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Patent & Trade-mark Agents

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April 23, 2007

Alberta Energy and Utilities Board  
640 - 5 Avenue S.W.  
Calgary Alberta  
T2P 3G4

**Attention: Mr. Gary D. Perkins**

Dear Sir:

**Re: EnCana Oil And Gas Partnership (EnCana) Application No. 1394112**  
**Canadian Natural Resources Limited (CNRL) Application No. 1409180**  
**Husky Oil Operations Limited (Husky) Application No. 1481725**  
**Cold Lake Oil Sands Area – Clearwater Deposit**

Attached please find the responses of EnCana to Board Staff Questions dated April 13, 2007, on EnCana's Input/Output Files.

Yours very truly,

**McCarthy Tétrault LLP**

*Original signed by*

**D. G. DAVIES**

cc: Alberta Energy and Utilities Board  
Attention: Mr. Ernie Smith

Canadian Natural Resources Limited  
Attention: Mr. Jared Paddock

Thackray Burgess  
Attention: Mr. Patrick J. McGovern

Husky Oil Operations Ltd.  
Attention: Ms. Susan Anderson

Borden Ladner Gervais LLP  
Attention: Mr. Randall W. Block

Imperial Oil Resources  
Attention: Ms. Cheryl Trudell

**EnCana Oil and Gas Partnership (EnCana) Application No. 1394112**  
**Canadian Natural Resources Limited (CNRL) Application No. 1409180**  
**Husky Oil Operations (Husky) Application No. 1481725**  
**Cold Lake Oil Sands Area - Clearwater Deposit**

**Response of EnCana Oil and Gas Partnership (EnCana) to  
Board Staff (Board) Questions on EnCana Input/Output Files  
Dated April 13, 2007**

1. With respect to EnCana's re-run of Husky's January 30, 2007 model runs, it appears that in the non-depleted HWCSS case the gas well was produced, but in the non-depleted HSAGD case the gas well was not produced. Discuss the effect not producing the gas well in the non-depleted HWCSS case would have on the predicted results.

**Response:**

EnCana's models and Husky's model, when run with acceptable material balance errors, have consistently shown that there is no impact of gas cap production on HWCSS and HSAGD oil recovery factors. Therefore, we do not expect any significant changes to the results of the non-depleted HWCSS case if the gas well was shut in.

EnCana has rerun Husky's non-depleted HWCSS case (January 30, 2007) with gas well shut in. As expected, there is no significant difference in results from those submitted for this case in our April 5, 2007 submission. For the non-depleted HWCSS case, an oil recovery of 33.3% OBIP was obtained for the gas well shut in compared to 33.0 %OBIP for the case in which the gas well was produced. The cumulative SOR was 6.2 m<sup>3</sup>/m<sup>3</sup> for both cases. The summary results for these two cases are presented in Table 1 and Figure 1 and 2. Table 1 and Figures 1 and 2 also compare the results of these two cases to the results of the depletion case already provided in EnCana's April 5, 2007 submission.

EnCana will be pleased to submit the input and output files for the rerun of the non-depleted HWCSS case with the gas well shut in should the Board Staff request them.

2. With respect to EnCana's revised model runs referred to on page 54 of EnCana's opening statement where EnCana indicated it addressed the issues of dilation and high pressure steam injection, it appears that the injection pressure only exceeded the dilation pressure for a short time during the first cycle, after which the injection pressure was significantly below the dilation pressure (injection pressures were 3000 kPa or lower compared to a dilation pressure of 7300 kPa). Explain how the revised model runs address the issue of dilation and high pressure steam injection.

**Response:**

As discussed during the Cold Lake Hearing of February 20 to March 1, 2007, EnCana encountered some difficulties in restarting the Piezometer model (January 8, 2007 submission) to incorporate the dilation model after achieving a history match of the conventional gas production. However, due to time limitations for that submission the dilation model was not implemented prior to assessing HWCSS and SAGD in the Husky's Caribou area model.

