

## Board Staff Information Requests to EnCana (Feb 7, 2007)

### IR 1.

In accordance with our February 14<sup>th</sup> reply, we received a new STARS version (2006.15) that corrected some formulations to fix a bug in the STARS model. EnCana has now rerun Husky's 2-D HWCSS and HSAGD models using the new STARS version and applying the MOD1 convergence criteria with tight convergence tolerance (\*CONVERGE \*TOTRES \*TIGHT) and KLEVEL for UPSTREAM calculation Methods for the four Husky runs. These convergence criteria were included in all the four runs to minimize material balance errors to achieve acceptable predictions results from the models. The same numerical input parameters were applied in all the four runs. Summary results of the new runs (February 17, 2007) are compared with the old runs (January 24<sup>th</sup>, 2007) in the attached Table 1.

Results of the simulation runs indicate that the material balance errors involved in the HWCSS for both the January 24, 2007 old runs and the February 17, 2007 new runs are quite low (less than 1%) and therefore acceptable. The predicted recovery factors are the same at 29% for the No Depletion and the Depletion cases for both the old and the new runs. (Please note that there was a typo in the January 24<sup>th</sup>, 2007 submission that incorrectly stated that a bitumen recovery factor of 28% OBIP for the HWCSS cases. The recovery factors were 29% OBIP and Figure 5 attached in that submission correctly showed recovery factors of 29% OBIP for the HWCSS gas cap depletion and no gas cap depletion cases).

The material balance errors involved in the HSAGD cases reported in our January 24, 2007 submission are too large and therefore these results are not acceptable. ***A comparison of the material balance errors and recovery factors for the January 24, 2007 old runs and February 17, 2007 new runs shows how sensitive recovery factors are to the level of material balance errors involved in the these models and underscores the importance of achieving very low material balance errors in these model runs.*** Results of the new cases now show very low and acceptable material balance errors in the order of 1.0 E-03. The two HSAGD cases show a similar bitumen recovery factor of 33% OBIP for the gas cap depletion and no gas cap depletion cases.

Comparison plots of the predicted bitumen recoveries versus time for the January 24, 2007 old runs and the February 17, 2007 new runs are provided in Figures 1 - 6. These results indicate that excessively large material balance errors could lead to erroneous results and conclusions. ***Results of our reruns of Husky's 2D simulation models with liquid rate constraint presented in Table 1 show very low and acceptable material balance errors and indicate that there is no adverse impact of gas cap depletion on HWCSS and HSAGD recovery factors.***

Table 2 presents a list of cases provided by Husky in the output simulation datasets in its submissions. Table 2 also reports the recovery factors and the material balance errors in its STARS simulation log and output files for these cases. Table 2 shows that excessively large material balance errors were involved in all of Husky's reported bitumen production and recovery factors. ***Therefore, all of the results of Husky's simulation cases in its submissions are not acceptable and will definitely lead to erroneous conclusions.***

STARS simulation input and output files of the February 16, 2007 new runs are being provided.

**TABLE 1****EnCana's Run of Husky's 2D Models with Liquid Constraints**

PROCESS	Case Name	Bitumen Recovery Factor (%OBIP)		Material Balance Error (%)	
		Feb 17, 2007	Jan 24, 2007	Feb 17, 2007	Jan 24, 2007
HWCSS	d08gc-2d-Dep200	29.7	29.2	0.15	0.5
HWCSS	d08gc-2d-No Dep	29.3	29.4	0.14	0.7
HSAGD	d07gc-2d-Dep200	32.7	44.5	0.0009	7.9
HSAGD	d07gc-2d-No Dep	33.1	37.4	0.0004	3.5

**TABLE 2****Summary of Husky's Runs taken from Husky's Output ( Log ) Files Submissions****Submission Date: January 08, 2007**

Process	Case Name	Recovery Factor %	Max Material balance error %	Comments
2D HWCSS	d08gc-2d-Dep200	15.6	6.5	No maximum liquid production constraint
2D HWCSS	d08gc-2d-No Dep	27.8	12.0	
2D HSAGD	d07gc-2d-Dep200	34.4	6.2	
2D HSAGD	d07gc-2d-No Dep	33.6	5.9	
3D HWCSS	d08gc-Dep200	<i>Not completed</i>	1.9 (to termination day)	No maximum liquid production constraint
3D HWCSS	d08gc-No Dep	<i>Not completed</i>	2.5 (to termination day)	
3D HSAGD	d07gc-Dep200	<i>Not completed</i>	2.9 (to termination day)	
3D HSAGD	d07gc-No Dep	<i>Not completed</i>	2.7 (to termination day)	

