41	1.46	1249.99	25.50	0.819	0.0135	26.00	1.90000
3.43	3.43	858.97	92.40	97.00	92.40	82.36	1.46	1250.00	25.49	0.819	0.0135	26.00	1.90000
3.92	3.92	863.25	92.35	97.00	92.35	82.32	1.46	1250.00	25.48	0.819	0.0135	26.00	1.90000
4.41	4.41	867.53	92.30	97.00	92.30	82.27	1.46	1250.00	25.47	0.819	0.0135	26.00	1.90000
4.90	4.90	871.81	92.25	97.00	92.25	82.23	1.46	1250.00	25.45	0.819	0.0135	26.00	1.90000
5.39	5.39	876.09	92.20	97.00	92.20	82.18	1.46	1250.00	25.44	0.819	0.0135	26.00	1.90000
5.88	5.88	880.38	92.15	97.00	92.15	82.14	1.46	1250.00	25.43	0.819	0.0135	26.00	1.90000
6.37	6.37	884.66	92.10	97.00	92.10	82.09	1.46	1250.00	25.42	0.819	0.0135	26.00	1.90000
6.85	6.85	888.94	92.05	97.00	92.05	82.05	1.46	1250.00	25.41	0.819	0.0135	26.00	1.90000
7.34	7.34	893.22	92.00	97.00	92.00	82.00	1.46	1250.00	25.40	0.819	0.0135	26.00	1.90000
7.83	7.83	897.50	91.95	97.00	91.95	81.96	1.47	1250.00	25.39	0.819	0.0135	26.00	1.90000
8.32	8.32	901.78	91.90	97.00	91.90	81.91	1.47	1250.00	25.38	0.819	0.0135	26.00	1.90000
8.81	8.81	906.06	91.85	97.00	91.85	81.87	1.47	1250.00	25.37	0.819	0.0135	26.00	1.90000
9.30	9.30	910.34	91.80	97.00	91.80	81.82	1.47	1250.00	25.37	0.820	0.0135	26.00	1.90000
9.79	9.79	914.63	91.75	97.00	91.75	81.78	1.47	1250.00	25.36	0.820	0.0135	26.00	1.90000
10.28	10.28	918.91	91.70	97.00	91.70	81.73	1.47	1250.00	25.35	0.820	0.0135	26.00	1.90000
10.77	10.77	923.19	91.65	97.00	91.65	81.68	1.47	1250.00	25.34	0.820	0.0135	26.00	1.90000
11.26	11.26	927.47	91.60	97.00	91.60	81.64	1.47	1250.00	25.33	0.820	0.0135	26.00	1.90000
11.75	11.75	931.75	91.55	97.00	91.55	81.59	1.47	1250.00	25.33	0.820	0.0135	26.00	1.90000
12.24	12.24	936.03	91.50	97.00	91.50	81.54	1.47	1250.00	25.32	0.820	0.0135	26.00	1.90000
12.73	12.73	940.31	91.45	97.00	91.45	81.50	1.47	1250.00	25.31	0.820	0.0135	26.00	1.90000
13.22	13.22	944.59	91.40	97.00	91.40	81.45	1.47	1250.00	25.30	0.820	0.0135	26.00	1.90000
13.71	13.71	948.88	91.35	97.00	91.35	81.40	1.48	1250.00	25.30	0.820	0.0135	26.00	1.90000
14.20	14.20	953.16	91.30	97.00	91.30	81.36	1.48	1250.00	25.29	0.820	0.0135	26.00	1.90000
14.69	14.69	957.44	91.25	97.00	91.25	81.31	1.48	1250.00	25.28	0.820	0.0135	26.00	1.90000
15.18	15.18	961.72	91.20	97.00	91.20	81.26	1.48	1250.00	25.28	0.820	0.0135	26.00	1.90000
15.67	15.67	966.00	91.15	97.00	91.15	81.21	1.48	1250.00	25.27	0.820	0.0135	26.00	1.90000



TITLE: THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

Pipe Name:	GASPAJ_5	Upstream Node:	Node5	Downstream Node:	Node6
Length:	16.607 km	Inside Diameter:	13.465 in	Survey:	NONE
Maximum Pressure:	97.000 kg/cm2g	Milepost:	0.00	Time:	0.000 seconds
Minimum Pressure:	92.752 kg/cm2g	Milepost:	16.61	Time:	0.000 seconds
Maximum  Velocity :	1.452 m/s	Milepost:	16.61	Time:	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	793.00	93.54	97.00	93.54	83.53	1.43	1250.01	25.46	0.818	0.0136	26.00	1.90000
0.49	0.49	794.06	93.52	97.00	93.52	83.51	1.43	1250.01	25.47	0.818	0.0136	26.00	1.90000
0.98	0.98	795.12	93.50	97.00	93.50	83.48	1.43	1250.01	25.47	0.818	0.0136	26.00	1.90000
1.47	1.47	796.18	93.47	97.00	93.47	83.45	1.43	1250.01	25.48	0.818	0.0136	26.00	1.90000
1.95	1.95	797.24	93.45	97.00	93.45	83.43	1.43	1250.01	25.48	0.818	0.0136	26.00	1.90000
2.44	2.44	798.29	93.43	97.00	93.43	83.40	1.43	1250.01	25.49	0.818	0.0136	26.00	1.90000
2.93	2.93	799.35	93.41	97.00	93.40	83.37	1.44	1250.01	25.49	0.818	0.0136	26.00	1.90000
3.42	3.42	800.41	93.38	97.00	93.38	83.35	1.44	1250.01	25.50	0.818	0.0136	26.00	1.90000
3.91	3.91	801.47	93.36	97.00	93.36	83.32	1.44	1250.00	25.50	0.818	0.0136	26.00	1.90000
4.40	4.40	802.53	93.34	97.00	93.33	83.30	1.44	1250.00	25.51	0.818	0.0136	26.00	1.90000
4.88	4.88	803.59	93.31	97.00	93.31	83.27	1.44	1250.00	25.51	0.818	0.0136	26.00	1.90000
5.37	5.37	804.65	93.29	97.00	93.29	83.24	1.44	1250.00	25.51	0.818	0.0136	26.00	1.90000
5.86	5.86	805.71	93.27	97.00	93.26	83.22	1.44	1250.00	25.52	0.818	0.0136	26.00	1.90000
6.35	6.35	806.76	93.24	97.00	93.24	83.19	1.44	1250.00	25.52	0.818	0.0136	26.00	1.90000
6.84	6.84	807.82	93.22	97.00	93.22	83.17	1.44	1250.00	25.53	0.818	0.0136	26.00	1.90000
7.33	7.33	808.88	93.20	97.00	93.19	83.14	1.44	1250.00	25.53	0.818	0.0136	26.00	1.90000
7.82	7.82	809.94	93.17	97.00	93.17	83.12	1.44	1250.00	25.53	0.818	0.0136	26.00	1.90000
8.30	8.30	811.00	93.15	97.00	93.15	83.09	1.44	1250.00	25.54	0.818	0.0136	26.00	1.90000
8.79	8.79	812.06	93.13	97.00	93.12	83.07	1.44	1250.00	25.54	0.818	0.0136	26.00	1.90000
9.28	9.28	813.12	93.10	97.00	93.10	83.04	1.44	1250.00	25.54	0.818	0.0136	26.00	1.90000
9.77	9.77	814.18	93.08	97.00	93.08	83.01	1.44	1250.00	25.55	0.818	0.0136	26.00	1.90000
10.26	10.26	815.24	93.06	97.00	93.05	82.99	1.44	1250.00	25.55	0.818	0.0136	26.00	1.90000
10.75	10.75	816.29	93.03	97.00	93.03	82.96	1.44	1250.00	25.55	0.818	0.0136	26.00	1.90000
11.23	11.23	817.35	93.01	97.00	93.01	82.94	1.44	1250.00	25.56	0.818	0.0136	26.00	1.90000
11.72	11.72	818.41	92.99	97.00	92.98	82.91	1.44	1250.00	25.56	0.818	0.0136	26.00	1.90000
12.21	12.21	819.47	92.96	97.00	92.96	82.89	1.44	1250.00	25.56	0.819	0.0136	26.00	1.90000
12.70	12.70	820.53	92.94	97.00	92.94	82.86	1.44	1250.00	25.56	0.819	0.0136	26.00	1.90000
13.19	13.19	821.59	92.92	97.00	92.91	82.84	1.44	1250.00	25.57	0.819	0.0136	26.00	1.90000
13.68	13.68	822.65	92.89	97.00	92.89	82.81	1.45	1250.00	25.57	0.819	0.0136	26.00	1.90000
14.16	14.16	823.71	92.87	97.00	92.87	82.79	1.45	1250.00	25.57	0.819	0.0136	26.00	1.90000
14.65	14.65	824.76	92.85	97.00	92.85	82.76	1.45	1250.00	25.57	0.819	0.0136	26.00	1.90000
15.14	15.14	825.82	92.82	97.00	92.82	82.74	1.45	1250.00	25.58	0.819	0.0136	26.00	1.90000
15.63	15.63	826.88	92.80	97.00	92.80	82.71	1.45	1250.00	25.58	0.819	0.0136	26.00	1.90000
16.12	16.12	827.94	92.78	97.00	92.78	82.69	1.45	1250.00	25.58	0.819	0.0136	26.00	1.90000
16.61	16.61	829.00	92.75	97.00	92.75	82.67	1.45	1250.00	25.58	0.819	0.0136	26.00	1.90000



