

DOWN HOLE PRESSURE & TEMPERATURE GAUGE FOR FLUID LEVEL CONTROL ON A PCP SYSTEM

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Introduction

This application was done in Manantiales Behr Field, REPSOL YPF, well AEA-507. This is a field located 30 miles northwest of Comodoro Rivadavia City, in Chubut's Province.

The field's characteristics are heavy oil, very high viscosity, low production (15-60 m3/day), medium water cut, medium depths (1200 meters) and sand. Besides, the weather conditions are very harsh during the winters, getting below 0 °C.

Problem

Well conditions and free gas on the annular space, generated foam (emulsion), which distorted level measurements with the ecometer from surface, causing over production of the well, and pump damage for lack of fluid.

Solution

A down hole pressure and temperature gauge was installed, to sense real temperature and intake pressure (fluid level). See figure 1. This carrier was run one joint above the pc pump.

The electrical signal was sent to a variable frequency drive that had a PID controller. The PID received the pressure signal, compared with the desired intake pressure, and adjusted the speed of the pump to maintain that set point. See figure 2.

Stainless Steel 1/4" encapsulated cable was used to take the signal up to surface. This cable was protected in each tubing joint, using special cable clamps protectors. See photo.

The fluid level was calculated using an average density of the fluid considering the down hole conditions.

Besides, the variable frequency drive controlled torque, avoiding breaking the rods.

Conclusions

The optimum production rate was found, eliminating failures due to lack of fluid and rods problems. A comparison was done, between the real pump intake pressure (measured by the gauge) and the level shots; finding variations of up to 60%. This information has been extrapolated to other similar wells. See Table 1.

The error in the measurement from surface increases when the intake pressure decreases, because more gas is separated from the liquid causing more emulsion (foam). See Table 1.

Table 1

AEA-507
Density **0,9758**
Depth (meters) **1240**

Ecometer		Down Hole Gauge			Difference (Mts.)	Difference (%)
Fluid Level (mts)	Fluid Level Above Pump (mts)	P _{gauge} (psi)	P _{gauge} (Kg/cm2)	Fluid Level Above Pump (mts)		
976	264	265	18,64	191,0	-73,0	38%
1147	93	80	5,63	57,7	-35,3	61%

Figures



Figure 1. Gauge Carrier



Figure 2. 1" Down Hole Gauge P&T



Figure 3. Cable Protectores

CURRICULUM VITAE:

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High School Degree

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Work Experience

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