**Submission Date: January 30, 2007**

Process	Case Name	Recovery Factor %	Max Material balance error %	Comments
2D HWCSS	d08gc-2d-Dep200	34.9	6.3	maximum production rate constraint 1500m3/d
2D HWCSS	d08gc-2d-No Dep	40.4	5.4	maximum production rate constraint 750m3/d
2D HSAGD	d07gc-2d-Dep200	41.9	11.7 (Fraction of Newton iterations with matrix solver failures (23%) is too large. Simulation result may not be valid. )	maximum production rate constraint 750m3/d
2D HSAGD	d07gc-2d-No Dep	45.7	11.2 (Fraction of Newton iterations with matrix solver failures (26%) is too large. Simulation result may not be valid. )	maximum production rate constraint 750m3/d
3D HWCSS	d08gc-Dep200	<i>Not completed</i>	2.1 (to termination day)	No maximum liquid production constraint
3D HWCSS	d08gc-No Dep	<i>Not completed</i>	4.0 (to termination day)	
3D HSAGD	d07gc-Dep200	<i>Not completed</i>	10.1 (to termination day)	
3D HSAGD	d07gc-No Dep	<i>Not completed</i>	8.1 (to termination day)	

**TABLE 2 (Cont'd.)****Summary of Husky's Runs taken from Husky's Output (Log) Files Submissions****Submission Date: February 14, 2007**

Process	Case Name	Recovery Factor %	Max Material balance error %	Comments
2D HWCSS	d08gc-2d-Dep200	46.7	5.8 (Fraction of Newton iterations with matrix solver failures (11%) is too large. Simulation result may not be valid.)	maximum production rate constraint 750m3/d
2D HWCSS	d08gc-2d-No Dep	48.4	6.5 (Fraction of Newton iterations with matrix solver failures (14%) is too large. Simulation result may not be valid.)	maximum production rate constraint 750m3/d
2D HSAGD	d07gc-2d-Dep200	41.9	11.7 (Fraction of Newton iterations with matrix solver failures (23%) is too large. Simulation result may not be valid.)	maximum production rate constraint 750m3/d
2D HSAGD	d07gc-2d-No Dep	45.7	11.2 (Fraction of Newton iterations with matrix solver failures (26%) is too large. Simulation result may not be valid.)	maximum production rate constraint 750m3/d
3D HWCSS	d08gc-Dep200	<i>Not completed</i>		
3D HWCSS	d08gc-No Dep	<i>Not completed</i>		
3D HSAGD	d07gc-Dep200	<i>Not completed</i>		
3D HSAGD	d07gc-No Dep	<i>Not completed</i>		

**Submission Date: February 14, 2007**

Process	Case Name	Recovery Factor %	Max Material balance error %	Comments
NOP1-HSAGD-BASE	d17gc-2d-Dep200	27.8	8.3	
NOP1-HSAGD-BASE	d17gc-2d-No Dep	33.0	8.0	
NOP1-HSAGD-WS125	d17gc-2d-Dep200	26.4	6.4	
NOP1-HSAGD-WS126	d17gc-2d-No Dep	28.7	7.0 (Fraction of Newton iterations with matrix solver failures (12%) is too large. Simulation result may not be valid.)	

