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op-100

Cooldown

Thermal Conductivity of Fluid

n/a

Heat Transfer Parameters		Transient Cooldown Parameters	
Overall Heat Transfer Coefficient:	---	Maximum Time Since Shutdown:	---
Inside Film Coefficient:	---	First Intermediate Time:	---
Thermal Conductivity of Fluid:	---	Second Intermediate Time:	---
Heat Capacity of Pipe Material:	---	Third Intermediate Time:	---
Density of Pipe Material:	---	Minimum Cooldown Temperature:	---
		Calculation Time Step:	---

Results

Cumulative Length (m)	Overall Heat Transfer Coefficient (kJ/h-m2-C)	Inside Film Coefficient (kJ/h-m2-C)	Fluid Thermal Conductivity (W/m-K)	First Intermediate Temperature (C)	Second Intermediate Temperature (C)	Third Intermediate Temperature (C)	Temperature for Max Time Since Shutdown (C)	Time to Reach Min Cooldown Temperature (hours)

Inlet Properties : inlet

		Overall	Vapour Phase			
Vapour/Phase Fraction		1.0000	1.0000			
Temperature:	(C)	45.00 *	45.00			
Pressure:	(kPa)	8000.00 *	8000.00			
Molar Flow	(kgmole/h)	300.00 *	300.00			
Mass Flow	(kg/h)	5512.61	5512.61			
Liquid Volume Flow	(m3/h)	16.82	16.82			
Std Gas Flow	(STD_m3/h)	7093.33	7093.33			
Molar Enthalpy	(kJ/kgmole)	-8.188e+004	-8.188e+004			
Mass Enthalpy	(kJ/kg)	-4456	-4456			
Heat Flow	(kJ/h)	-2.457e+007	-2.457e+007			
Molar Density	(kgmole/m3)	3.4253	3.4253			
Mass Density	(kg/m3)	62.942	62.942			
Std Liquid Mass Density	(kg/m3)	---	---			
Molar Heat Capacity	(kJ/kgmole-C)	49.646	49.646			
Mass Heat Capacity	(kJ/kg-C)	2.702	2.702			
Molar Entropy	(kJ/kgmole-C)	149.938	149.938			
Mass Entropy	(kJ/kg-C)	8.160	8.160			
ThermalConductivity	(W/m-K)	0.042	0.042			
Viscosity	(cP)	0.014	0.014			
Surface Tension	(dyne/cm)	---	---			
Molecular Weight		18.375	18.375			
Z Factor		0.883	0.883			

* Specified by user.

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Outlet Properties : out

	Overall	Vapour Phase			
Vapour/Phase Fraction	1.0000	1.0000			
Temperature: (C)	26.46	26.46			
Pressure: (kPa)	7271.64	7271.64			
Molar Flow (kgmole/h)	300.00 *	300.00			
Mass Flow (kg/h)	5512.61	5512.61			
Liquid Volume Flow (m3/h)	16.82	16.82			
Std Gas Flow (STD_m3/h)	7093.33	7093.33			
Molar Enthalpy (kJ/kgmole)	-8.267e+004	-8.267e+004			
Mass Enthalpy (kJ/kg)	-4499	-4499			
Heat Flow (kJ/h)	-2.480e+007	-2.480e+007			
Molar Density (kgmole/m3)	3.4028	3.4028			
Mass Density (kg/m3)	62.527	62.527			
Std Liquid Mass Density (kg/m3)	---	---			
Molar Heat Capacity (kJ/kgmole-C)	50.284	50.284			
Mass Heat Capacity	2.736	2.736			
Molar Entropy (kJ/kgmole-C)	148.090	148.090			
Mass Entropy (kJ/kg-C)	8.059	8.059			
ThermalConductivity (W/m-K)	0.039	0.039			
Viscosity (cP)	0.013	0.013			
Surface Tension (dyne/cm)	---	---			
Molecular Weight	18.375	18.375			
Z Factor	0.858	0.858			

Stream Compositions

Component	Inlet Mole Fraction	Outlet Mole Fraction
Methane	0.89592 *	0.89592 *
Ethane	0.04907 *	0.04907 *
i-Butane	0.00243 *	0.00243 *
n-Butane	0.00778 *	0.00778 *
CO2	0.01708 *	0.01708 *
H2S	0.00523 *	0.00523 *
i-Pentane	0.00188 *	0.00188 *
n-Pentane	0.00183 *	0.00183 *
n-Hexane	0.00026 *	0.00026 *
Propane	0.01208 *	0.01208 *
Nitrogen	0.00643 *	0.00643 *

