

GEIE
Route de Soultz
F-67250 Kutzenhausen

Production GPK4

05.03.2007 – 09.03.2007

HEX-B correction

Technical Note TN17.22

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S W I S S
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GEO THERMAL ENERGY

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1. Aims

The purpose of this technical note is to calculate productivity index from a production test realised in well GPK4 on the week of 05.03.2007

2. Well model used for Hex-B calculations

Table 1 shows properties of the well GPK4 model used.

Table 1: Borehole/rock model in HEX-B for GPK4 production well

Bore hole parameters					Rock mass parameters		
Nr	Depth section MD [m]		Inner radius [m]	Flow rate [% of injection rate]	Average wall roughness [mm]	Thermal conductivity [W/m K]	Specific heat capacity [J/m ³ K]
	from:	to:					
1	0	1500.	0.11	100	0.15	2.0	2.2 10 ⁶
2	1500	3800	0.11	100	0.15	3.0	2.2 10 ⁶
3	3800	4800	0.11	100	0.15	2.0	2.2 10 ⁶

3. Datas overview

The density of produced fluid is considered as a downhole input data for the HEX_B model (see Figure 1).

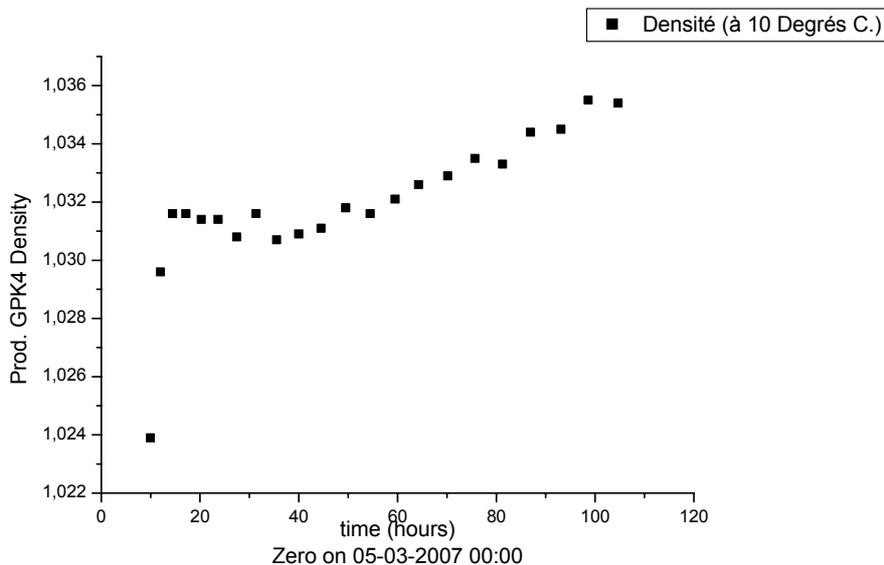


Figure 1: produced fluid density during production test.

The Figure 2 shows flowrate in separator. Flowrates used for the calculation of the downhole overpressure were slightly different; they are multiplied by a coefficient 1.04 in order to take in account the phase change of the produced fluid.