TITLE:

THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

Pipe Name:	GASPAJ_4	Upstream Node:	Node4	Downstream Node:	Node5
Length:	14.388 km	Inside Diameter:	13.485 in	Survey:	NONE
Maximum Pressure:	97.000 kg/cm2g	Milepost:	0.00	Time:	0.000 seconds
Minimum Pressure:	93.544 kg/cm2g	Milepost:	14.39	Time:	0.000 seconds
Maximum  Velocity :	1.433 m/s	Milepost:	14.39	Time:	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	673.00	94.97	97.00	94.97	84.72	1.41	1250.01	25.93	0.817	0.0137	26.00	1.90000
0.50	0.50	677.14	94.92	97.00	94.92	84.68	1.41	1250.00	25.91	0.817	0.0137	26.00	1.90000
0.99	0.99	681.28	94.87	97.00	94.87	84.64	1.41	1250.00	25.88	0.817	0.0137	26.00	1.90000
1.49	1.49	685.41	94.83	97.00	94.82	84.61	1.41	1250.00	25.86	0.817	0.0137	26.00	1.90000
1.98	1.98	689.55	94.78	97.00	94.78	84.57	1.41	1250.00	25.84	0.817	0.0137	26.00	1.90000
2.48	2.48	693.69	94.73	97.00	94.73	84.53	1.41	1250.00	25.82	0.817	0.0137	26.00	1.90000
2.98	2.98	697.83	94.68	97.00	94.68	84.49	1.41	1250.00	25.80	0.817	0.0137	26.00	1.90000
3.47	3.47	701.97	94.63	97.00	94.63	84.45	1.41	1250.00	25.78	0.817	0.0136	26.00	1.90000
3.97	3.97	706.10	94.58	97.00	94.58	84.41	1.41	1250.00	25.76	0.817	0.0136	26.00	1.90000
4.47	4.47	710.24	94.53	97.00	94.53	84.37	1.41	1250.00	25.74	0.817	0.0136	26.00	1.90000
4.96	4.96	714.38	94.48	97.00	94.48	84.33	1.41	1250.00	25.72	0.817	0.0136	26.00	1.90000
5.46	5.46	718.52	94.43	97.00	94.43	84.29	1.42	1250.01	25.70	0.817	0.0136	26.00	1.90000
5.95	5.95	722.66	94.38	97.00	94.38	84.25	1.42	1250.01	25.69	0.817	0.0136	26.00	1.90000
6.45	6.45	726.79	94.33	97.00	94.33	84.21	1.42	1250.01	25.67	0.817	0.0136	26.00	1.90000
6.95	6.95	730.93	94.28	97.00	94.28	84.17	1.42	1250.01	25.65	0.817	0.0136	26.00	1.90000
7.44	7.44	735.07	94.23	97.00	94.23	84.13	1.42	1250.01	25.64	0.817	0.0136	26.00	1.90000
7.94	7.94	739.21	94.18	97.00	94.18	84.09	1.42	1250.01	25.62	0.817	0.0136	26.00	1.90000
8.43	8.43	743.34	94.13	97.00	94.13	84.05	1.42	1250.01	25.61	0.817	0.0136	26.00	1.90000
8.93	8.93	747.48	94.09	97.00	94.08	84.01	1.42	1250.01	25.59	0.817	0.0136	26.00	1.90000
9.43	9.43	751.62	94.04	97.00	94.04	83.96	1.42	1250.01	25.58	0.817	0.0136	26.00	1.90000
9.92	9.92	755.76	93.99	97.00	93.99	83.92	1.42	1250.01	25.57	0.817	0.0136	26.00	1.90000
10.42	10.42	759.90	93.94	97.00	93.94	83.88	1.42	1250.01	25.55	0.817	0.0136	26.00	1.90000
10.92	10.92	764.03	93.89	97.00	93.89	83.84	1.42	1250.01	25.54	0.817	0.0136	26.00	1.90000
11.41	11.41	768.17	93.84	97.00	93.84	83.79	1.42	1250.01	25.53	0.817	0.0136	26.00	1.90000
11.91	11.91	772.31	93.79	97.00	93.79	83.75	1.42	1250.01	25.52	0.817	0.0136	26.00	1.90000
12.40	12.40	776.45	93.74	97.00	93.74	83.71	1.43	1250.01	25.50	0.817	0.0136	26.00	1.90000
12.90	12.90	780.59	93.69	97.00	93.69	83.66	1.43	1250.01	25.49	0.817	0.0136	26.00	1.90000
13.40	13.40	784.72	93.64	97.00	93.64	83.62	1.43	1250.01	25.48	0.817	0.0136	26.00	1.90000
13.89	13.89	788.86	93.59	97.00	93.59	83.58	1.43	1250.01	25.47	0.817	0.0136	26.00	1.90000
14.39	14.39	793.00	93.54	97.00	93.54	83.53	1.43	1250.01	25.46	0.818	0.0136	26.00	1.90000



TITLE:

**THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_3	<b>Upstream Node:</b>	Node2638	<b>Downstream Node:</b>	Node4
<b>Length:</b>	15.597 km	<b>Inside Diameter:</b>	13.511 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	94.973 kg/cm2g	<b>Milepost:</b>	15.60	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	1.404 m/s	<b>Milepost:</b>	15.60	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	626.00	95.82	97.00	95.82	85.28	1.39	1249.98	26.46	0.817	0.0137	26.00	1.90000
0.49	0.49	627.47	95.79	97.00	95.79	85.26	1.39	1249.98	26.43	0.817	0.0137	26.00	1.90000
0.97	0.97	628.94	95.77	97.00	95.76	85.25	1.39	1249.98	26.41	0.817	0.0137	26.00	1.90000
1.46	1.46	630.41	95.74	97.00	95.74	85.24	1.39	1249.99	26.39	0.817	0.0137	26.00	1.90000
1.95	1.95	631.88	95.71	97.00	95.71	85.22	1.39	1249.99	26.36	0.817	0.0137	26.00	1.90000
2.44	2.44	633.34	95.69	97.00	95.69	85.21	1.39	1249.99	26.34	0.817	0.0137	26.00	1.90000
2.92	2.92	634.81	95.66	97.00	95.66	85.19	1.40	1249.99	26.32	0.817	0.0137	26.00	1.90000
3.41	3.41	636.28	95.63	97.00	95.63	85.18	1.40	1249.99	26.30	0.817	0.0137	26.00	1.90000
3.90	3.90	637.75	95.61	97.00	95.61	85.16	1.40	1249.99	26.28	0.817	0.0137	26.00	1.90000
4.39	4.39	639.22	95.58	97.00	95.58	85.15	1.40	1249.99	26.26	0.817	0.0137	26.00	1.90000
4.87	4.87	640.69	95.55	97.00	95.55	85.13	1.40	1249.99	26.24	0.817	0.0137	26.00	1.90000
5.36	5.36	642.16	95.53	97.00	95.53	85.12	1.40	1249.99	26.22	0.817	0.0137	26.00	1.90000
5.85	5.85	643.63	95.50	97.00	95.50	85.10	1.40	1249.99	26.20	0.817	0.0137	26.00	1.90000
6.34	6.34	645.09	95.48	97.00	95.47	85.08	1.40	1249.99	26.18	0.817	0.0137	26.00	1.90000
6.82	6.82	646.56	95.45	97.00	95.45	85.07	1.40	1250.00	26.17	0.817	0.0137	26.00	1.90000
7.31	7.31	648.03	95.42	97.00	95.42	85.05	1.40	1250.00	26.15	0.817	0.0137	26.00	1.90000
7.80	7.80	649.50	95.40	97.00	95.40	85.03	1.40	1250.00	26.13	0.817	0.0137	26.00	1.90000
8.29	8.29	650.97	95.37	97.00	95.37	85.01	1.40	1250.00	26.12	0.817	0.0137	26.00	1.90000
8.77	8.77	652.44	95.34	97.00	95.34	84.99	1.40	1250.00	26.10	0.817	0.0137	26.00	1.90000
9.26	9.26	653.91	95.32	97.00	95.32	84.98	1.40	1250.00	26.09	0.817	0.0137	26.00	1.90000
9.75	9.75	655.38	95.29	97.00	95.29	84.96	1.40	1250.00	26.07	0.817	0.0137	26.00	1.90000
10.24	10.24	656.84	95.26	97.00	95.26	84.94	1.40	1250.00	26.06	0.817	0.0137	26.00	1.90000
10.72	10.72	658.31	95.24	97.00	95.24	84.92	1.40	1250.00	26.05	0.817	0.0137	26.00	1.90000
11.21	11.21	659.78	95.21	97.00	95.21	84.90	1.40	1250.00	26.03	0.817	0.0137	26.00	1.90000
11.70	11.70	661.25	95.18	97.00	95.18	84.88	1.40	1250.00	26.02	0.817	0.0137	26.00	1.90000
12.19	12.19	662.72	95.16	97.00	95.16	84.86	1.40	1250.00	26.01	0.817	0.0137	26.00	1.90000
12.67	12.67	664.19	95.13	97.00	95.13	84.84	1.40	1250.00	26.00	0.817	0.0137	26.00	1.90000
13.16	13.16	665.66	95.11	97.00	95.10	84.82	1.40	1250.00	25.98	0.817	0.0137	26.00	1.90000
13.65	13.65	667.13	95.08	97.00	95.08	84.80	1.40	1250.01	25.97	0.817	0.0137	26.00	1.90000
14.13	14.13	668.59	95.05	97.00	95.05	84.78	1.40	1250.01	25.96	0.817	0.0137	26.00	1.90000
14.62	14.62	670.06	95.03	97.00	95.03	84.76	1.40	1250.01	25.95	0.817	0.0137	26.00	1.90000
15.11	15.11	671.53	95.00	97.00	95.00	84.74	1.40	1250.01	25.94	0.817	0.0137	26.00	1.90000
15.60	15.60	673.00	94.97	97.00	94.97	84.72	1.40	1250.01	25.93	0.817	0.0137	26.00	1.90000



TITLE: THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

Pipe Name:	GASPAJ_2	Upstream Node:	Node2	Downstream Node:	Node2638
Length:	15.324 km	Inside Diameter:	13.474 in	Survey:	NONE
Maximum Pressure:	97.000 kg/cm2g	Milepost:	0.00	Time:	0.000 seconds
Minimum Pressure:	95.818 kg/cm2g	Milepost:	15.32	Time:	0.000 seconds
Maximum  Velocity :	1.404 m/s	Milepost:	0.00	Time:	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	631.00	96.22	97.00	96.22	85.20	1.40	1250.01	27.31	0.819	0.0137	26.00	1.90000
0.49	0.49	630.84	96.21	97.00	96.20	85.21	1.40	1250.01	27.27	0.819	0.0137	26.00	1.90000
0.99	0.99	630.68	96.19	97.00	96.19	85.22	1.40	1250.01	27.23	0.819	0.0137	26.00	1.90000
1.48	1.48	630.52	96.18	97.00	96.18	85.23	1.40	1250.01	27.19	0.819	0.0137	26.00	1.90000
1.98	1.98	630.35	96.17	97.00	96.17	85.24	1.40	1250.01	27.15	0.819	0.0137	26.00	1.90000
2.47	2.47	630.19	96.15	97.00	96.15	85.25	1.40	1250.00	27.12	0.819	0.0137	26.00	1.90000
2.97	2.97	630.03	96.14	97.00	96.14	85.25	1.40	1250.00	27.08	0.819	0.0137	26.00	1.90000
3.46	3.46	629.87	96.13	97.00	96.13	85.26	1.40	1250.00	27.05	0.818	0.0137	26.00	1.90000
3.95	3.95	629.71	96.11	97.00	96.11	85.27	1.40	1250.00	27.01	0.818	0.0137	26.00	1.90000
4.45	4.45	629.55	96.10	97.00	96.10	85.27	1.40	1250.00	26.98	0.818	0.0137	26.00	1.90000
4.94	4.94	629.39	96.09	97.00	96.09	85.28	1.40	1249.99	26.95	0.818	0.0137	26.00	1.90000
5.44	5.44	629.23	96.08	97.00	96.08	85.28	1.40	1249.99	26.92	0.818	0.0137	26.00	1.90000
5.93	5.93	629.06	96.06	97.00	96.06	85.28	1.40	1249.99	26.89	0.818	0.0137	26.00	1.90000
6.43	6.43	628.90	96.05	97.00	96.05	85.29	1.40	1249.99	26.86	0.818	0.0137	26.00	1.90000
6.92	6.92	628.74	96.04	97.00	96.04	85.29	1.40	1249.99	26.83	0.818	0.0137	26.00	1.90000
7.41	7.41	628.58	96.02	97.00	96.02	85.29	1.40	1249.99	26.80	0.818	0.0137	26.00	1.90000
7.91	7.91	628.42	96.01	97.00	96.01	85.29	1.40	1249.99	26.78	0.818	0.0137	26.00	1.90000
8.40	8.40	628.26	96.00	97.00	96.00	85.29	1.40	1249.98	26.75	0.818	0.0137	26.00	1.90000
8.90	8.90	628.10	95.99	97.00	95.99	85.30	1.40	1249.98	26.73	0.818	0.0137	26.00	1.90000
9.39	9.39	627.94	95.97	97.00	95.97	85.30	1.40	1249.98	26.70	0.818	0.0137	26.00	1.90000
9.89	9.89	627.77	95.96	97.00	95.96	85.30	1.40	1249.98	26.68	0.818	0.0137	26.00	1.90000
10.38	10.38	627.61	95.95	97.00	95.95	85.30	1.40	1249.98	26.65	0.818	0.0137	26.00	1.90000
10.88	10.88	627.45	95.93	97.00	95.93	85.30	1.40	1249.98	26.63	0.818	0.0137	26.00	1.90000
11.37	11.37	627.29	95.92	97.00	95.92	85.29	1.40	1249.98	26.61	0.818	0.0137	26.00	1.90000
11.86	11.86	627.13	95.91	97.00	95.91	85.29	1.40	1249.98	26.59	0.818	0.0137	26.00	1.90000
12.36	12.36	626.97	95.90	97.00	95.90	85.29	1.40	1249.98	26.57	0.818	0.0137	26.00	1.90000
12.85	12.85	626.81	95.88	97.00	95.88	85.29	1.40	1249.98	26.55	0.817	0.0137	26.00	1.90000
13.35	13.35	626.65	95.87	97.00	95.87	85.29	1.40	1249.98	26.53	0.817	0.0137	26.00	1.90000
13.84	13.84	626.48	95.86	97.00	95.86	85.29	1.40	1249.98	26.51	0.817	0.0137	26.00	1.90000
14.34	14.34	626.32	95.84	97.00	95.84	85.28	1.40	1249.98	26.49	0.817	0.0137	26.00	1.90000
14.83	14.83	626.16	95.83	97.00	95.83	85.28	1.40	1249.98	26.47	0.817	0.0137	26.00	1.90000
15.32	15.32	626.00	95.82	97.00	95.82	85.28	1.40	1249.98	26.46	0.817	0.0137	26.00	1.90000



