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Sent: Wed, 4 Aug 2010 15:14:15  
To: GS FOIA 0105 <foia0105@usgs.gov>  
Subject: Fw: pressure-based flow calcs

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----- Forwarded by Janet N Arneson/DO/USGS/DOI on 08/04/2010 03:13 PM -----

From: "Wereley, Steven T." <wereley@purdue.edu>

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Date: 06/05/2010 09:55 PM

Subject: pressure-based flow calcs

Hi all. I received the attached email--along with 4 million others... This guy does some calculations of flow rate using well geometry and so forth. I think this is Paul Bommer's area. I'm not sure it adds anything new to Paul's work, but it might be worth a quick look.

Best,

Steve Wereley, Professor of Mechanical Engineering

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----- Message from "Bray, Alan" <Alan.Bray@can.apachecorp.com> on Fri, 4

Jun 2010 00:30:05 -0400 -----

To: "Wereley, Steven T."

<wereley@purdue.edu>

Subject: FW: Deep water Horizon estimated

oil rate

Steve,

FYI: I approached the oil rate calculation in a different manner by calculating the flow potential based on the ability of the reservoir to deliver fluid to and up the wellbore. In petroleum engineering, this is called nodal analysis. I based the nodal analysis (attached) on the information I could piece together from news reports, senate committee testimony and my knowledge of GoM reservoirs. I assumed annular flow behind the 7" & 9-7/8" production casing (a copy of the wellbore schematic

is attached as presented by Haliburton to the Senate committee). I suspect that the bent riser pipe was providing a significant restriction to flow and that prior to cutting the riser pipe the flow could have been between 12,000 to 25,000bopd as you have estimated. Now that the riser pipe is removed the flow rate has likely increased dramatically and is probably more like about 40,000bopd. If I had a copy of the well logs or more information about the reservoir properties I would be able to do a better estimate. Any petroleum engineer is able to do these calculations.

Regards,

Alan Bray

Calgary, Alberta

(See attached file: 20100603160825274.pdf)(See attached file:  
oil-halliburton-cement-052010jpg-e618a2271a66c847.jpg)