

**Via Courier**



May 9, 2005

Staff Submission Group  
640 – 5<sup>th</sup> Ave. S.W.  
Calgary, Alberta, Canada T2P 3G4

**Attention: Mr. J.P. Mousseau**

Dear Sir:

**Re: GENERAL BULLETIN 2003-28 (GB 2003-28)  
BITUMEN CONSERVATION REQUIREMENTS  
ATHABASCA, WABISKAW – MCMURRAY  
PHASE 3 FINAL PROCEEDING NO. 1347905  
PEOC RESPONSE SUBMISSION TO SSG**

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With respect to the SSG's evidence filed with the EUB on February 14, 2005, Paramount Energy Operating Corp. (PEOC) notes that the SSG continues to focus on the presence of a regional mudstone that it claims is required to provide an effective seal between overlying gas pools and underlying potential SAGD operations. On February 14, 2005, other parties put forth similar arguments citing the lack of lateral continuity of mudstones precluding the development of an effective seal. It is argued by these parties that without such a seal, potential SAGD operations and ultimate bitumen recovery will be jeopardized when there is an overlying depleted gas pool.

In contrast, PEOC has shown in its February 14<sup>th</sup> submission that SAGD performance is dominantly controlled by geological heterogeneity and associated petrophysical properties, not overlying gas pools pressures. The nature of the muddy zone lithology, combined with the inherent facies and petrophysical heterogeneity that exists within the McMurray Formation, was sufficient to mitigate and thus limit the interaction of the steam chambers and overlying gas zones, regardless of the quality of the bitumen saturated sandstones. This results in SAGD recovery being essentially insensitive to overlying gas pool pressure.

Significantly, in these cases, there was no need to invoke a thick, regional, continuous mudstone to provide a barrier between SAGD steam chambers and overlying gas pools.

PEOC's approach focused on determining the impact that depleted gas pressure would have on SAGD recovery. To this end, PEOC completed detailed three-dimensional geostatistical modeling of the geology of four pools covering a variety of reservoir quality, sandstone stacking patterns, and fluid configurations. Each study used all available log and core to build a high resolution model in a rigorous, sophisticated and technically unbiased manner which preserved the heterogeneity of the rock system, and

used production data within the pool to calibrate the geological model by way of history match.

PEOC's pool studies identified a common, pervasive and predictable vertical lithological pattern that supports the likelihood that regional depositional mechanisms controlled sedimentation, resulting in a predictable vertical lithological sequence. This sequence which tends to deposit high quality sand at the base and fines upward is typically capped by a thick succession of interbedded muddy facies. A review of 206 wells within the channel system defined by the RGS in Communication Map #3, over a 23 township area (T78-07W4 to T85-11W4) demonstrates the predictable regional character of this upward muddying succession and outcrop and well logs show a similar pattern of vertical lithological sequences.

Numerical SAGD flow simulation runs were conducted on cross sectional models representative of the geological diversity within each of the pools. Three SAGD performance forecasts were prepared for each cross sectional model using a different gas pool operating pressure. The first version depleted the gas reserve to 1200 kPa prior to initiating the SAGD program. Once the gas pool operating pressure was depleted the gas well was shut in and SAGD operations commenced. SAGD operating pressures were constant at 3000 kPa for all sensitivities. Second and third forecast versions used progressively lower gas pool operating pressures of 600 kPa and ~200 kPa.

Bitumen recovery levels for the various 2D well models were well below technical criteria for an effective SAGD project. Simulations incorporating the most probable geostatistically-generated geology forecast very poor SAGD performance with prohibitively low average bitumen rates and impractical steam/oil ratios. SAGD recovery in the geostatistical models was essentially insensitive to overlying gas pool pressure. Isolation afforded by the intervening muddy zone lithology and the depressed conductivity of the bitumen intervals of the pools modeled was sufficient to prevent interaction of the steam chambers and overlying gas zones.

Parametric sensitivities determined what impact gas depletion would have in the event that a high quality bitumen-saturated homogeneous sand-filled channel was found within the region of influence of the overlying gas pool. The introduction of high quality bitumen-saturated sand improved the results of the simulation runs drastically, yielding significant oil production rates, high cumulative bitumen recoveries and low steam/oil ratios. SAGD recovery in both the geostatistical models and the sand-filled sensitivity models was essentially insensitive to overlying gas pool pressure.

Based on the results of numerical flow simulations of realistic reservoir models (that preserve the inherent heterogeneity of the McMurray Formation) conducted by PEOC in the Corner McMurray C and McMurray G, Hangingstone McMurray X and McMurray KKK Pools, it is concluded that the minimum 0.5 metre thick regional shale or mudstone criterion (used historically to determine the production status of a well) is not always required to conduct successful SAGD operations, and the lack of such a regional shale

does not impair ultimate SAGD bitumen recovery.

Should you have any questions, please contact the undersigned at 269-4419.

Yours truly,

**PARAMOUNT ENERGY OPERATING CORP.**

A handwritten signature in black ink, appearing to read "Brett", followed by a long horizontal line extending to the right.

Brett Norris  
Vice President, New Ventures & Geoscience  
cc: Interested Parties