**TECHNICAL REPORT**

No. **RL-9560.00-6521-940-NTS-005**

REV. **A**

**PAULINIA-JACUTINGA TRANSPORT SYSTEM**

PAGE **15 de 23**

TITLE: **THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_1	<b>Upstream Node:</b>	Node1	<b>Downstream Node:</b>	Node2
<b>Length:</b>	16.182 km	<b>Inside Diameter:</b>	13.433 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	96.218 kg/cm2g	<b>Milepost:</b>	16.18	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	1.423 m/s	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	595.00	97.00	97.00	97.00	84.52	1.42	1250.00	30.00	0.825	0.0138	26.00	1.90000
0.49	0.49	596.09	96.98	97.00	96.98	84.56	1.42	1249.99	29.87	0.825	0.0138	26.00	1.90000
0.98	0.98	597.18	96.95	97.00	96.95	84.61	1.42	1249.98	29.75	0.824	0.0138	26.00	1.90000
1.47	1.47	598.27	96.93	97.00	96.93	84.65	1.42	1249.98	29.63	0.824	0.0138	26.00	1.90000
1.96	1.96	599.36	96.91	97.00	96.91	84.68	1.42	1249.97	29.52	0.824	0.0138	26.00	1.90000
2.45	2.45	600.45	96.88	97.00	96.88	84.72	1.42	1249.98	29.41	0.824	0.0138	26.00	1.90000
2.94	2.94	601.55	96.86	97.00	96.86	84.76	1.42	1249.98	29.30	0.823	0.0138	26.00	1.90000
3.43	3.43	602.64	96.83	97.00	96.83	84.79	1.42	1249.98	29.19	0.823	0.0138	26.00	1.90000
3.92	3.92	603.73	96.81	97.00	96.81	84.82	1.42	1249.98	29.09	0.823	0.0138	26.00	1.90000
4.41	4.41	604.82	96.79	97.00	96.79	84.85	1.42	1249.99	28.99	0.823	0.0138	26.00	1.90000
4.90	4.90	605.91	96.76	97.00	96.76	84.88	1.42	1249.99	28.90	0.822	0.0138	26.00	1.90000
5.39	5.39	607.00	96.74	97.00	96.74	84.91	1.42	1250.00	28.80	0.822	0.0138	26.00	1.90000
5.88	5.88	608.09	96.72	97.00	96.72	84.93	1.42	1250.00	28.71	0.822	0.0138	26.00	1.90000
6.37	6.37	609.18	96.69	97.00	96.69	84.96	1.42	1250.01	28.62	0.822	0.0138	26.00	1.90000
6.87	6.87	610.27	96.67	97.00	96.67	84.98	1.41	1250.01	28.54	0.822	0.0138	26.00	1.90000
7.36	7.36	611.36	96.64	97.00	96.64	85.00	1.41	1250.01	28.45	0.821	0.0138	26.00	1.90000
7.85	7.85	612.45	96.62	97.00	96.62	85.02	1.41	1250.02	28.37	0.821	0.0138	26.00	1.90000
8.34	8.34	613.55	96.60	97.00	96.60	85.04	1.41	1250.02	28.30	0.821	0.0138	26.00	1.90000
8.83	8.83	614.64	96.57	97.00	96.57	85.06	1.41	1250.02	28.22	0.821	0.0138	26.00	1.90000
9.32	9.32	615.73	96.55	97.00	96.55	85.08	1.41	1250.02	28.15	0.821	0.0138	26.00	1.90000
9.81	9.81	616.82	96.53	97.00	96.53	85.09	1.41	1250.02	28.07	0.821	0.0138	26.00	1.90000
10.30	10.30	617.91	96.50	97.00	96.50	85.11	1.41	1250.03	28.00	0.821	0.0138	26.00	1.90000
10.79	10.79	619.00	96.48	97.00	96.48	85.12	1.41	1250.03	27.94	0.820	0.0138	26.00	1.90000
11.28	11.28	620.09	96.45	97.00	96.45	85.13	1.41	1250.03	27.87	0.820	0.0138	26.00	1.90000
11.77	11.77	621.18	96.43	97.00	96.43	85.14	1.41	1250.03	27.81	0.820	0.0138	26.00	1.90000
12.26	12.26	622.27	96.41	97.00	96.41	85.15	1.41	1250.03	27.75	0.820	0.0138	26.00	1.90000
12.75	12.75	623.36	96.38	97.00	96.38	85.16	1.41	1250.02	27.69	0.820	0.0138	26.00	1.90000
13.24	13.24	624.45	96.36	97.00	96.36	85.17	1.41	1250.02	27.63	0.820	0.0138	26.00	1.90000
13.73	13.73	625.55	96.34	97.00	96.34	85.18	1.41	1250.02	27.57	0.820	0.0138	26.00	1.90000
14.22	14.22	626.64	96.31	97.00	96.31	85.19	1.41	1250.02	27.52	0.819	0.0138	26.00	1.90000
14.71	14.71	627.73	96.29	97.00	96.29	85.19	1.41	1250.02	27.46	0.819	0.0137	26.00	1.90000
15.20	15.20	628.82	96.27	97.00	96.27	85.20	1.41	1250.02	27.41	0.819	0.0137	26.00	1.90000
15.69	15.69	629.91	96.24	97.00	96.24	85.20	1.41	1250.01	27.36	0.819	0.0137	26.00	1.90000
16.18	16.18	631.00	96.22	97.00	96.22	85.20	1.41	1250.01	27.31	0.819	0.0137	26.00	1.90000



TITLE:

THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

Supply Name	Mode of Control	Pressure	Flow	Temperature	Specific Gravity	Heating Value
		kg/cm2g	kSm3/d	Deg C		MJ/m3
PR Paulínia	MaximumPressure	97.00	-1250.000	30.00	0.6312	39.68

Delivery Name	Mode of Control	Pressure	Flow	Temperature	Specific Gravity	Heating Value
		kg/cm2g	kSm3/d	Deg C		MJ/m3
PE Jacutinga	MaximumFlow	91.15	1250.000	25.27	0.6312	39.68

Type	Name	Mode
XREG	PR Paulínia	MaximumPressure
XREG	PE Jacutinga	MaximumFlow

## CENÁRIO 2 – Steady State Report

## Default Initial Values Selected

Pressure	97.000
Flow	2500.000
Temperature	26.001
% C1	89.091
% C2	6.002
% C3	1.861
% IC4	0.398
% NC4	0.488
% CO2	1.513
% N2	0.647

## Problem Size Report

Nodes	7
Pipes	6
Supplies	1
Deliveries	2
Compositional Fluids	8

## Reference Conditions Report

Reference Pressure	0.00 kg/cm2g
Reference Temperature	20.00 Deg C

	Mass Units	Volumetric Units
	Tonn/h	kSm3/d
Total Input Flow	158.320	5000.000
Total Output Flow	158.320	5000.000
Network Flow Balance	0.000	0.000