Figure 1

**Comparison of HWCSS runs (d08gc-2d-Dep200)**

*EnCana's Run of Husky's 2D Model*

**Jan 24, 2007 vs. Feb 17, 2007 runs**

**Caribou Hybrid SAGD**

Entire Field

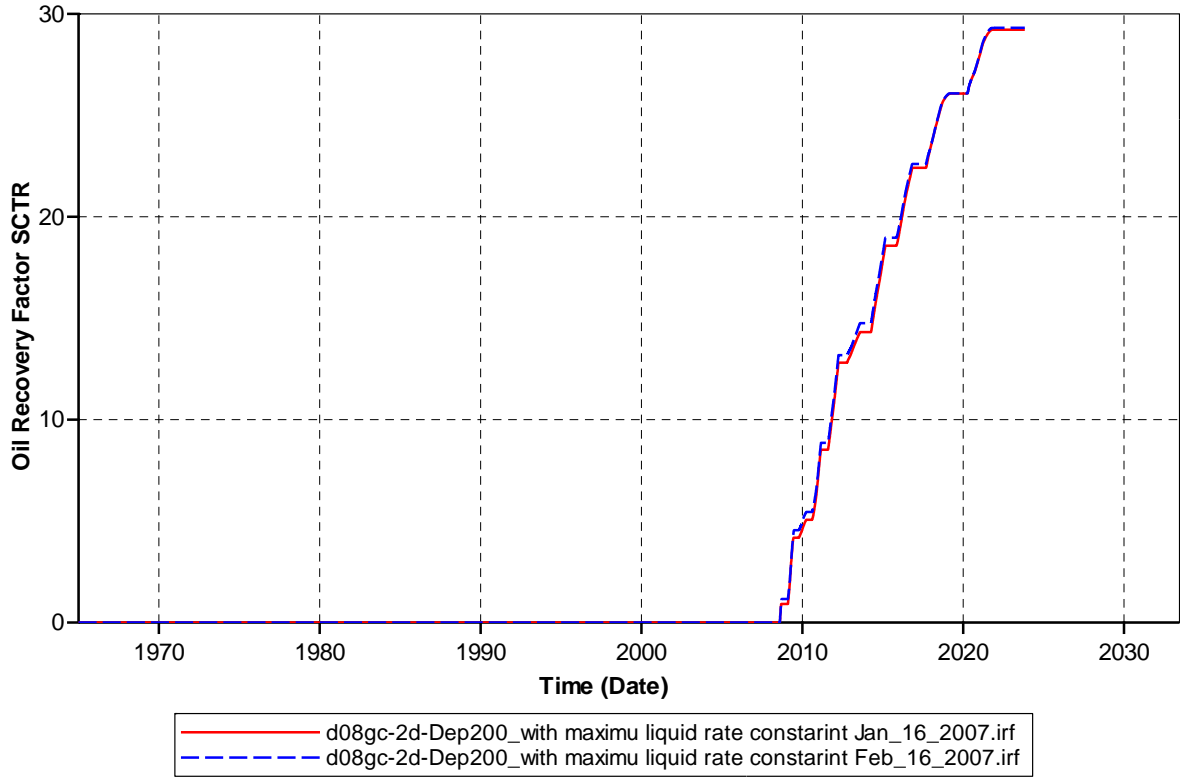


Figure 2

**Comparison of HWCSS runs (d08gc-2d-No Dep)**  
*EnCana's Run of Husky's 2D Model*  
**Jan 24, 2007 vs. Feb 17, 2007 runs**