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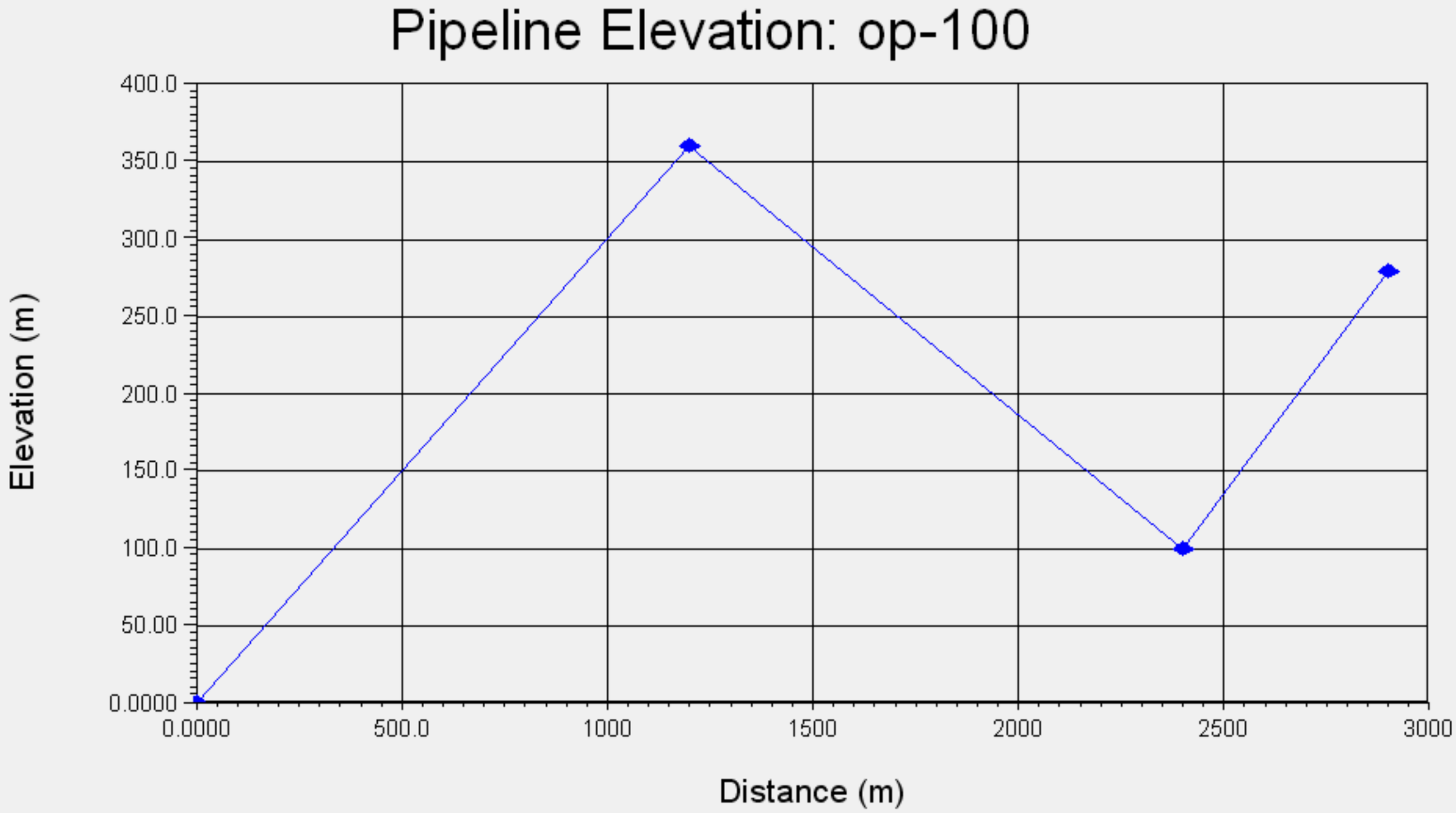
