

From: SCHU <SCHU@hq.doe.gov>
Sent: Monday, August 02, 2010 3:14:56 PM
To: "'pahsieh@usgs.gov'" <pahsieh@usgs.gov>
Subject: Re: Rock compressibility

Actually we have a reasonable idea of the flow rate, assuming no leak to the formation.

From: Paul A Hsieh <pahsieh@usgs.gov>
To: SCHU
Sent: Mon Aug 02 13:31:26 2010
Subject: Rock compressibility

Secretary Chu:

The shut-in pressure data in the Horner plot do not narrow the uncertainty in the rock compressibility. To obtain a unique value of rock compressibility from analysis of the Horner plot, it is necessary to know the flow rate. For the Macondo well, the flow rate is not known. Assuming different flow rates would yield different rock compressibility values.

The rock compressibility of $12 \times 10^{-6} \text{ psi}^{-1}$ (12 microsips) is based on BP's own estimate, as shown by scanned pages from their presentation on July 9, 2010. (See attached pdf file BP_Presentation_9July.pdf.) The first scanned page shows the cover page of the entire BP presentation ("Shut the Well in on Paper Benefits and Risks"). The lower half of the second scanned page contains the title slide of Bob Merrill's presentation ("Reservoir Depletion"). The upper half of the third scanned page shows the reservoir parameters used by BP in their analysis. In particular, the values in red are the values they used. The rock compressibility, C_{sub_r} is given as 12 microsips. In the sensitivities section, C_{sub_r} is varied from a low of 6 to a high of 18 microsips.

Either Bob Merrill or another BP reservoir modeler told me that a lab measurement of a "sidewall sample" from the Macondo well gave a rock compressibility of 6 microsips. However, they found that in their reservoir modeling for the Gulf Coast, 6 microsips is typically too low and 12 microsips is more representative.

Due to spatial variability in rock properties, it is likely that the result of lab testing of a sidewall sample would not yield a rock compressibility that is representative of the entire reservoir. This assessment is widely held in geological sciences.

I will continue to research on ways to better define the rock compressibility and report my findings to the science team. Please email me if you have additional questions.

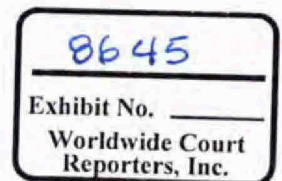
Respectfully,
Paul Hsieh
U.S. Geological Survey

-----SCHU <SCHU@hq.doe.gov> wrote: -----

>To: "'pahsieh@usgs.gov'" <pahsieh@usgs.gov>
>From: SCHU <SCHU@hq.doe.gov>
>Date: 08/02/2010 08:43AM
>Subject: FW: IN LIEU OF DAILY WIT BP SCIENCE CALLS - Daily Well
>Integrity Updates and Information

>
>
> Paul,

>Are the uncertainties in the rock compressibility being narrowed as
>we continue forward in Horner time?
>



CONFIDENTIAL

IGS629-002021

TREX 008645.0001

>Steve
>
>Steven Chu
>Department of Energy