TITLE: **THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_6	<b>Upstream Node:</b>	Node6	<b>Downstream Node:</b>	Node7
<b>Length:</b>	15.668 km	<b>Inside Diameter:</b>	13.440 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	35.443 kg/cm2g	<b>Milepost:</b>	15.67	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	16.816 m/s	<b>Milepost:</b>	15.67	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	829.00	52.80	97.00	51.92	45.96	10.46	4999.98	16.93	0.871	0.0118	26.00	1.90000
0.49	0.49	833.28	52.40	97.00	51.48	45.59	10.54	4999.98	16.83	0.871	0.0117	26.00	1.90000
0.98	0.98	837.56	51.98	97.00	51.05	45.21	10.63	4999.98	16.72	0.872	0.0117	26.00	1.90000
1.47	1.47	841.84	51.57	97.00	50.60	44.84	10.72	4999.98	16.61	0.873	0.0117	26.00	1.90000
1.96	1.96	846.13	51.15	97.00	50.16	44.46	10.81	4999.98	16.50	0.874	0.0117	26.00	1.90000
2.45	2.45	850.41	50.73	97.00	49.71	44.08	10.90	4999.98	16.39	0.874	0.0117	26.00	1.90000
2.94	2.94	854.69	50.31	97.00	49.25	43.70	11.00	4999.98	16.28	0.875	0.0117	26.00	1.90000
3.43	3.43	858.97	49.88	97.00	48.80	43.31	11.09	4999.98	16.17	0.876	0.0116	26.00	1.90000
3.92	3.92	863.25	49.45	97.00	48.33	42.92	11.20	4999.98	16.06	0.877	0.0116	26.00	1.90000
4.41	4.41	867.53	49.01	97.00	47.87	42.53	11.30	4999.98	15.95	0.878	0.0116	26.00	1.90000
4.90	4.90	871.81	48.57	97.00	47.39	42.13	11.40	4999.98	15.84	0.879	0.0116	26.00	1.90000
5.39	5.39	876.09	48.13	97.00	46.92	41.73	11.51	4999.98	15.72	0.879	0.0116	26.00	1.90000
5.88	5.88	880.38	47.69	97.00	46.44	41.33	11.63	4999.98	15.61	0.880	0.0116	26.00	1.90000
6.37	6.37	884.66	47.24	97.00	45.95	40.92	11.74	4999.99	15.49	0.881	0.0115	26.00	1.90000
6.85	6.85	888.94	46.78	97.00	45.46	40.51	11.86	4999.99	15.37	0.882	0.0115	26.00	1.90000
7.34	7.34	893.22	46.32	97.00	44.96	40.10	11.98	4999.99	15.25	0.883	0.0115	26.00	1.90000
7.83	7.83	897.50	45.86	97.00	44.46	39.68	12.11	4999.99	15.13	0.884	0.0115	26.00	1.90000
8.32	8.32	901.78	45.39	97.00	43.95	39.26	12.24	4999.99	15.01	0.885	0.0115	26.00	1.90000
8.81	8.81	906.06	44.92	97.00	43.44	38.84	12.37	4999.99	14.89	0.886	0.0115	26.00	1.90000
9.30	9.30	910.34	44.44	97.00	42.91	38.41	12.51	4999.99	14.76	0.887	0.0114	26.00	1.90000
9.79	9.79	914.63	43.96	97.00	42.39	37.98	12.65	4999.99	14.64	0.888	0.0114	26.00	1.90000
10.28	10.28	918.91	43.47	97.00	41.85	37.54	12.80	4999.99	14.51	0.889	0.0114	26.00	1.90000
10.77	10.77	923.19	42.98	97.00	41.31	37.10	12.95	4999.99	14.38	0.890	0.0114	26.00	1.90000
11.26	11.26	927.47	42.48	97.00	40.76	36.66	13.11	5000.00	14.25	0.891	0.0114	26.00	1.90000
11.75	11.75	931.75	41.98	97.00	40.21	36.21	13.27	5000.00	14.12	0.892	0.0113	26.00	1.90000
12.24	12.24	936.03	41.47	97.00	39.64	35.75	13.44	5000.00	13.99	0.893	0.0113	26.00	1.90000
12.73	12.73	940.31	40.95	97.00	39.07	35.29	13.61	5000.00	13.85	0.894	0.0113	26.00	1.90000
13.22	13.22	944.59	40.43	97.00	38.49	34.83	13.80	5000.00	13.71	0.895	0.0113	26.00	1.90000
13.71	13.71	948.88	39.90	97.00	37.90	34.36	13.98	5000.00	13.57	0.896	0.0113	26.00	1.90000
14.20	14.20	953.16	39.36	97.00	37.30	33.88	14.18	5000.00	13.43	0.897	0.0113	26.00	1.90000
14.69	14.69	957.44	38.82	97.00	36.69	33.40	14.39	5000.00	13.28	0.898	0.0112	26.00	1.90000
15.18	15.18	961.72	38.27	97.00	36.07	32.91	14.60	5000.00	13.13	0.899	0.0112	26.00	1.90000
15.67	15.67	966.00	37.71	97.00	35.44	32.42	14.82	5000.00	12.98	0.901	0.0112	26.00	1.90000



TITLE: **THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_5	<b>Upstream Node:</b>	Node5	<b>Downstream Node:</b>	Node6
<b>Length:</b>	16.607 km	<b>Inside Diameter:</b>	13.465 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	51.918 kg/cm2g	<b>Milepost:</b>	16.61	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	11.126 m/s	<b>Milepost:</b>	16.61	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	793.00	64.63	97.00	64.36	56.84	8.42	4999.97	19.61	0.851	0.0122	26.00	1.90000
0.49	0.49	794.06	64.32	97.00	64.03	56.55	8.47	4999.97	19.53	0.851	0.0122	26.00	1.90000
0.98	0.98	795.12	64.00	97.00	63.70	56.26	8.51	4999.97	19.46	0.852	0.0122	26.00	1.90000
1.47	1.47	796.18	63.68	97.00	63.37	55.96	8.55	4999.97	19.38	0.852	0.0122	26.00	1.90000
1.95	1.95	797.24	63.36	97.00	63.03	55.66	8.60	4999.97	19.31	0.853	0.0122	26.00	1.90000
2.44	2.44	798.29	63.04	97.00	62.70	55.37	8.65	4999.97	19.24	0.853	0.0122	26.00	1.90000
2.93	2.93	799.35	62.71	97.00	62.36	55.07	8.69	4999.97	19.16	0.854	0.0122	26.00	1.90000
3.42	3.42	800.41	62.38	97.00	62.02	54.77	8.74	4999.97	19.09	0.854	0.0121	26.00	1.90000
3.91	3.91	801.47	62.06	97.00	61.67	54.46	8.79	4999.97	19.01	0.855	0.0121	26.00	1.90000
4.40	4.40	802.53	61.73	97.00	61.33	54.16	8.84	4999.97	18.94	0.855	0.0121	26.00	1.90000
4.88	4.88	803.59	61.39	97.00	60.98	53.85	8.89	4999.97	18.86	0.856	0.0121	26.00	1.90000
5.37	5.37	804.65	61.06	97.00	60.63	53.55	8.94	4999.97	18.79	0.856	0.0121	26.00	1.90000
5.86	5.86	805.71	60.73	97.00	60.28	53.24	8.99	4999.97	18.71	0.857	0.0121	26.00	1.90000
6.35	6.35	806.76	60.39	97.00	59.93	52.93	9.04	4999.97	18.63	0.858	0.0121	26.00	1.90000
6.84	6.84	807.82	60.05	97.00	59.57	52.61	9.10	4999.97	18.56	0.858	0.0120	26.00	1.90000
7.33	7.33	808.88	59.71	97.00	59.21	52.30	9.15	4999.97	18.48	0.859	0.0120	26.00	1.90000
7.82	7.82	809.94	59.37	97.00	58.85	51.98	9.21	4999.97	18.40	0.859	0.0120	26.00	1.90000
8.30	8.30	811.00	59.02	97.00	58.49	51.67	9.27	4999.97	18.33	0.860	0.0120	26.00	1.90000
8.79	8.79	812.06	58.67	97.00	58.13	51.35	9.32	4999.97	18.25	0.860	0.0120	26.00	1.90000
9.28	9.28	813.12	58.32	97.00	57.76	51.03	9.38	4999.97	18.17	0.861	0.0120	26.00	1.90000
9.77	9.77	814.18	57.97	97.00	57.39	50.70	9.44	4999.97	18.09	0.862	0.0120	26.00	1.90000
10.26	10.26	815.24	57.62	97.00	57.02	50.38	9.50	4999.97	18.01	0.862	0.0119	26.00	1.90000
10.75	10.75	816.29	57.26	97.00	56.64	50.05	9.56	4999.97	17.93	0.863	0.0119	26.00	1.90000
11.23	11.23	817.35	56.91	97.00	56.26	49.72	9.63	4999.97	17.85	0.863	0.0119	26.00	1.90000
11.72	11.72	818.41	56.55	97.00	55.88	49.39	9.69	4999.97	17.77	0.864	0.0119	26.00	1.90000
12.21	12.21	819.47	56.18	97.00	55.50	49.06	9.76	4999.97	17.69	0.865	0.0119	26.00	1.90000
12.70	12.70	820.53	55.82	97.00	55.11	48.72	9.83	4999.97	17.61	0.865	0.0119	26.00	1.90000
13.19	13.19	821.59	55.45	97.00	54.72	48.38	9.89	4999.97	17.53	0.866	0.0119	26.00	1.90000
13.68	13.68	822.65	55.08	97.00	54.33	48.04	9.96	4999.98	17.44	0.867	0.0118	26.00	1.90000
14.16	14.16	823.71	54.71	97.00	53.94	47.70	10.04	4999.98	17.36	0.867	0.0118	26.00	1.90000
14.65	14.65	824.76	54.33	97.00	53.54	47.36	10.11	4999.98	17.28	0.868	0.0118	26.00	1.90000
15.14	15.14	825.82	53.95	97.00	53.14	47.01	10.18	4999.98	17.19	0.869	0.0118	26.00	1.90000
15.63	15.63	826.88	53.57	97.00	52.74	46.66	10.26	4999.98	17.11	0.869	0.0118	26.00	1.90000
16.12	16.12	827.94	53.19	97.00	52.33	46.31	10.34	4999.98	17.02	0.870	0.0118	26.00	1.90000
16.61	16.61	829.00	52.80	97.00	51.92	45.96	10.42	4999.98	16.93	0.871	0.0118	26.00	1.90000