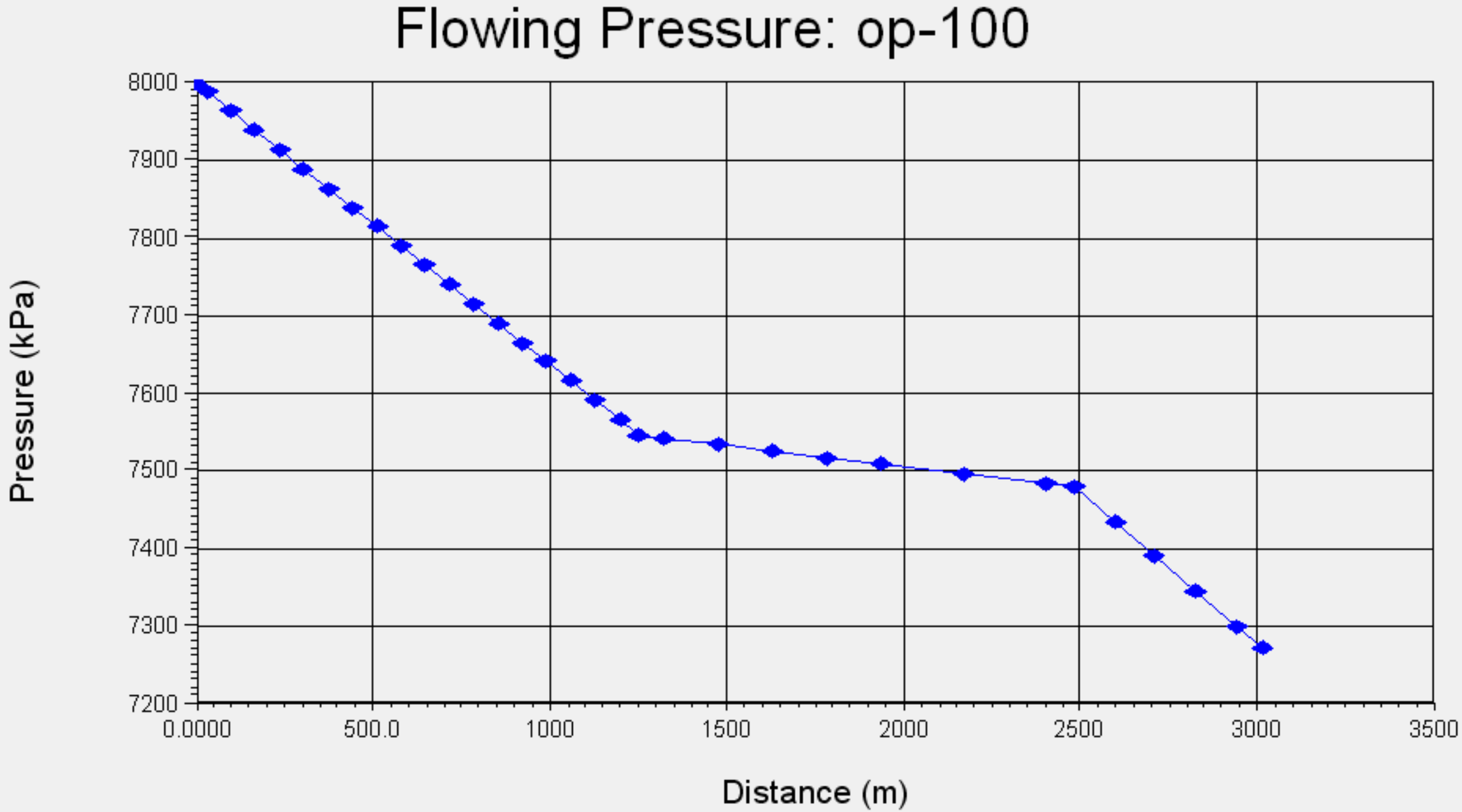