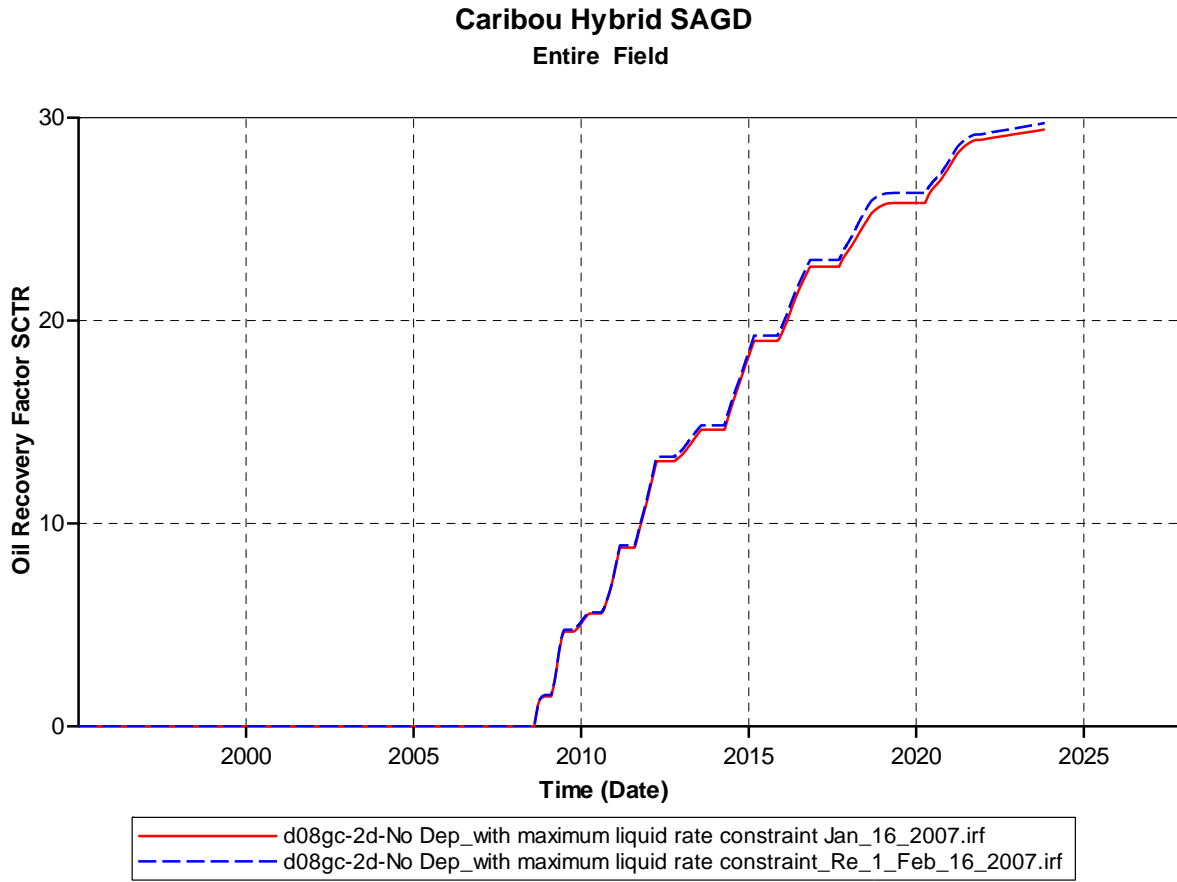


Figure 3

**Comparison of HSAGD runs (d07gc-2d-Dep200)**

*EnCana's Run of Husky's 2D Model*

**Jan 24, 2007 vs. Feb 17, 2007 runs**

**Caribou Hybrid SAGD**

Entire Field

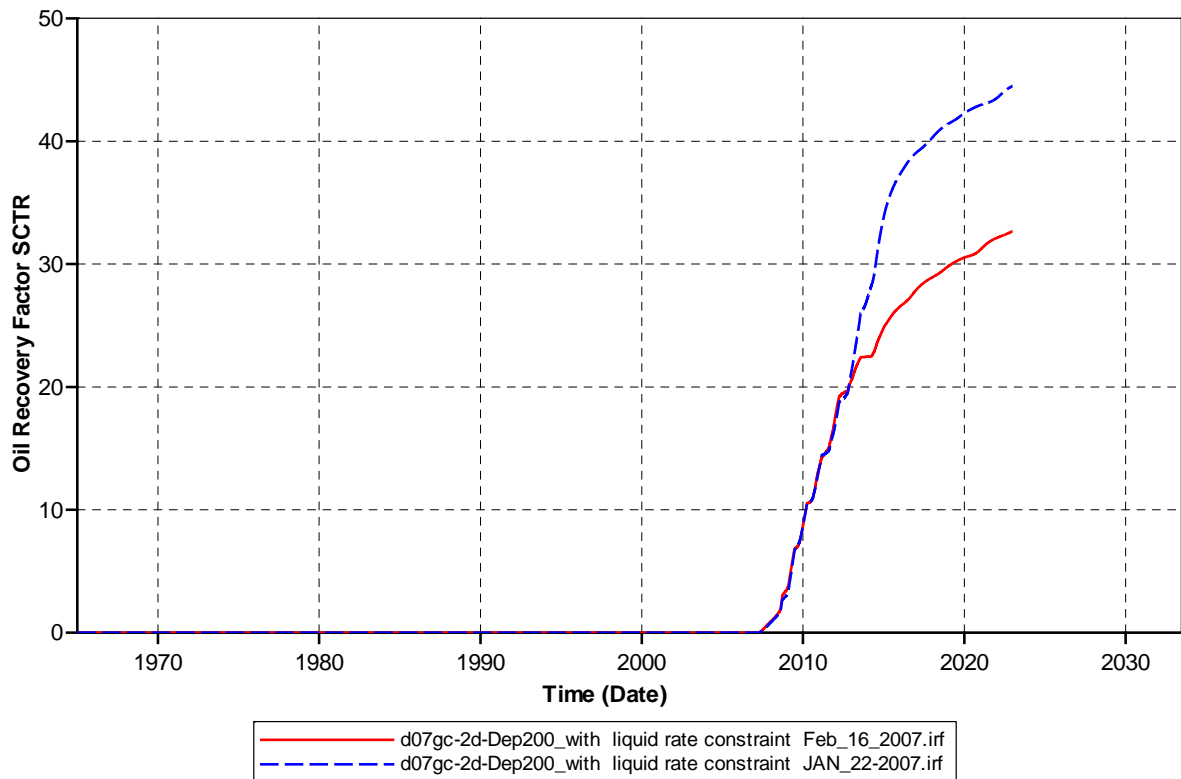


Figure 4

**Comparison of HSAGD runs (d07gc-2d-No Dep)**  
*EnCana's Run of Husky's 2D Model*  
**Jan 24, 2007 vs. Feb 17, 2007 runs**