TITLE:

**THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_4	<b>Upstream Node:</b>	Node4	<b>Downstream Node:</b>	Node5
<b>Length:</b>	14.388 km	<b>Inside Diameter:</b>	13.485 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	64.363 kg/cm2g	<b>Milepost:</b>	14.39	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	8.744 m/s	<b>Milepost:</b>	14.39	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	673.00	73.81	97.00	73.73	65.10	7.33	5000.01	22.21	0.839	0.0127	26.00	1.90000
0.50	0.50	677.14	73.51	97.00	73.43	64.83	7.36	5000.01	22.12	0.840	0.0126	26.00	1.90000
0.99	0.99	681.28	73.21	97.00	73.12	64.56	7.39	5000.01	22.03	0.840	0.0126	26.00	1.90000
1.49	1.49	685.41	72.91	97.00	72.82	64.29	7.42	5000.00	21.94	0.840	0.0126	26.00	1.90000
1.98	1.98	689.55	72.61	97.00	72.51	64.02	7.45	5000.00	21.85	0.841	0.0126	26.00	1.90000
2.48	2.48	693.69	72.30	97.00	72.21	63.75	7.49	5000.00	21.76	0.841	0.0126	26.00	1.90000
2.98	2.98	697.83	72.00	97.00	71.90	63.48	7.52	5000.00	21.67	0.841	0.0126	26.00	1.90000
3.47	3.47	701.97	71.69	97.00	71.59	63.21	7.55	5000.00	21.58	0.842	0.0126	26.00	1.90000
3.97	3.97	706.10	71.38	97.00	71.28	62.93	7.58	4999.99	21.49	0.842	0.0125	26.00	1.90000
4.47	4.47	710.24	71.07	97.00	70.97	62.66	7.62	4999.99	21.40	0.842	0.0125	26.00	1.90000
4.96	4.96	714.38	70.76	97.00	70.66	62.38	7.65	4999.99	21.31	0.843	0.0125	26.00	1.90000
5.46	5.46	718.52	70.45	97.00	70.35	62.10	7.69	4999.99	21.22	0.843	0.0125	26.00	1.90000
5.95	5.95	722.66	70.14	97.00	70.04	61.82	7.72	4999.99	21.13	0.844	0.0125	26.00	1.90000
6.45	6.45	726.79	69.83	97.00	69.72	61.54	7.76	4999.99	21.04	0.844	0.0125	26.00	1.90000
6.95	6.95	730.93	69.51	97.00	69.40	61.25	7.79	4999.99	20.95	0.844	0.0125	26.00	1.90000
7.44	7.44	735.07	69.20	97.00	69.07	60.97	7.83	4999.98	20.86	0.845	0.0124	26.00	1.90000
7.94	7.94	739.21	68.88	97.00	68.75	60.68	7.87	4999.98	20.77	0.845	0.0124	26.00	1.90000
8.43	8.43	743.34	68.56	97.00	68.42	60.40	7.90	4999.98	20.68	0.846	0.0124	26.00	1.90000
8.93	8.93	747.48	68.24	97.00	68.09	60.11	7.94	4999.98	20.59	0.846	0.0124	26.00	1.90000
9.43	9.43	751.62	67.92	97.00	67.76	59.82	7.98	4999.98	20.50	0.846	0.0124	26.00	1.90000
9.92	9.92	755.76	67.60	97.00	67.43	59.53	8.02	4999.98	20.41	0.847	0.0124	26.00	1.90000
10.42	10.42	759.90	67.27	97.00	67.09	59.23	8.06	4999.98	20.32	0.847	0.0124	26.00	1.90000
10.92	10.92	764.03	66.95	97.00	66.76	58.94	8.10	4999.98	20.23	0.848	0.0123	26.00	1.90000
11.41	11.41	768.17	66.62	97.00	66.42	58.64	8.14	4999.98	20.14	0.848	0.0123	26.00	1.90000
11.91	11.91	772.31	66.29	97.00	66.08	58.35	8.18	4999.98	20.05	0.849	0.0123	26.00	1.90000
12.40	12.40	776.45	65.97	97.00	65.74	58.05	8.22	4999.98	19.96	0.849	0.0123	26.00	1.90000
12.90	12.90	780.59	65.64	97.00	65.40	57.75	8.26	4999.98	19.87	0.849	0.0123	26.00	1.90000
13.40	13.40	784.72	65.30	97.00	65.06	57.45	8.31	4999.98	19.78	0.850	0.0123	26.00	1.90000
13.89	13.89	788.86	64.97	97.00	64.71	57.14	8.35	4999.97	19.69	0.850	0.0123	26.00	1.90000
14.39	14.39	793.00	64.63	97.00	64.36	56.84	8.40	4999.97	19.61	0.851	0.0122	26.00	1.90000



