Exhibit No. 11112

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From: Reidar B. Schuller
To: Miller, Wayne O.
CC: Ruben Schulkes; Stale.Selmer-Olsen@dnv.com
Sent: 8/25/2010 8:48:16 PM
Subject: RE: Hydro choke model
Attachments: Gas mass fractions vs pressure.jpg

Hello Wayne

Here is the diagram I referred to showing how the gas mass fraction increases with decreasing pressure level at a temperature of 82.2 C.

Best regards,

Reidar

From: Miller, Wayne O. [mailto:miller99@llnl.gov]
Sent: 25. august 2010 22:39
To: Reidar B. Schuller
Cc: Ruben Schulkes; Stale.Selmer-Olsen@dnv.com
Subject: RE: Hydro choke model

Dear Reidar,

Thank you very much for your effort on the choke flow analysis. Please also send my warm thanks to Statoil for giving you the time to work on this effort.

Your results are interesting and clearly show the complexity of this flow path. We are all estimating a flow increase as the valve is closed, so this strongly suggests that there is more going on that what we have captured in our models. The model I am using can do choked flow but my equation of state is not sophisticated. I did not have any choked flow in my results.

I did not receive the data on gas mass or volume fraction vs. pressure. Please resend it again if you can.

I will send your results to our analysis teams, and send you any further comments that they have. Again thank you for your help.

Regards,

Wayne

From: Reidar B. Schuller [mailto:rbsc@statoil.com]
Sent: Wednesday, August 25, 2010 12:14 PM
To: Miller, Wayne O.
Cc: Ruben Schulkes; Stale.Selmer-Olsen@dnv.com
Subject: Hydro choke model

Flash calculations using the PVTSim file show that the gas mass fraction at inlet to the flow geometry varies from 0 to 24 weight%, depending on the pressure. (See attached diagram.) According to my calculations 23 weight% corresponds to the specified 2900 standard cubic feet of methane per stock tank barrel of oil.

I did not receive the gas mass fraction data, please send it again.

Comments:

The maximum gas mass fraction in the present case is approximately 24% giving gas volume fractions between 50 and 60%, and the choke model did not predict critical flow for any of the valve openings. For situations with higher gas fractions the flow may readily become choked if the pressure drop is high.

The choke opening limits the flow rate for small openings and small flow rates where most of the pressure drop is across the choke. The choke may operate critically if the pressure drop is large enough.

The pressure drop across the upstream restriction, having a flow area of 42% of the maximum choke opening, will be large when the choke opens, and the flow may become critical at this location.

The gas expansion (and including some flashing of gas from the oil phase) and friction effects may result in choked flow at the pipe exit (Fanno flow) limiting the flow rate through the system.

In addition there are frictional pressure drops in the piping that affect the pressure distribution, so this is a complex flow problem where it is difficult to determine what actually determines the flow rate.

We also believe that the assumption of a downstream pressure of 150.9 bara (2189 psia) may be uncertain, especially for flows with large gas fractions.

1) In a pipe system like this the phenomenon multiple choking may occur, i.e. the flow may be

critical in more than one cross-section of the pipe system. The critical cross-section furthest downstream will determine the mass flow rate. Upstream there may be both subsonic and supersonic flow as well as shocks. A model of this has to allow implicit solution of multiple choking for complex pipe geometries.

2) If there not is sufficient flow restrictions and friction to dissipate enough stagnation pressure upstream, the flow will choke where the pipe exits into the sea. The mass flow rate will be determined here. The exit pressure will be larger (or equal to) the sea pressure, and there will be further expansion and dissipation in the form of normal or oblique shocks etc in a turbulent jet to the sea.

It should be possible to develop a model combining the Hydro choke model with pipe flow as described above, but we do not have that available now. It would be useful to have a tool that could determine how these high velocity compressible flows behave in complex piping systems. The basis for such a model was developed by DNV and partners in the mid 90ies for one and two component flows based on a similar model as the HYDRO-model. However, the model would have to be made operational again and further validated. This was done within the framework of a French, Belgian, German, Polish and Norwegian collaborative R&D project with financial support from the EC, CEA, UCL, TUHH, DNV, Statoil, ConocoPhillips, ++.

