



GAS LIFT WELLS

It is now well known from previous projects that the precipitation rapidly appears within the production riser tubing in Gas Lift Wells. This is all due to the adiabatic effect which is a phenomenon which occurs when gases expand causing a temperature drop after being injected into the production tubing riser under pressure.

The oil as it leaves the formation is under pressure, and as such the gas contained within the oil stream is also under pressure. Injected gas is driven into the production tubing adding to the gas content already present in the oil stream. The net result is that there is a pressure drop on the riser tubing, and the combined compressed gas takes advantage of this, and rapidly expands. This rapid expansion creates a temperature drop due to the adiabatic effect, and this is why there is a sudden appearance of precipitation within the riser tubing which is the root cause of the problem.



Paraffin precipitation has a direct effect on the oil by raising the viscosity, along with Wax deposition on the flow line pipe walls. It gathers solids entrained in the oil stream due to its adhesive effect, therefore reducing the capacity of the same. The changes to the 3 (three) elements are the prime causes of flow reduction all a direct result of paraffin precipitation.

The treatment is a controlled dosage program which consists of being an injected dose of 200 PPM, calculated against the total liquid production rate, by volume, into the gas-injection stream.

This regime has proven to provide an immediate cancellation of new paraffin precipitation, with the residual FloWell removing existing deposits (legacy precipitation) in the tubing, and flow lines. Paraffin precipitation is a direct effect of temperature reduction, in the assets, to below the Wax Appearance Temperature (W.A.T.), and FloWell eliminates this process. Future monitoring, testing, and ongoing deliberations could show the possibility of reducing the injection rate to a measurable amount that will just eliminate paraffin precipitation as cleaning is no longer required.



For the success of any Gas Lift Well project, FloWell is injected into the gas-lift stream then as the oil flow is driven up the production tubing, the pressure drops, the rapid expansion of the gases (the instigator of the problem) creates enormous amounts of turbulence.



FloWell takes advantage of this, as turbulence causes the rapid distribution of FloWell within the oil stream meeting the paraffin, and eliminating its ability to precipitate whilst slowly, and silently, returning existing deposits to liquid phase. Once this has occurred the paraffin will remain in liquid phase through the remainder of the assets, and all the way to the refinery.

With regard to the existing dosing equipment, and attachment points already in existence, where we have often found that xylene, and/or PPD is used in combination to remove precipitation, it is required to identify if this equipment together with its injection point will be suitable for the injection of FloWell. As these pumps are already used to pump aggressive fluids, they will have no issue in being suitable for pumping the relatively mild solution of FloWell.

However, the injection point, once identified may/may not be suitable for the injection point for FloWell, and a decision would be made after further examination. A further requirement is that the pumps be capable of pumping the much-reduced ratio of FloWell, and if not, will need to be replaced with smaller capacity pumps.

Once the treatment program is completed, and the preventative dose is continuously applied, then improved production can be anticipated due to the continuous elimination of paraffin wax precipitation. The subsequent decrease in related viscosity is due to paraffin being maintained in the liquid phase. Wax scraping requirements will become a 'thing of the past'.



Recent project report.

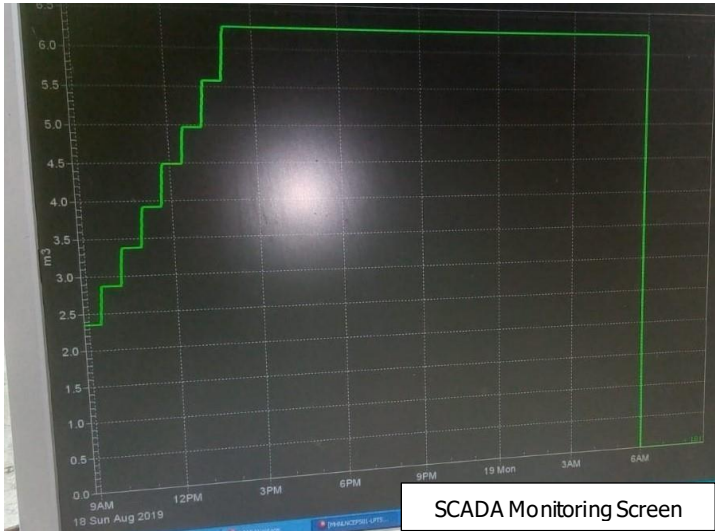
A recent project was undertaken on a gas lift well which was producing 7 m³ average production daily. The well had a duty cycle of five minutes production with a recovery time of 45 minutes. The well was due for a work over, and as there was a period of two weeks before this work over was due, it was decided to take the opportunity of applying the FloWell solution.

When this well was scraped of paraffin precipitation it achieved a flow equivalent of 18 m³ average production daily which quickly reduced over the next 24hrs – 48hrs to almost 0. The appearance of paraffin precipitation was so immense that a scraping of the well had to be completed every two days.

FloWell was injected into the gas stream prior to entry into the well at a rate of 200 PPM. Injection was only performed when the gas flow was switched on for the five-minute period to ensure overdosing of the well did not happen. This injection began directly after wax cutting.

Two days later when the wax cutting crew arrived at the wellhead, they were astonished to discover that there was no new precipitation. Not only was new precipitation eliminated, the flowrate of oil, when it was usually close to 0, was a healthy 16.2 m³ average production daily.

Over the next 12 days there was no precipitation found each time the wax cutting operation was performed. It had been decided to examine the well on the same basis as the normal operation was performed, because there were two other wells on the same site requiring the same procedure.



On the final day before the well was due to be closed for the work over, it was reported that flow had ceased. This caused a worry until the SCADA flow monitoring was examined.

It was discovered that prior to the flow ceasing, there had been a period of gradual build-up in flow to the point where the monitoring recorded a flow rate of 6.3 m³ for 21 cycles.

An examination of the well brought the discovery that all legacy precipitation had been returned to liquid phase, and the previously reduced bore, due to this precipitation, (which was around 1 inch – 1.1/4 inch), was no longer restricting the flow, and the production tubing had been returned to full capacity.

This was proof that the FloWell solution had not only eliminated new paraffin precipitation but had also returned all legacy precipitation to liquid phase thoroughly clearing the production tubing.

The cause of the zero flowrate was due to overproduction, and had completely drained the casing of oil. It took nearly 8 hours for the well to recover sufficient oil to enter the production tubing to enable the flow to continue. Even so it took only three minutes to remove all the oil that had accumulated over this period which meant a new pumping cycle regime had to be calculated.

The following day the well was shut-in for the essential maintenance work to be done, and no further information from this project has been received. Unfortunately, we have not received permission to disclose either the client or the location of this project, but we were at liberty to provide the picture of the improved flow from the SCADA readout.