Revisions were later made to the Piezometer model and dilation was incorporated into the model. Summary results of the revised model were presented at the Cold Lake Hearing as per the summary Table on page 54 of EnCana's opening statement. Correct observations were made by Board Staff that the injection pressure only exceeded the dilation pressure for a short time during the first cycle, after which the injection pressure lowered significantly to below the dilation pressure. This observation is not surprising because the maximum injection pressure achievable in a reservoir is dependent on the following key parameters:

- Mobile water saturation
- Steam injection rate
- Reservoir Pressure
- Permeability of the formation and of the specified well or reservoir gridblocks for dilation
- Formation compressibility (fluid type, fluid saturation)
- Model size

The model only reached dilation pressure for a short time because of the values of these key parameters. Mobile water saturation is an important key variable in this model influencing the maximum achievable injection pressure. This has been demonstrated by sensitivity runs carried out using the generic models. Mobile water saturation of 15 to 17% in the Piezometer model in combination with other key variables listed above likely caused the maximum injection pressure to exceed the dilation pressure for only a short time as observed from model results. An important point that must be borne in mind is that due to solution gas liberation in the bitumen zone resulting from pressure reduction from gas production, formation of free gas in the bitumen zone should decrease the maximum achievable bottomhole injection pressure at a given steam injection rate. This point is often overlooked in cases of gas cap depletion followed by steam injection operations in the bitumen zone. The level of decrease in the maximum achievable injection pressure due to free gas

saturation in the bitumen zone will depend on the values of the other key parameters listed above.

3. With respect to EnCana's re-run of CNRL's model with high pressure instead of low pressure CSS, it appears that for the GOR = 1 case, the gas cap added to the model by EnCana was kept at the initial pressure of 3500 kPa. Shouldn't the gas cap have been depleted to a low pressure (such as 200 kPa) for the GOR = 1 case? Discuss the effect this would have on the predicted results.

**Response:**

Correct observation was made by Board Staff. We initialized the model, GOR=1 at a reservoir pressure of 3500 kPa to make it consistent with CNRL's model with GOR =1 (CNRL's January 30, 2007 submission) which was initialized at a pressure of 3500 kPa. We do not expect any significant changes to the results of the GOR=1 case if the gas cap was depleted to a low pressure such as 200 kPa.

EnCana has rerun GOR=1 model with an initial gas cap pressure of 200 kPa. As we expected, there is no significant difference in results from those submitted for this case in our April 5, 2007 submission. The GOR=1 case with a low gas cap pressure of 200 kPa achieved 47.1% OBIP oil recovery. This oil recovery factor is in good agreement with a recovery factor of 46.8% OBIP achieved for the GOR=1 case with the gas cap initialized at a pressure of 3500 kPa. The cumulative SOR is 6.5 and 6.7 m<sup>3</sup>/m<sup>3</sup> for gas cap pressure of 200 kPa and 3500 kPa respectively. The summary results for these two cases are presented in Table 2 and Figure 3 and 4. Table 2 and Figures 3 and 4 also compare the results of these two cases to the results of the GOR= 2, 3, 5 and 8 cases already provided in EnCana's April 5, 2007 submission (input and output files).

Results of the rerun of the CNRL's model with high pressure injection (Table 2) show that the bitumen recovery factor is similar for GOR = 3, GOR =5 and GOR =8 at approximately 49% OBIP. The maximum difference in bitumen recovery factor between GOR=1 (gas cap at 200 kPa) and GOR=8 is only 2.2% OBIP. However, it should be recognized in the field it is unrealistic to expect a GOR =1, over a reasonable gas production time, since the bitumen zone is very large in comparison to the size of the gas cap.

**Table 1: Summary Results - Rerun Husky's Jan 30, 2007 2D HWCSS No Depletion Model with Gas Well Shut in**

Case Comments	<i>HWCSS</i> Description	Case Name	Oil Recovery Factor	CUM SOR	Max Material Balance Error	Material Balance Error at the end
			%OBIP	m3/m3	%	%
Rerun	EnCana's rerun Husky's Jan 30, 2007 model, Gas Well Shutin for No Depletion	d08gc-2d-NoDep_tight	33.3	6.2	0.009	0.009
Submitted April 05,2007	EnCana's rerun Husky's Jan 30, 2007 model, Gas Well Open for No Depletion	d08gc-2d-NoDep_tight	33.0	6.2	0.004	0.004

