Data Automation and Operations Management in Chihuido de la Sierra Negra Field

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Abstract

Chihuido de la Sierra Negra (ChSN) is one of the largest oil fields with water injection as a secondary recovery mechanism in Argentina. Water injection begun in 1993 and proved to be highly successful showing a current RF near 40%, but also shows high water cut values (>96%) that became a major challenge for surface and subsurface teams. Around 1200 wells (producers + injectors) are active today in this field. Formation water is highly corrosive and prone to build up scales.

It is fundamental for field life to develop an integrated monitoring methodology to optimize well operations and maximize oil production. Every day an enormous amount of data is generated both from well interventions and production operations. Data gathering is highly automatized using a specially designed interface among corporate databases. With this tool the time expended by the geoscientists and production engineers to gather data is minimized. In a matter of seconds data from wells are imported to Excel (e.g. rates, strings, perforations, well notes, formation tops, petrophysical properties, etc.).

Oil production and injection are forecasted for each well. Forecasted productions rates are weekly compared to actual values. Analysis is made by well or by group of wells (battery or zone). When an anomaly is detected a working team analyzes data to determine the main causes of the problem, and further activities are scheduled (from injection rate adjust to replacement well proposal).

Activities which require large capital expenditures (e.g. when rigs are needed) are ranked according to two main parameters: reserves and success of well intervention. Both parameters are calculated well by well and an economic analysis is made using this data to assure that more profitable wells are on the top of the list. Finally, rigs are scheduled (weekly) to meet these list criteria.

Also when new technologies are tested, the same economic analysis is made. If it met corporate criteria, this procedure can be used to extend well (and field) life. Depending on well condition, one or more solutions are required to restore injection (or production). Currently the following technologies are being used:

- Annular space gel to seal Casing leaks
- Weak acid to remove scales
- Casing patch as a technique to seal large Casing leaks
- Recase existing wells with non-corrosive plastic pipes.

This integrated methodology has been applied since 2009 and it proved to be profitable under corporate requirements. Reserves are added every year due to the fact that decline rate is maintained or even diminish.