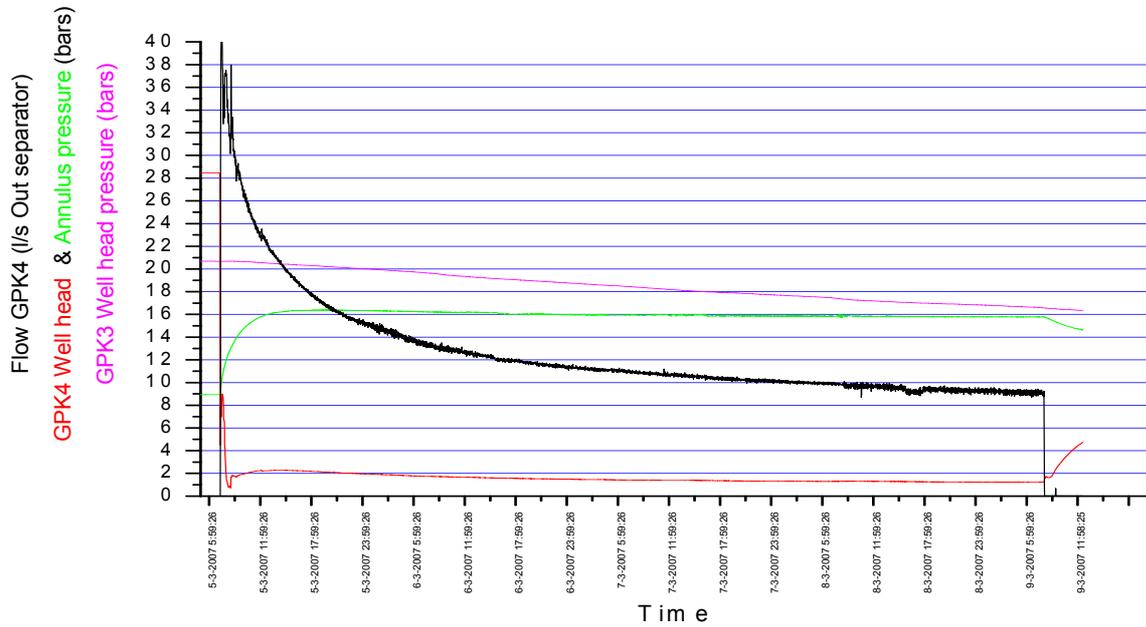


Figure 2: Measured production flowrates and imposed wellhead pressures in GPK4 during production test.

4. Results

The GPK4 correction was run with HEX-B-83. The unique producing entry is at 4768 m MD and at a temperature of 160°C.

Figure 3 shows parameters used in Hex_B for this calculation. Produced density leads to a molality between 0.5 mol/kg and 1.5 mol/kg.

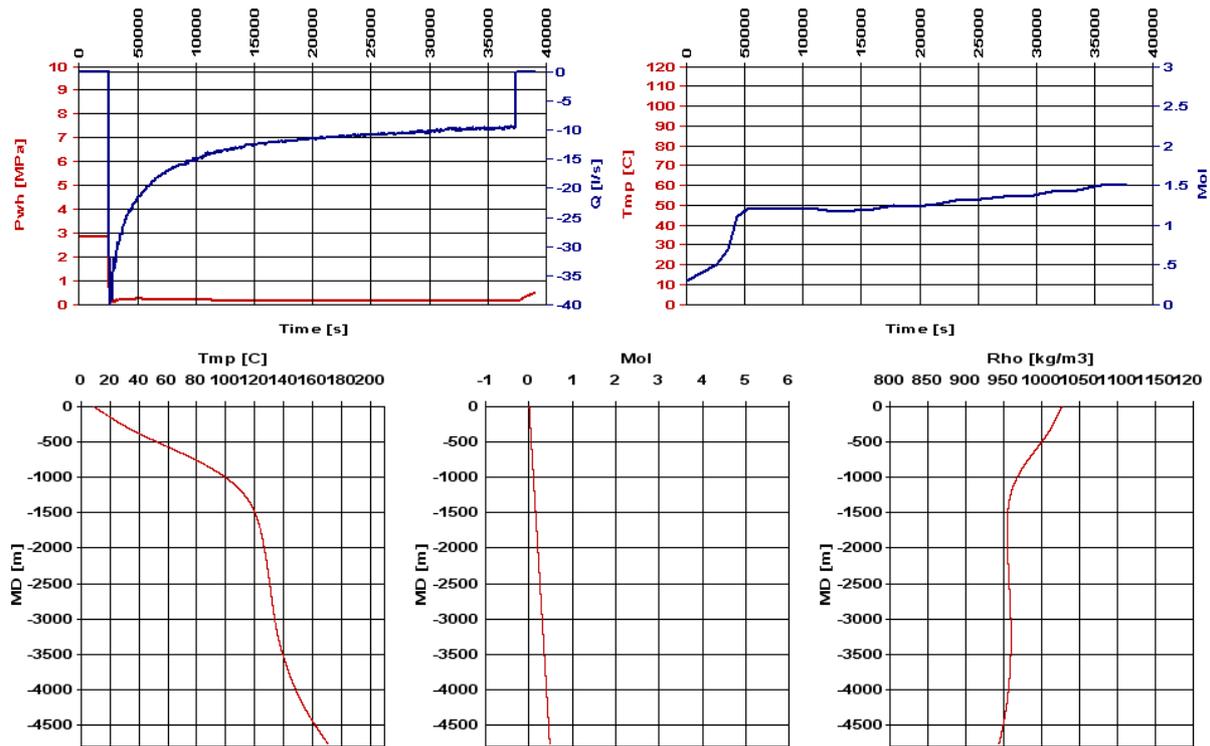


Figure 3: Input and initial parameters of Hex-b, GPK4 production test correction. On top left, wellhead pressure and flowrate; on top right, downhole molality, and on second line, initial temperature, molality and density profiles in borehole

Figure 4 shows results of the calculations. On can make several observations on these results:

- The first 40000 seconds of simulation may be hard to interpretate, because of a lack of density measurements during this period.
- The decrease of flowrate measured during production is completely balanced by the increase of fluid density measured. This results in a remarkably constant computed well productivity.
- A difference of several degrees is observed in the computed produced fluid temperature and the measures. This can be attributed to measurements imprecisions during the test.