**Table 2: Summary Results - EnCana's Rerun of CNRL GOR Models with Gas Cap and High Pressure HWCSS**

Case Comments	Description	Case Name	Oil Recovery Factor	CUM SOR	Max Material Balance Error	Material Balance Error at the end
			%OBIP	m3/m3	%	%
Rerun	GOR 1 (GasCap Pressure 200 kPa)	Gas Cap_GOR_1	47.1	6.5	0.05	0.05
Submitted April 05,2006	GOR 1 (GasCap initial Pressure 3500 kPa)	Gas Cap_GOR_1	46.8	6.7	0.04	0.04
Submitted April 05,2008	GOR 2 (GasCap initial Pressure 3500 kPa)	Gas Cap_GOR_2	48.2	6.7	0.37	0.09
Submitted April 05,2009	GOR 3 (GasCap initial Pressure 3500 kPa)	Gas Cap_GOR_3	49.0	6.9	0.09	0.09
Submitted April 05,2010	GOR 5 (GasCap initial Pressure 3500 kPa)	Gas Cap_GOR_5	49.7	7.1	0.07	0.07
Submitted April 05,2007	GOR 8 (GasCap initial Pressure 3500 kPa)	Gas Cap_GOR_8	49.3	7.1	0.04	0.04

Figure 1: Oil Recovery Factor of EnCana's runs of Husky's Jan 30, 2007 2D HWCSS Model (April 5, 2007 submission) and EnCana's Rerun Husky's No depletion Model with Gas Well Shut in  
(Husky's 2D HWCSS Models: d08gc-2d-NoDep\_tight)

