

From: SCHU [REDACTED]  
Sent: Monday, August 02, 2010 3:14:56 PM  
To: "'pahnleh@usgs.gov'" <pahnleh@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 Haleh <pahnleh@usgs.gov>  
To: SCHU  
Sent: Mon Aug 02 13:31:26 2010  
Subject: Rock compressibility

Secretary Chua

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,  $C_{\text{sub}r}$  is given as 12 microsips. In the sensitivities section,  $C_{\text{sub}r}$  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.