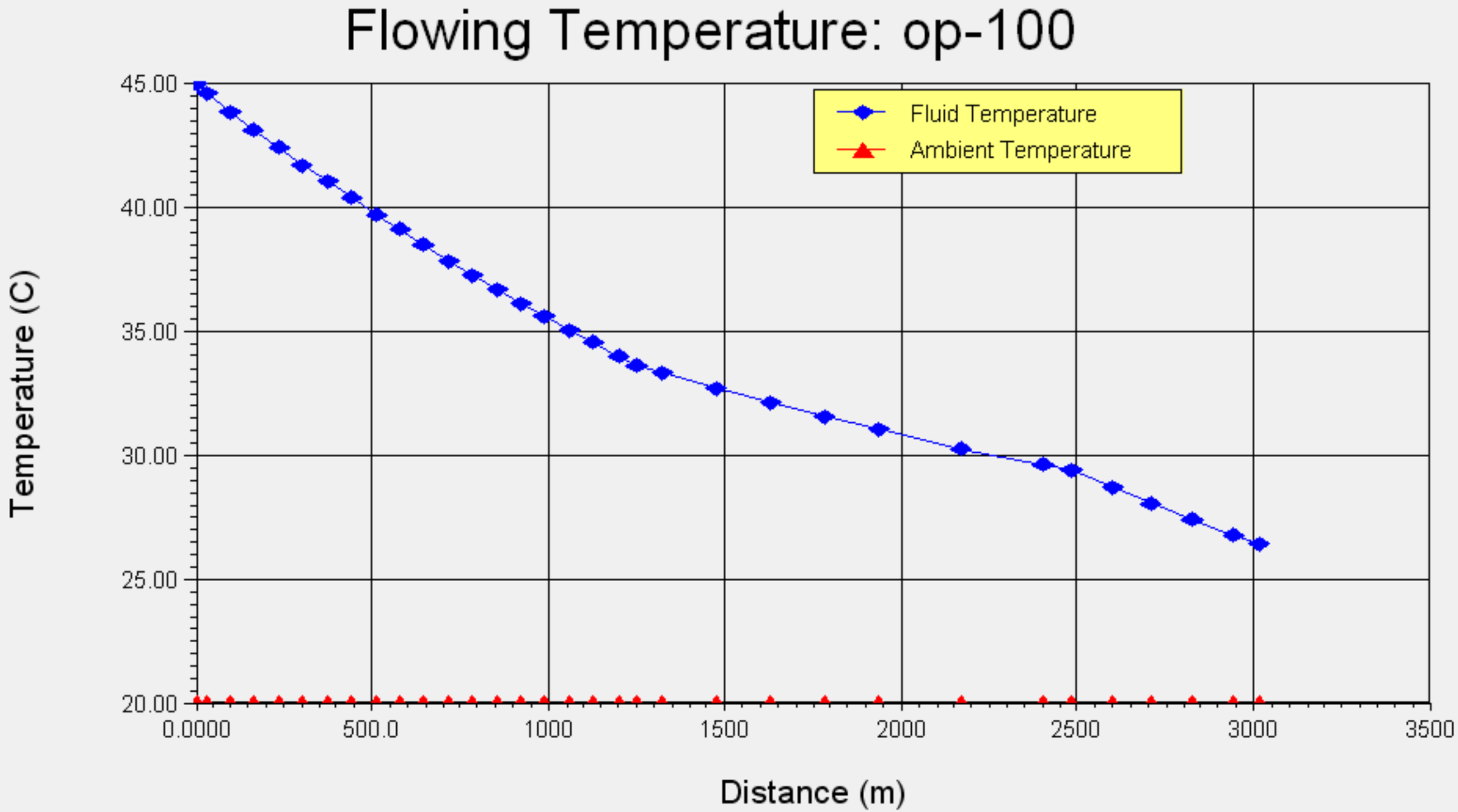
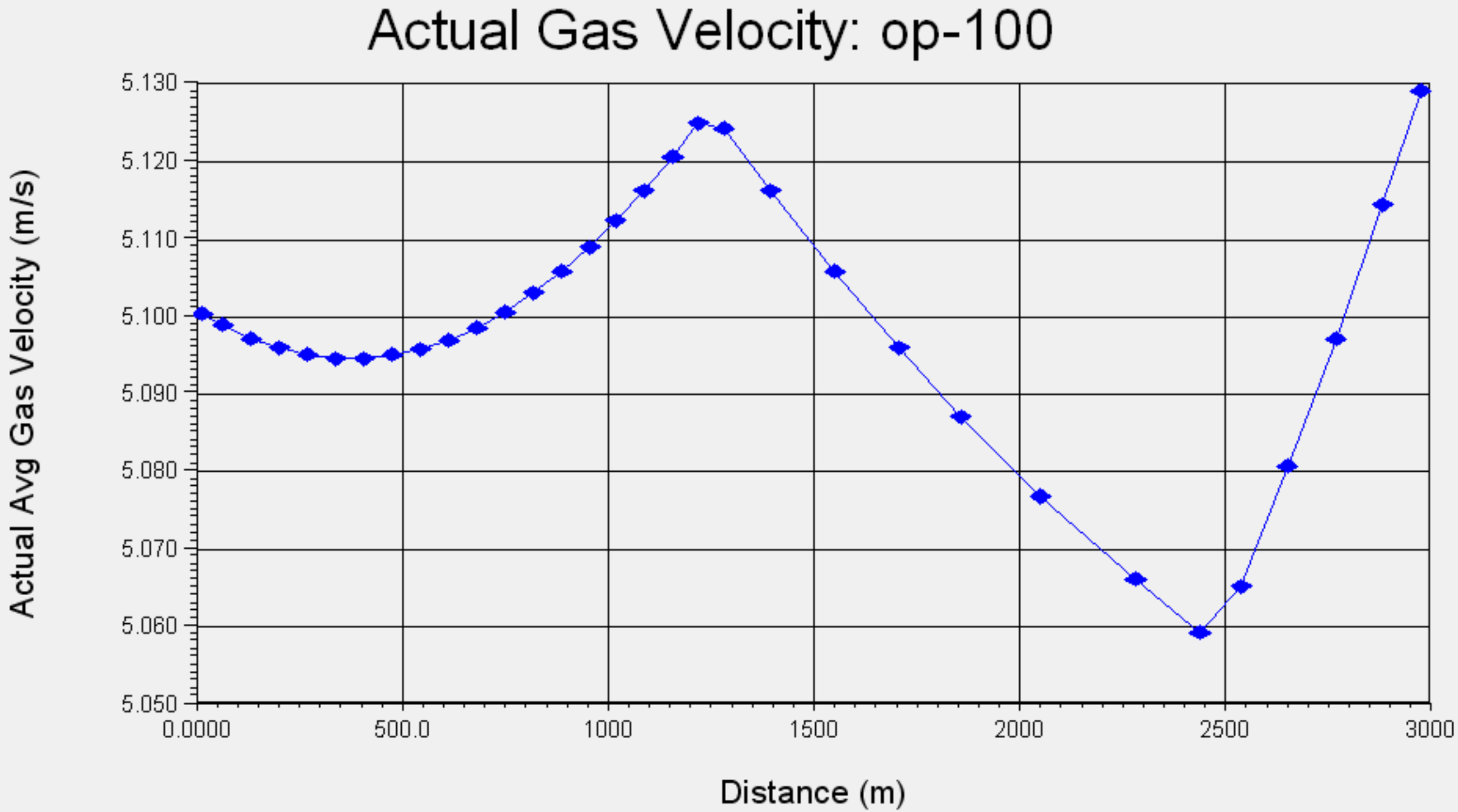
Summary