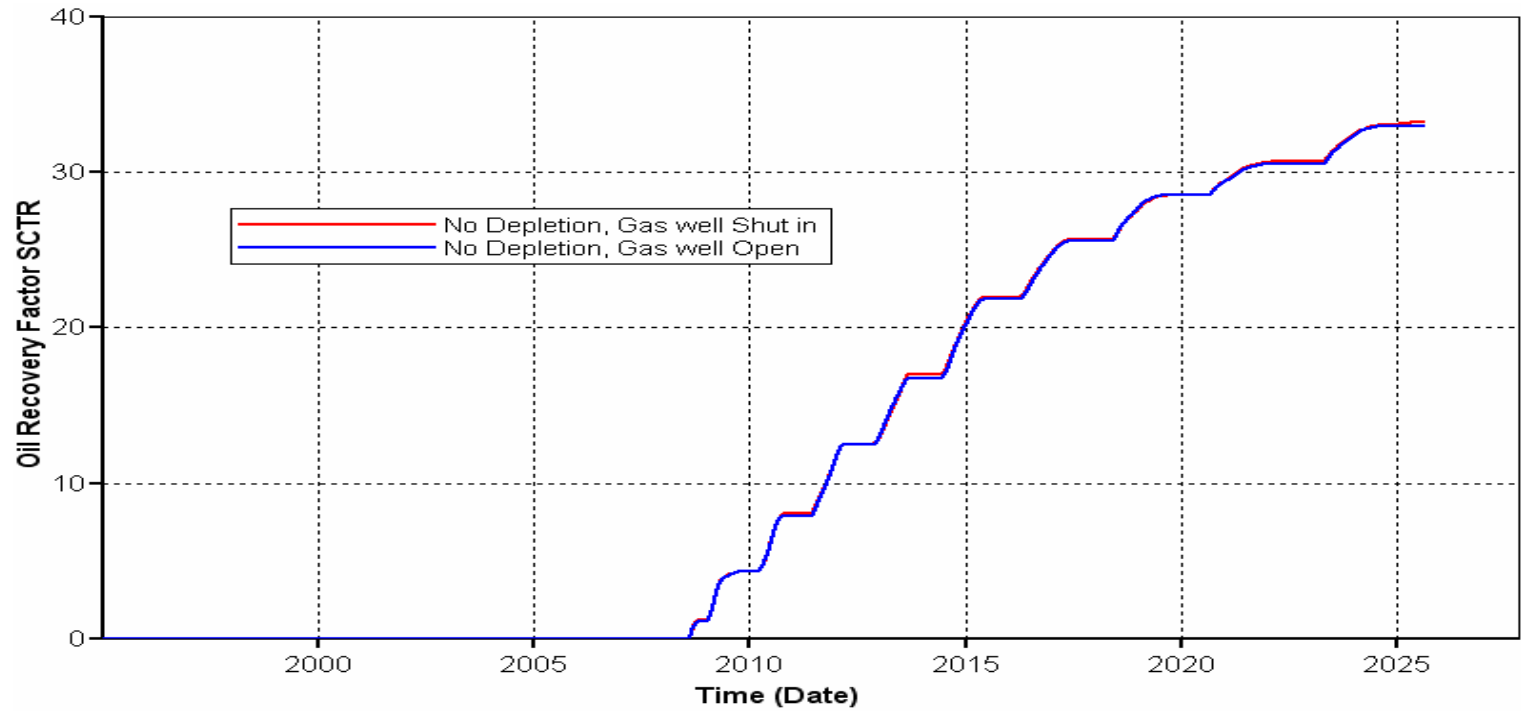
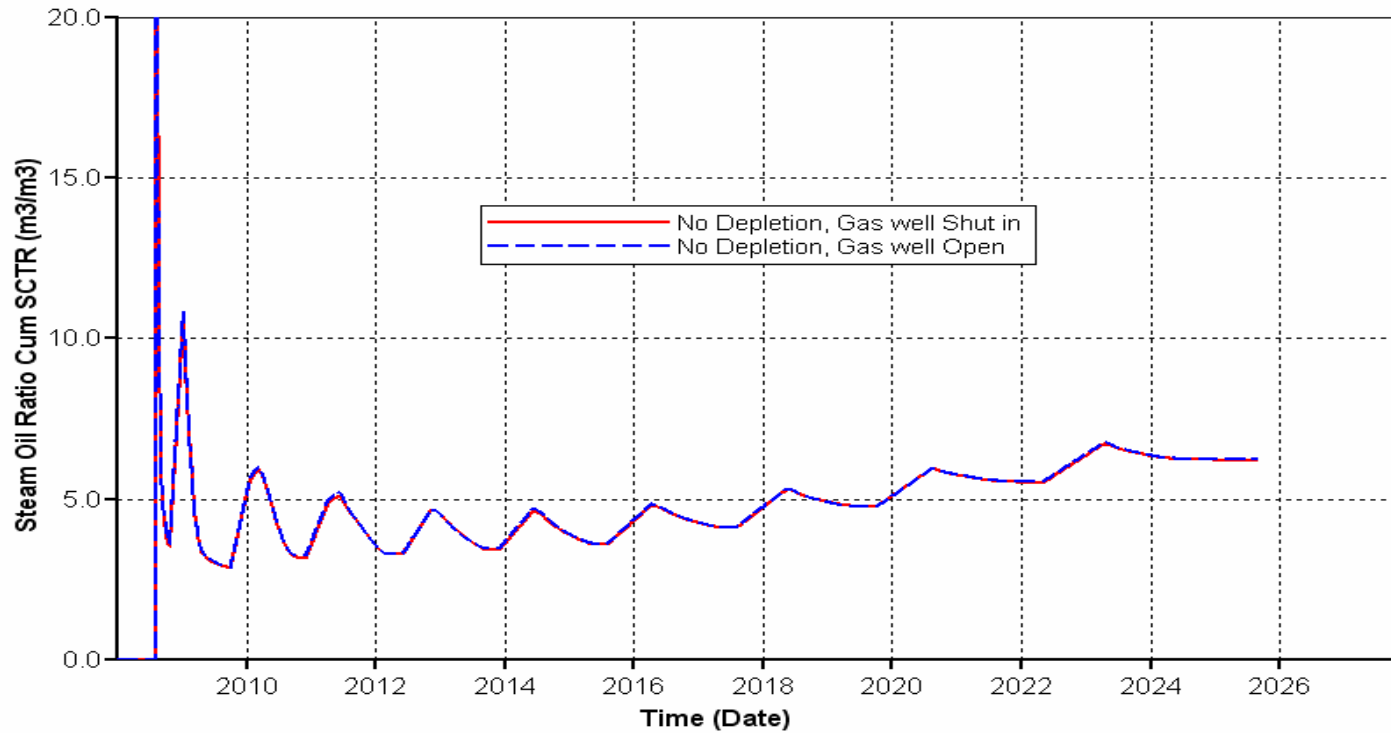


Figure 2: Cumulative SOR of EnCana's runs of Husky's Jan 30, 2007 2D HWCSS Model (April 5, 2007 submission) and EnCana's Rerun Husky's No depletion Model with Gas Well Shut in  
(Husky's 2D HWCSS Models: d08gc-2d-NoDep\_tight)