TITLE: **THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_3	<b>Upstream Node:</b>	Node2638	<b>Downstream Node:</b>	Node4
<b>Length:</b>	15.597 km	<b>Inside Diameter:</b>	13.511 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	73.727 kg/cm2g	<b>Milepost:</b>	15.60	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	7.470 m/s	<b>Milepost:</b>	15.60	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	626.00	82.18	97.00	82.13	72.48	6.56	5000.06	24.64	0.831	0.0131	26.00	1.90000
0.49	0.49	627.47	81.93	97.00	81.88	72.26	6.58	5000.06	24.56	0.831	0.0130	26.00	1.90000
0.97	0.97	628.94	81.68	97.00	81.63	72.05	6.60	5000.06	24.48	0.832	0.0130	26.00	1.90000
1.46	1.46	630.41	81.43	97.00	81.38	71.83	6.62	5000.06	24.40	0.832	0.0130	26.00	1.90000
1.95	1.95	631.88	81.18	97.00	81.12	71.61	6.64	5000.06	24.33	0.832	0.0130	26.00	1.90000
2.44	2.44	633.34	80.93	97.00	80.87	71.39	6.66	5000.06	24.25	0.832	0.0130	26.00	1.90000
2.92	2.92	634.81	80.67	97.00	80.62	71.17	6.68	5000.06	24.17	0.832	0.0130	26.00	1.90000
3.41	3.41	636.28	80.42	97.00	80.36	70.95	6.70	5000.06	24.09	0.833	0.0130	26.00	1.90000
3.90	3.90	637.75	80.16	97.00	80.11	70.73	6.72	5000.05	24.02	0.833	0.0130	26.00	1.90000
4.39	4.39	639.22	79.91	97.00	79.85	70.51	6.74	5000.05	23.94	0.833	0.0129	26.00	1.90000
4.87	4.87	640.69	79.65	97.00	79.59	70.28	6.76	5000.05	23.86	0.833	0.0129	26.00	1.90000
5.36	5.36	642.16	79.40	97.00	79.33	70.06	6.79	5000.05	23.79	0.834	0.0129	26.00	1.90000
5.85	5.85	643.63	79.14	97.00	79.08	69.83	6.81	5000.05	23.71	0.834	0.0129	26.00	1.90000
6.34	6.34	645.09	78.88	97.00	78.82	69.60	6.83	5000.05	23.63	0.834	0.0129	26.00	1.90000
6.82	6.82	646.56	78.62	97.00	78.56	69.38	6.85	5000.04	23.56	0.834	0.0129	26.00	1.90000
7.31	7.31	648.03	78.36	97.00	78.29	69.15	6.88	5000.04	23.48	0.835	0.0129	26.00	1.90000
7.80	7.80	649.50	78.10	97.00	78.03	68.92	6.90	5000.04	23.41	0.835	0.0129	26.00	1.90000
8.29	8.29	650.97	77.84	97.00	77.77	68.69	6.92	5000.04	23.33	0.835	0.0128	26.00	1.90000
8.77	8.77	652.44	77.58	97.00	77.51	68.45	6.95	5000.04	23.26	0.835	0.0128	26.00	1.90000
9.26	9.26	653.91	77.31	97.00	77.24	68.22	6.97	5000.04	23.18	0.836	0.0128	26.00	1.90000
9.75	9.75	655.38	77.05	97.00	76.98	67.99	6.99	5000.03	23.11	0.836	0.0128	26.00	1.90000
10.24	10.24	656.84	76.79	97.00	76.71	67.75	7.02	5000.03	23.03	0.836	0.0128	26.00	1.90000
10.72	10.72	658.31	76.52	97.00	76.44	67.52	7.04	5000.03	22.95	0.836	0.0128	26.00	1.90000
11.21	11.21	659.78	76.25	97.00	76.18	67.28	7.07	5000.03	22.88	0.837	0.0128	26.00	1.90000
11.70	11.70	661.25	75.99	97.00	75.91	67.04	7.09	5000.03	22.81	0.837	0.0128	26.00	1.90000
12.19	12.19	662.72	75.72	97.00	75.64	66.80	7.12	5000.02	22.73	0.837	0.0127	26.00	1.90000
12.67	12.67	664.19	75.45	97.00	75.37	66.56	7.14	5000.02	22.66	0.838	0.0127	26.00	1.90000
13.16	13.16	665.66	75.18	97.00	75.10	66.32	7.17	5000.02	22.58	0.838	0.0127	26.00	1.90000
13.65	13.65	667.13	74.91	97.00	74.82	66.08	7.20	5000.02	22.51	0.838	0.0127	26.00	1.90000
14.13	14.13	668.59	74.64	97.00	74.55	65.83	7.22	5000.02	22.43	0.838	0.0127	26.00	1.90000
14.62	14.62	670.06	74.36	97.00	74.28	65.59	7.25	5000.02	22.36	0.839	0.0127	26.00	1.90000
15.11	15.11	671.53	74.09	97.00	74.00	65.34	7.28	5000.01	22.28	0.839	0.0127	26.00	1.90000
15.60	15.60	673.00	73.81	97.00	73.73	65.10	7.30	5000.01	22.21	0.839	0.0127	26.00	1.90000



TITLE: **THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_2	<b>Upstream Node:</b>	Node2	<b>Downstream Node:</b>	Node2638
<b>Length:</b>	15.324 km	<b>Inside Diameter:</b>	13.474 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	82.132 kg/cm2g	<b>Milepost:</b>	15.32	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	6.641 m/s	<b>Milepost:</b>	15.32	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp	Ht Cf
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C	KCAL/H*M2*DGC
0.00	0.00	631.00	89.45	97.00	89.43	78.64	6.08	5000.01	26.97	0.827	0.0134	26.00	1.90000
0.49	0.49	630.84	89.22	97.00	89.20	78.45	6.09	5000.01	26.89	0.827	0.0134	26.00	1.90000
0.99	0.99	630.68	88.99	97.00	88.98	78.27	6.11	5000.02	26.81	0.827	0.0134	26.00	1.90000
1.48	1.48	630.52	88.77	97.00	88.75	78.08	6.12	5000.02	26.73	0.827	0.0134	26.00	1.90000
1.98	1.98	630.35	88.54	97.00	88.52	77.89	6.14	5000.02	26.65	0.827	0.0134	26.00	1.90000
2.47	2.47	630.19	88.31	97.00	88.29	77.70	6.15	5000.03	26.58	0.827	0.0134	26.00	1.90000
2.97	2.97	630.03	88.08	97.00	88.06	77.51	6.17	5000.03	26.50	0.827	0.0134	26.00	1.90000
3.46	3.46	629.87	87.86	97.00	87.83	77.32	6.18	5000.04	26.42	0.827	0.0133	26.00	1.90000
3.95	3.95	629.71	87.63	97.00	87.60	77.13	6.20	5000.04	26.34	0.828	0.0133	26.00	1.90000
4.45	4.45	629.55	87.40	97.00	87.37	76.94	6.21	5000.04	26.27	0.828	0.0133	26.00	1.90000
4.94	4.94	629.39	87.17	97.00	87.14	76.75	6.23	5000.05	26.19	0.828	0.0133	26.00	1.90000
5.44	5.44	629.23	86.94	97.00	86.91	76.55	6.24	5000.05	26.12	0.828	0.0133	26.00	1.90000
5.93	5.93	629.06	86.70	97.00	86.67	76.36	6.26	5000.05	26.04	0.828	0.0133	26.00	1.90000
6.43	6.43	628.90	86.47	97.00	86.44	76.16	6.28	5000.05	25.96	0.828	0.0133	26.00	1.90000
6.92	6.92	628.74	86.24	97.00	86.21	75.96	6.29	5000.06	25.89	0.828	0.0133	26.00	1.90000
7.41	7.41	628.58	86.00	97.00	85.97	75.77	6.31	5000.06	25.81	0.828	0.0132	26.00	1.90000
7.91	7.91	628.42	85.77	97.00	85.74	75.57	6.33	5000.06	25.74	0.829	0.0132	26.00	1.90000
8.40	8.40	628.26	85.54	97.00	85.50	75.37	6.34	5000.06	25.66	0.829	0.0132	26.00	1.90000
8.90	8.90	628.10	85.30	97.00	85.27	75.17	6.36	5000.06	25.59	0.829	0.0132	26.00	1.90000
9.39	9.39	627.94	85.06	97.00	85.03	74.97	6.38	5000.06	25.52	0.829	0.0132	26.00	1.90000
9.89	9.89	627.77	84.83	97.00	84.79	74.76	6.39	5000.06	25.44	0.829	0.0132	26.00	1.90000
10.38	10.38	627.61	84.59	97.00	84.55	74.56	6.41	5000.07	25.37	0.829	0.0132	26.00	1.90000
10.88	10.88	627.45	84.35	97.00	84.31	74.36	6.43	5000.07	25.29	0.830	0.0132	26.00	1.90000
11.37	11.37	627.29	84.11	97.00	84.07	74.15	6.45	5000.07	25.22	0.830	0.0132	26.00	1.90000
11.86	11.86	627.13	83.88	97.00	83.83	73.95	6.47	5000.07	25.15	0.830	0.0131	26.00	1.90000
12.36	12.36	626.97	83.64	97.00	83.59	73.74	6.48	5000.07	25.07	0.830	0.0131	26.00	1.90000
12.85	12.85	626.81	83.39	97.00	83.35	73.53	6.50	5000.07	25.00	0.830	0.0131	26.00	1.90000
13.35	13.35	626.65	83.15	97.00	83.11	73.32	6.52	5000.07	24.93	0.830	0.0131	26.00	1.90000
13.84	13.84	626.48	82.91	97.00	82.87	73.11	6.54	5000.07	24.86	0.831	0.0131	26.00	1.90000
14.34	14.34	626.32	82.67	97.00	82.62	72.90	6.56	5000.07	24.78	0.831	0.0131	26.00	1.90000
14.83	14.83	626.16	82.43	97.00	82.38	72.69	6.58	5000.07	24.71	0.831	0.0131	26.00	1.90000
15.32	15.32	626.00	82.18	97.00	82.13	72.48	6.60	5000.06	24.64	0.831	0.0131	26.00	1.90000