We hope the above information gives you some ideas on how to proceed finding a good prediction model for your system.

Best regards,

Reidar

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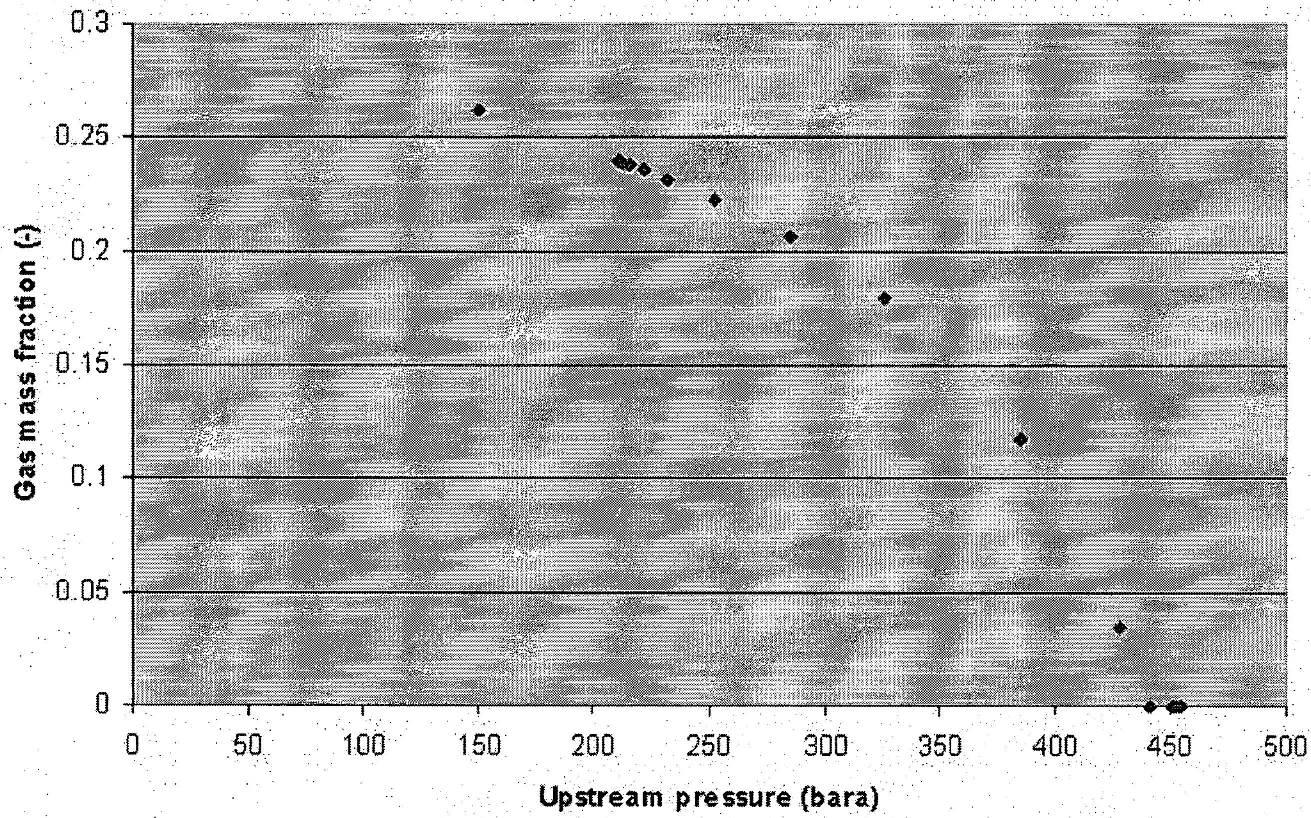
0.3
0.25
0.2
0.15
0.1
0.05
0
Gas mass fraction (-)
0
50
100
150
200
250
300
350
400
450
500
Upstream pressure (bara)