Upstream Pressure:	8000.00 kPa
Upstream Temperature:	45.00 C
Downstream Pressure:	7271.64 kPa
Downstream Temperature:	26.46 C
Predicted Pressure Loss:	728.37 kPa
Friction Loss:	555.71 kPa
Hydrostatic Loss:	172.50 kPa
Kinetic Loss:	0.156 kPa
Inline Facilities Loss:	0.00 kPa
Average Pressure Gradient:	-0.2418 kPa/m
Total Liquid Holdup:	0.0 m3
Total Line Pack @STD:	1167.7 m3
Pipe Volume:	14.4 m3
Net Heat Loss to the Surroundings:	2.195e+005 kJ/h


Pipeline Elevation: op-100
Elevation (m)
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.00
0.0000
0.0000
500.0
1000
1500
2000
2500
3000
Distance (m)


Flowing Pressure: op-100
Pressure (kPa)
8000
7900
7800
7700
7600
7500
7400
7300
7200
0.0000
500.0
1000
1500
2000
2500
3000
3500
Distance (m)


Flowing Temperature: op-100
Fluid Temperature
Ambient Temperature
Temperature (C)
45.00
40.00
35.00
30.00
25.00
20.00
0.0000
500.0
1000
1500
2000
2500
3000
3500
Distance (m)


Actual Gas Velocity: op-100
Actual Avg Gas Velocity (m/s)
5.130
5.120
5.110
5.100
5.090
5.080
5.070
5.060
5.050
0.0000
500.0
1000
1500
2000
2500
3000
Distance (m)