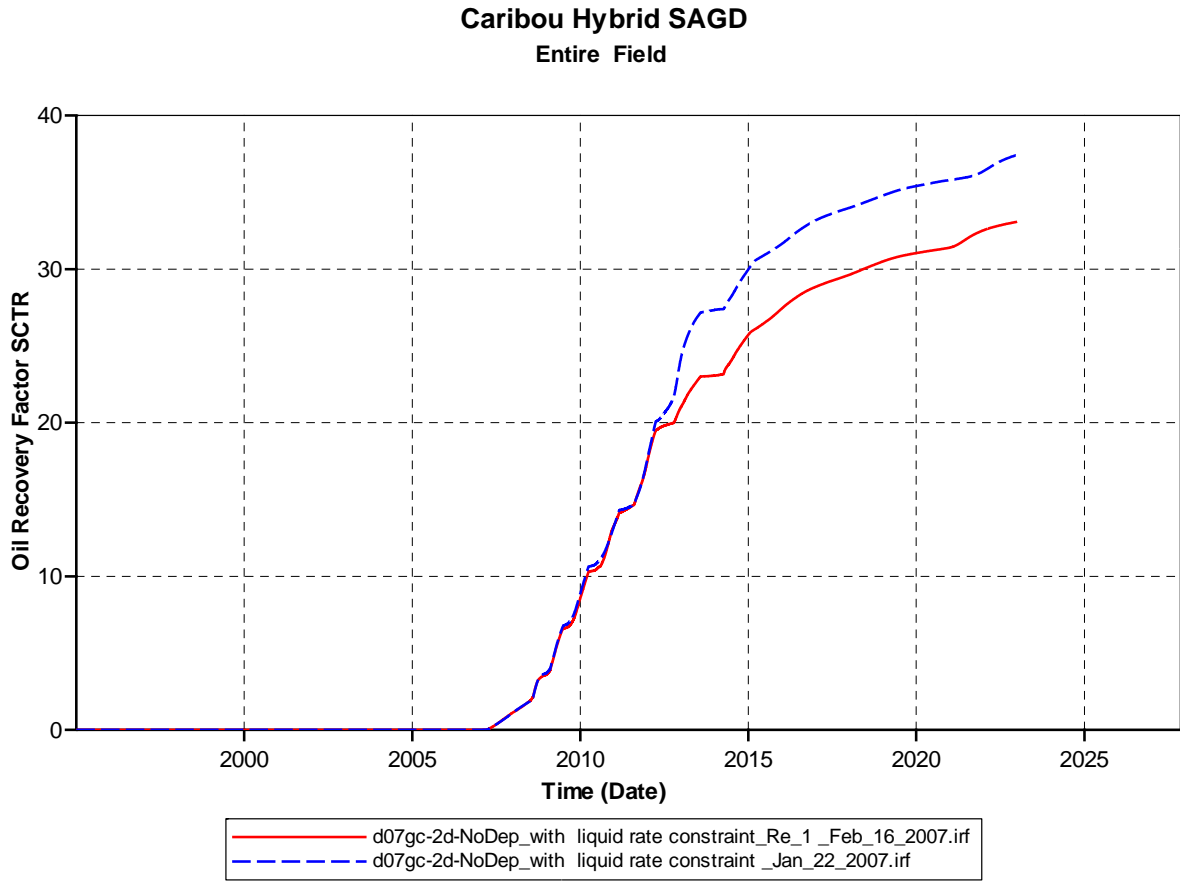


Figure 5

**Comparison of HCSS runs (d08gc-2d-Dep200 Vs No Dep)**  
*EnCana's Run of Husky's 2D Model*  