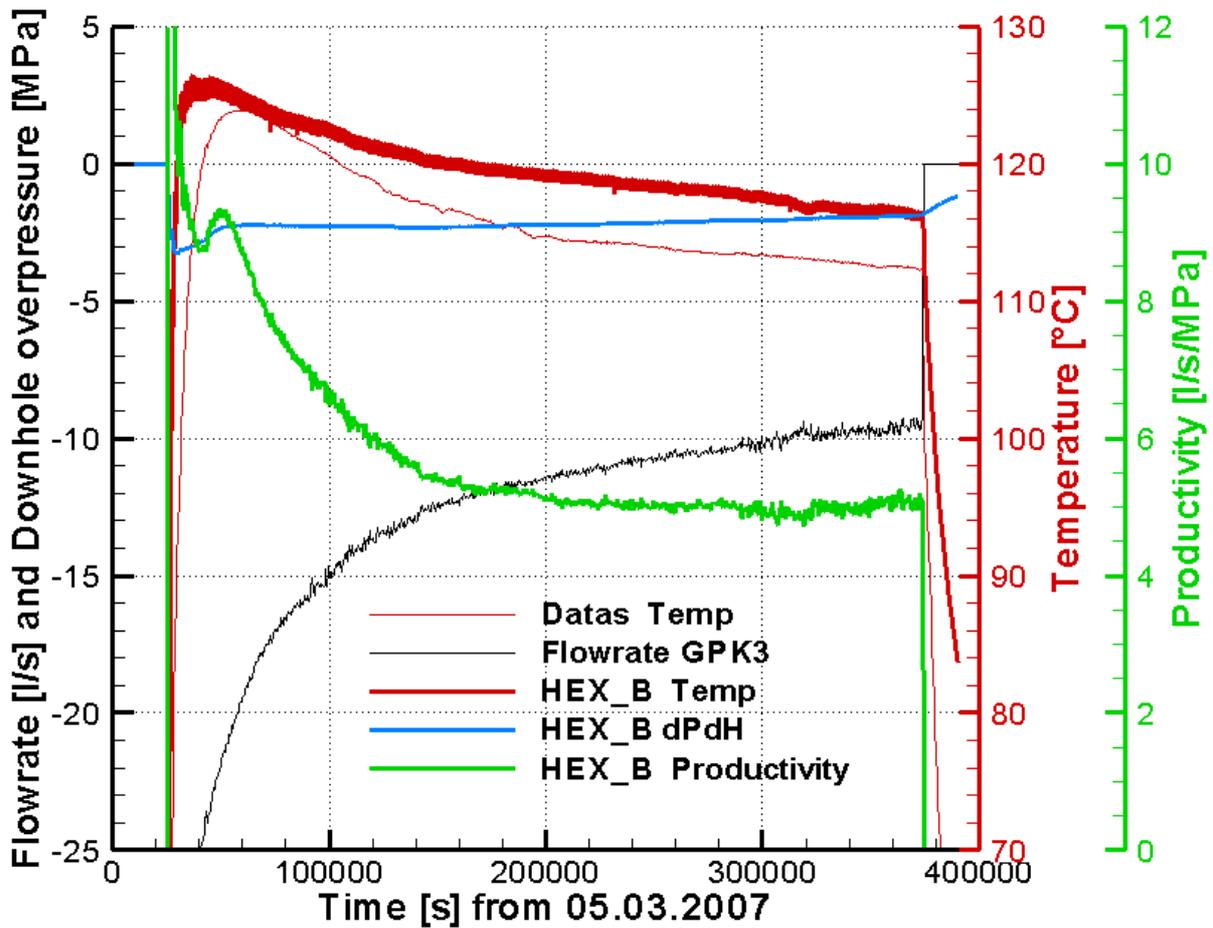


Figure 4: Results of the HEX_B calculations

5. Conclusion

As one can observe on the last figure, the final productivity of the well GPK4 is stable at the end of the production test at a value of 5 l/s/MPa. This represents a relatively good improvement (around 20%) in comparison to the last production test of GPK4, on January 15 (see TN 21), as computed well productivity was computed around 4 l/s/MPa.