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Exhibit No. \_\_\_\_\_  
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**From:** Ballard, Adam  
**Sent:** Sun Apr 25 19:15:45 2010  
**To:** Gudimella, Ravi  
**Subject:** Confidential...FW: Preliminary Results for Orifice Size  
**Importance:** Normal  
**Attachments:** image001.gif

Expect a call from me tomorrow regarding some quick checks on some calculations. FYI...this work is for the currently leaking well at Macondo so it is pretty sensitive and critical.

Background...the riser pipe is bent at the BOP and they expect it to look like an eight pattern with the flow going through the two "orifices" on either side of the pipe bend. This work is to try and estimate how big those orifices would be and further to look at whether erosion would make the leak get larger over time.

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**From:** Austin, Julian  
**Sent:** Sunday, April 25, 2010 2:09 PM  
**To:** Ballard, Adam  
**Subject:** RE: Preliminary Results for Orifice Size

Adam,

We are going to have to review this observation in the light of our other estimates of orifice size (physical measurements, FEA) and our erosion predictions early this week and I will be recommending a review of the fluids data that we have been provided to ensure that our predictions make sense.

Many thanks again for your help today. will speak tomorrow.  
Julian

**From:** Ballard, Adam  
**Sent:** 25 April 2010 20:04  
**To:** Austin, Julian  
**Subject:** RE: Preliminary Results for Orifice Size

Yes, pretty small orifice in order to achieve the pressure drop at the rates we are seeing.

Yes, the bubble point seems pretty high...as an example, Thunder Horse GOR is ~900 scf/stb and bubble point is ~4000 psi. Higher GOR will usually result in higher bubble point...e.g. more methane...however, I can't recall any fluid that I have seen in GoM that has had such a high bubble point. Regardless though, even if bubble point were lower, it wouldn't affect the calculations that much...and it would be in the direction of an even smaller orifice.

Let me know if this doesn't make sense and we can discuss.

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Thanks,  
Adam

**Adam L. Ballard**

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**From:** Austin, Julian  
**Sent:** Sunday, April 25, 2010 1:17 PM  
**To:** Ballard, Adam  
**Subject:** RE: Preliminary Results for Orifice Size

Thanks for this Adam!

If I read it correctly this is saying that the orifice needs to be pretty small to achieve the pressure drop. I guess you were most suspect over the bubble point, which may be chucking a hell of a lot more gas into the equation than is actually present?

Kind regards,  
Julian

**From:** Ballard, Adam  
**Sent:** 25 April 2010 18:31  
**To:** Austin, Julian  
**Subject:** Preliminary Results for Orifice Size  
**Importance:** High  
Julian.

As discussed, here are some results from Pipesim on the work we discussed. See below:

**Assumptions**

**Fluid**

1. Bubble Point Pressure: 10,000 psi
2. GOR: 3000 scf/stb
3. Reservoir Temperature: 150 F
4. Fluid Temperature at Wellhead: 100 F

**System**

5. Seafloor Pressure (Outlet): 2250 psi
6. Frictional Losses in Riser Pipe is negligible

**Restriction**

7. Two Orifice restrictions exist (both identical and circular)
8. Flow is equally split between orifice restrictions
9. Upstream Pressure of Restriction is 7500 psi or 5000 psi

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#### **Results**

1. GVF U/S of Orifice Restrictions: ~40% (@ 7500 psi)
2. GVF U/S of Orifice Restrictions: ~60% (@ 5000 psi)
3. GVF D/S of Orifice Restrictions: ~70% (@ 2250 psi)
4. See Below Plot for System Results

#### **Conclusions**

1. **Orifice Size expected to flow ~1000 bbl/d through two orifice restrictions is 0.15 to 0.2 inches**

I am using some pretty rough numbers here so please keep that in mind. As discussed, if we find this work to be within reason in regards to the orifice size, we can certainly dig into the assumptions and fine tune this if needed. If you want to discuss or need anything else, don't hesitate to give me a call.

Adam

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