

From: Lockett, Tim
Sent: Sun May 23 18:33:45 2010
To: Hill, Trevor
Subject: RE: Plume pics_with measurements
Importance: Normal
Attachments: Kink-leak-flowrates.xls

Trevor

Unless we move to CFD for this, we have to approximate these holes by circles with diameter D when the first and second leaks are more like slots of width W and length L. I have used equivalent area to do this:

Equivalent Area, $D = ((W * L) * 4 / \pi)^{0.5}$

We also have a degree of uncertainty in whether the fluid exiting these holes is preferentially gas compared with the equilibrium fluid for these conditions, and some uncertainty over the conditions. For the purposes of the following flowrates, I have used an equilibrium fluid (gas and liquid exiting in the correct proportions for the conditions) at base case pressure of 2750 psia and 200F, with sensitivity cases at 2700 psia and then also at a sensitivity of 175F.

Details are in the attached xls but essentially, we should expect these leaks to have flowrates as follows

leak#1 ~3600 sbb/d

leak#2 ~7100 sbb/d

leak#3 ~900 sbb/d

Total: 11600 sbb/d

The sensitivity case gives a 5% lower flowrate if the upstream pressure is only 2700 psia.
The sensitivity case gives a 0.8% higher flowrate if the upstream temperature is only 175 F.

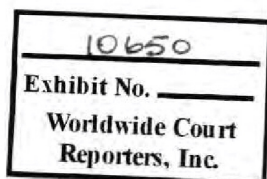
The flowrate through these leaks is somewhat larger than the flowrate that would be given for the flow along the riser given the same sized hole through the kink. This is because the riser imparts back-pressure (mostly from its elevation), whereas the leaks are direct to the sea ambient pressure.

I trust these results are helpful.

best regards
Tim

From: Hill, Trevor
Sent: 23 May 2010 14:10
To: Lockett, Tim
Cc: Tooms, Paul J; MC252_Email_Retention; Austin, Julian

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BP-HZN-2179MDL04996569
BPD361-000006

TREX 010650.0001

Subject: FW: Plume pics_with measurements

Tim

Good afternoon...

Given the dimensions of leaks at kink estimated by Julian, and an upstream pressure of 2750 psi, what would you estimate the individual and total kink leak rates to be, given the previous work on choke sizes?

Regards
Trevor

From: Austin, Julian
Sent: 23 May 2010 02:24
To: Hill, Trevor; Martin, John JW
Cc: Tooms, Paul J; MC252_Email_Retention
Subject: RE: Plume pics_with measurements

Trevor,

My estimates of the leaks are as shown in the attached Word document. It is very hard to estimate the width of the leaks, I have settled on 1/4" as my interpretation from the photos, but I recognise that this may be an upper estimate particularly as the gas is expected to be expanding rapidly on exit.

Kind regards,
Julian

From: Hill, Trevor
Sent: 23 May 2010 00:21
To: Austin, Julian; Martin, John JW
Cc: Tooms, Paul J; MC252_Email_Retention
Subject: FW: Plume pics_with measurements

Julian, John

Grateful if you would look at these... If holes are now more than pinhead sized leaks, we may be getting a more substantial flowrate out.

What is your view on size of each of the three leak holes please?

Regards
Trevor

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BP-HZN-2179MDL04996570
BPD361-000007

TREX 010650.0002

From: Wilson, Roberta
Sent: 21 May 2010 21:51
To: Hill, Trevor; Woods, Kay K; Turnbull, Jon B; Baker, Kate H (UNKNOWN BUSINESS PARTNER); McDonald, W Leith
Subject: FW: Plume pics_with measurements

Useful close-ups. I have also loaded to our sharepoint.

From: Graham Openshaw [mailto:graham.openshaw@tecpm.com]
Sent: 21 May 2010 11:46
To: Wilson, Roberta; Wells, Shane B; Breaux, Beau
Subject: FW: Plume pics_with measurements

FYI

Graham

T: (603) 373-8228
M: (832) 244-2163

From: Munstereifel, Eric J (Delta Marine Tec) [mailto:Eric.Munstereifel@bp.com]
Sent: Friday, May 21, 2010 2:51 AM
To: Openshaw, Graham (TecPM)
Cc: Gutierrez, Daniel
Subject: Plume pics_with measurements

Regards,

Eric Munstereifel
Atlantis Subsea Installation Team
of. 281-249-1678
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BPD361-000008

TREX 010650.0003