

Table of Contents

1	INTRODUCTION	1
2	BASE DATA.....	2
3	METHODOLOGY.....	3
4	RESULTS	5
5	DISCUSSIONS	9
5.1.1	To identify Suitable Pipeline Diameter	9
5.1.2	Evaluation of Pipeline pressure distance profile for 3280, 2460, 1640 and 820 sm ³ /day 9	9
5.2	Suitability of the selected line size from an erosion viewpoint using API RP 14E.....	9
5.3	Hydrate formation Temperature from K charts and insulation level for the pipeline considering the management of wax and hydrates	9
5.4	The insulation configuration required to achieve the calculated U.....	10
5.5	Suitability of the Separator's Slug Handling Capacity	10
5.5.1	To determine if the 3 criteria for severe slugging are met at 3280sm ³ /day	10
5.6	To identify if gas lift will be required when fluids will be 90% water	10
5.7	Other Operational modes to be addressed prior to finalizing the pipeline architecture	11
6	Conclusion.....	11
	REFERENCES	12
	APPENDICES.....	13
1	Erosional Velocity Maximum (m/s)	13
2	Hydrate Formation temperature (°C) and OHTC, U (W m ⁻² °C ⁻¹).....	13
3	Insulation Thickness	14
4	Slug length (m), Slug Volume (m ³) and Severe Slugging number for the maximum (worst case) flow rate of 3280sm ³ /day.....	14

List of Tables

Table 1	Line Sizes Outlet Pressure at 3280 sm ³ /day	5
Table 2	Line Sizes Pressure-Distance Profile for 3280, 2460, 1640 & 820 sm ³ /day	6
Table 3	Erosional Velocity Ratio values for all the line sizes.....	7
Table 4	Calculated Hydrate Formation Temperature (°C) and OHTC, U (W m ⁻² °C ⁻¹) at 820sm ³ /day .	7
Table 5	System Insulation Configuration	8
Table 6	Mean Slug Lengths (m) and Volumes (m ³), Flow Patterns on Approaching the Riser and Severe Slugging Numbers	8
Table 7	Outlet Pressures (bar) of the Line Sizes (m) at 3280sm ³ /day and Water volume ratio of 90%	8

List of Figures

Figure 1	Plot of Outlet Pressures (bar) vs Liquid Rates (sm ³ /day) for all IDs (m).....	6
Figure 2	Plot of Erosional Velocity Ratio maximum vs Liquid Rates (sm ³ /day) for all Line Sizes (m)	7
Figure 3	Plot of Pressure (bar) vs Distance (m) at 3280sm ³ /day and 90% Water Volume ratio	8

1 INTRODUCTION

The optimal design of a Subsea Pipeline system is always an uphill task. Subsea operations pose such challenges as Pressure drop, temperature drop, etc. which lead to chemistry related flow challenges like formations/precipitations of; waxes, scales, Asphaltene, Hydrates, etc. Hence the essence of Flow Assurance which involves the thermal-hydraulic designs of production and offtake systems as well as the predictions and remediation of these flow challenges [1].

Normally to avoid the problem of temperature drop or heat loss, flow rate should be increased. To increase the flow rate, a smaller inner pipeline diameter has to be used but this leads to the problem of pressure drop and slugging [2,3]. To avoid excessive pressure drop a larger pipeline inner diameter can be used but also with draw backs on cost [4], reduced flow rate and then heat loss due to large distance between the wellhead and the platform. To curb excessive heat loss, a good insulation material is used for the pipeline but this also comes at a great cost especially for long distance pipelines [5].

With all these, it can be seen that the solution of one problem leads to another problem. Hence in the course of this work, an optimum design of a pipeline system which would address and curb all these challenges mentioned above would be reached. The system will be able to discharge the produced fluid to the host platform at a pressure above 10.3 bar and the arrival fluids have to be at a temperature above 25°C to avoid wax and hydrate formations over a distance of 10,000m through a riser of 200m elevation. Having been provided with ranges of inner pipeline diameter and flow rates, an Optimum pipeline diameter to use which will give an outlet pressure above 10.3bar and a good Insulation configuration would be suggested in order to avoid temperature dropping to below Wax and Hydrate appearance temperatures.

The Pipeline diameter which would be recommended should be able to deliver fluids at a pressure above 10.3 bar towards the end of the field life when the produced fluids will be 90% water, otherwise there would be need for artificial gas lift [6].

The scope of this work also covers looking into the suitability of the slug handling capacity in the system when the flow rate is at 3280m³/day which is the worst case scenario.

To come up with these optimal and appropriate design parameters, a steady state simulator “**PIPESIM**” which is Production System analysis software that models multi-phase flow from the reservoir to the wellhead would be used [7,8] .

The methodology section of this report would detail how the simulations and design were

carried out based on the given set of data, the results of the simulation and the analysis of the results would as well be detailed out under results and discussion sections respectively.

**FOR COMPLETE PACKAGE OF THIS
PROJECT:
CONTACT US BY EMAIL:
contact@cleanscriptgroup.com
OR FILL & SUBMIT OUR ENQUIRY
FORM**