TITLE: **THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ**

<b>Pipe Name:</b>	GASPAJ_1	<b>Upstream Node:</b>	Node1	<b>Downstream Node:</b>	Node2
<b>Length:</b>	16.182 km	<b>Inside Diameter:</b>	13.433 in	<b>Survey:</b>	NONE
<b>Maximum Pressure:</b>	97.000 kg/cm2g	<b>Milepost:</b>	0.00	<b>Time:</b>	0.000 seconds
<b>Minimum Pressure:</b>	89.429 kg/cm2g	<b>Milepost:</b>	16.18	<b>Time:</b>	0.000 seconds
<b>Maximum  Velocity :</b>	6.139 m/s	<b>Milepost:</b>	16.18	<b>Time:</b>	0.000 seconds

Milepost	Distance From Head	Elevation	Pressure	Maximum Pressure	Minimum Pressure	Density	Velocity	Flow	Temperature	Z-factor	Viscosity	Amb Temp
km	km	m	kg/cm2g	kg/cm2g	kg/cm2g	kg/m3	m/s	kSm3/d	Deg C		cP	Deg C
0.00	0.00	595.00	97.00	97.00	97.00	84.52	5.69	5000.00	30.00	0.825	0.0138	26.00
0.49	0.49	596.09	96.78	97.00	96.78	84.36	5.70	4999.99	29.90	0.825	0.0138	26.00
0.98	0.98	597.18	96.56	97.00	96.56	84.19	5.71	4999.98	29.80	0.825	0.0138	26.00
1.47	1.47	598.27	96.33	97.00	96.33	84.02	5.72	4999.97	29.71	0.825	0.0138	26.00
1.96	1.96	599.36	96.11	97.00	96.11	83.86	5.74	4999.96	29.61	0.825	0.0138	26.00
2.45	2.45	600.45	95.89	97.00	95.89	83.69	5.75	4999.95	29.51	0.825	0.0138	26.00
2.94	2.94	601.55	95.66	97.00	95.66	83.52	5.76	4999.95	29.42	0.825	0.0137	26.00
3.43	3.43	602.64	95.44	97.00	95.44	83.35	5.77	4999.94	29.32	0.825	0.0137	26.00
3.92	3.92	603.73	95.21	97.00	95.21	83.18	5.78	4999.94	29.23	0.825	0.0137	26.00
4.41	4.41	604.82	94.99	97.00	94.99	83.01	5.79	4999.94	29.13	0.825	0.0137	26.00
4.90	4.90	605.91	94.76	97.00	94.76	82.84	5.81	4999.94	29.04	0.825	0.0137	26.00
5.39	5.39	607.00	94.54	97.00	94.53	82.67	5.82	4999.94	28.94	0.825	0.0137	26.00
5.88	5.88	608.09	94.31	97.00	94.31	82.49	5.83	4999.94	28.85	0.825	0.0137	26.00
6.37	6.37	609.18	94.08	97.00	94.08	82.32	5.84	4999.94	28.76	0.825	0.0137	26.00
6.87	6.87	610.27	93.86	97.00	93.85	82.14	5.86	4999.94	28.66	0.825	0.0137	26.00
7.36	7.36	611.36	93.63	97.00	93.62	81.97	5.87	4999.94	28.57	0.825	0.0136	26.00
7.85	7.85	612.45	93.40	97.00	93.39	81.79	5.88	4999.94	28.48	0.825	0.0136	26.00
8.34	8.34	613.55	93.17	97.00	93.17	81.61	5.89	4999.94	28.39	0.825	0.0136	26.00
8.83	8.83	614.64	92.94	97.00	92.94	81.43	5.91	4999.95	28.29	0.825	0.0136	26.00
9.32	9.32	615.73	92.71	97.00	92.71	81.25	5.92	4999.95	28.20	0.825	0.0136	26.00
9.81	9.81	616.82	92.48	97.00	92.47	81.07	5.93	4999.95	28.11	0.826	0.0136	26.00
10.30	10.30	617.91	92.25	97.00	92.24	80.89	5.95	4999.96	28.02	0.826	0.0136	26.00
10.79	10.79	619.00	92.02	97.00	92.01	80.71	5.96	4999.96	27.93	0.826	0.0136	26.00
11.28	11.28	620.09	91.79	97.00	91.78	80.52	5.97	4999.96	27.84	0.826	0.0135	26.00
11.77	11.77	621.18	91.56	97.00	91.55	80.34	5.99	4999.97	27.75	0.826	0.0135	26.00
12.26	12.26	622.27	91.32	97.00	91.31	80.15	6.00	4999.97	27.67	0.826	0.0135	26.00
12.75	12.75	623.36	91.09	97.00	91.08	79.97	6.01	4999.98	27.58	0.826	0.0135	26.00
13.24	13.24	624.45	90.86	97.00	90.85	79.78	6.03	4999.98	27.49	0.826	0.0135	26.00
13.73	13.73	625.55	90.62	97.00	90.61	79.59	6.04	4999.99	27.40	0.826	0.0135	26.00
14.22	14.22	626.64	90.39	97.00	90.38	79.40	6.06	4999.99	27.31	0.826	0.0135	26.00
14.71	14.71	627.73	90.15	97.00	90.14	79.21	6.07	4999.99	27.23	0.826	0.0135	26.00
15.20	15.20	628.82	89.92	97.00	89.90	79.02	6.09	5000.00	27.14	0.826	0.0134	26.00
15.69	15.69	629.91	89.68	97.00	89.67	78.83	6.10	5000.00	27.05	0.826	0.0134	26.00
16.18	16.18	631.00	89.45	97.00	89.43	78.64	6.12	5000.01	26.97	0.827	0.0134	26.00



TITLE: THERMAL HYDRAULIC SIMULATION REPORT  
GASPAJ

Supply Name	Mode of Control	Pressure kg/cm2g	Flow kSm3/d	Temperature Deg C	Specific Gravity
PR Paulinia	MaximumPressure	97.00	-5000.000	30.00	0.6312

Delivery Name	Mode of Control	Pressure kg/cm2g	Flow kSm3/d	Temperature Deg C	Specific Gravity	Heating Value MJ/m3
PE Jacutinga	MaximumFlow	37.71	1250.000	12.98	0.6312	39.68
PE Jacutinga II	MaximumFlow	37.71	3750.000	12.98	0.6312	39.68

Type	Name	Mode
XREG	PR Paulinia	MaximumPressure
XREG	PE Jacutinga	MaximumFlow
XREG	PE Jacutinga II	MaximumFlow