**Feb 17, 2007 runs**

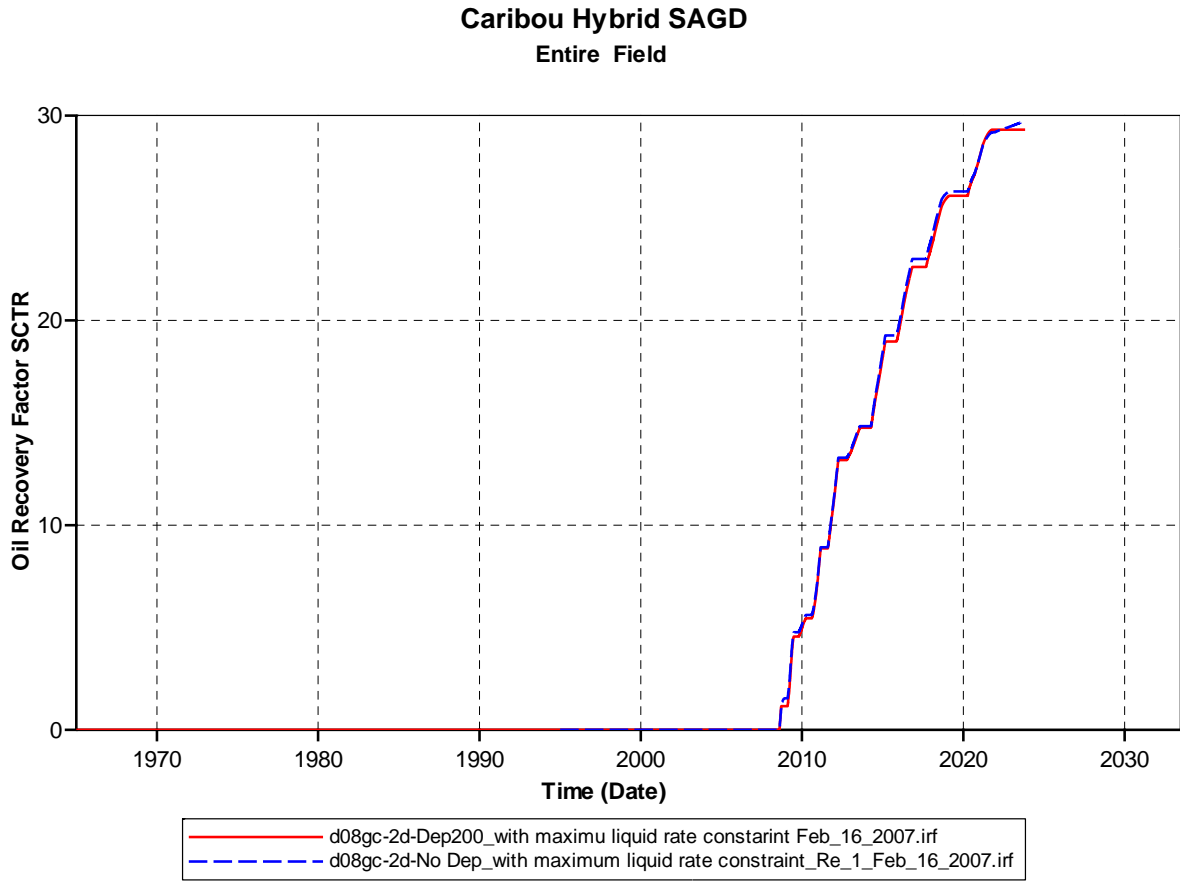


Figure 6

**Comparison of HSAGD runs (d07gc-2d-Dep200 Vs No Dep)**  
*EnCana's Run of Husky's 2D Model*  
**Feb 17, 2007 runs**