**Figure 3: Summary of Oil Recovery Factor - EnCana's Rerun of CNRL GOR Models with Gas Cap and High Pressure HWCSS and EnCana's Rerun GOR 1 Model with Gas Cap Pressure at 200 kPaa**

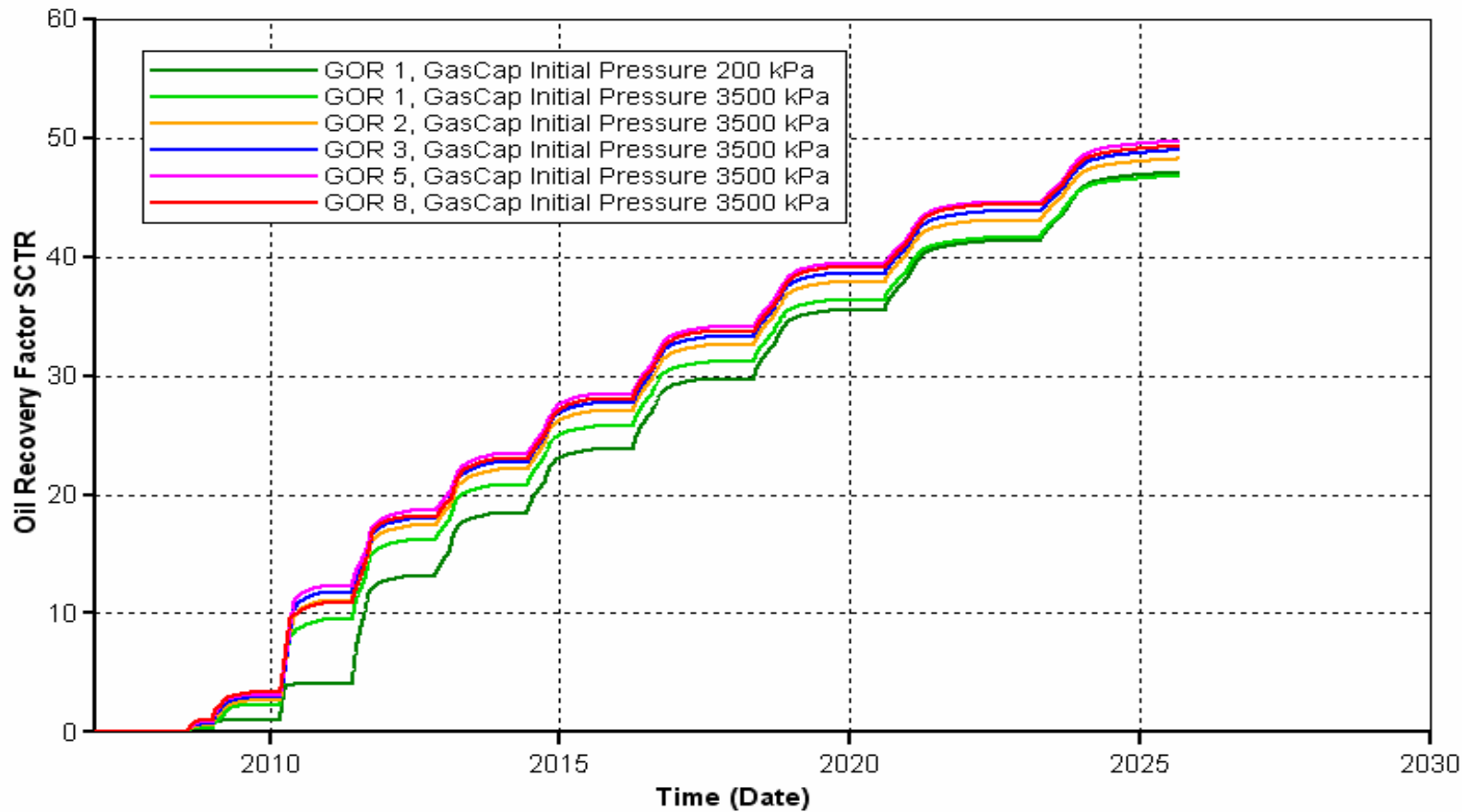


Figure 4: Summary of SOR -EnCana's Rerun of CNRL GOR Models with Gas Cap and High Pressure HWCSS and EnCana's Rerun GOR 1 Model with Gas Cap Pressure at 200 kPa

