ABSTRACT

As we known, the hydrate inhibitor is necessary for gas/condensate oil pipeline and it is recycled from the liquid flow, liquid hold up balance in the pipeline startup will impact the storage of hydrate inhibitor at the pipeline outlet. Because the liquid hold up will be large with different water depth between inlet and outlet of pipeline, the change of pipeline flowrate and transport pressure will make a severe surge in the pipeline. In order to reduce the influence to the downstream facilities, the suitable pigging process must be designed. All the above have been researched in this paper.

KEY WORDS: The deep water gas field; the gas/condensate oil pipeline; flow assurance.

INTRODUCTION

With the development of gas fields to deep water outspread, long distance of deep water pipeline will be laid more and more. Some transport case will impact on the development of the deep water gas fields. In this paper, the gas/condensate oil pipeline of the LiWan3-1 gas field is researched about flow assurance, such as liquid hold up balance in pipeline start up, the influence to platform when pipeline data changed, the pigging of pipeline. And the conclusions will be look forward to reference to the flow assurance design of deep water gas/condensate oil pipelines.

GENERAL DESCRIPTION ABOUT LIWAN 3-1 GAS FIELD

Liwan 3-1 gas field is the first deep water gas field that put into development in China. There is a subsea production system under 1480m water depth, and a platform which is 75km west-north from subsea wellhead. The water depth of the platform is about 200m. Considering the reduce of well head pressure and preventing more hold up in low flowrate case, there are 2 subsea pipelines will be laid in the project, by which all well flow transport to platform for treatment. The difference of water depth at the inlet and outlet pipeline is 1280m, the total height of the pipeline is 1510m with the riser height.

RESEARCH OF FLOW ASSURANCE DESIGN

The OLGA software that can simulate the multiphase pipeline transiently is used. The liquid hold up balance in pipeline start up, the influence to platform when pipeline data changed, the pigging of pipeline will be analyzed in this paper for pipeline of Liwan3-1 gas field.

The Analysis of Liquid Hold Up Balance Time

In the gas/condensate oil pipeline, hydrate inhibitor should be injected for flow assurance. Almost of hydrate inhibitor will be recycled from water phase at outlet of pipeline. In the deepwater pipeline, there is little or no water flow in the case of pipeline started until the hold up in the pipeline comes to a balance. If the balance time is long, the storage of hydrate inhibitor should be very large, so it is important to analyze balance time of hold up.

Limited to storage of hydrate inhibitor in the platform, the balance time of Liwan3-1 deep water gas/condensate oil pipeline should be short. According to the production profile, 18×10^8 m³/a and 15×10^8 m³/a are chosen as start up flowrate to be analyzed. Because of the large hold up, the winter case is as the typical case. Simulated by OLGA software, the balance time of hold up with 18×10^8 m³/a and 15×10^8 m³/a flowrate is shown as followed figures1~2.